

The background features a large, light blue hexagonal grid. Within the grid, there are several silhouettes of people in various professional roles: a nurse, a person with a stethoscope, a person with a clipboard, a person with a hand truck, a person with a shopping bag, a police officer, and a person with a tablet. The silhouettes are in shades of blue and green, matching the grid's color scheme.

Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

2018

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December 13, 2018

Dear Honorable Governor Wolf and Fellow Members of the Pennsylvania General Assembly:

The massive obligation facing Pennsylvania within the state's two largest public employee pension funds may not be readily apparent to most, yet the impact is felt by every Pennsylvanian. The numbers are difficult to comprehend and the effect of over \$60 billion in pension debt manifests itself in much more than dollars and cents. Core government services are affected; from protecting our most vulnerable and aging citizens to maintaining our highways and funding our schools. The resulting tax burden on property owners, families and businesses is substantial.

In recent years, policymakers have placed greater scrutiny on pension investment fees. A study conducted by the Maryland Public Policy Institute showed Pennsylvania's investment expenses for 2012 were the 3rd and 4th highest among a peer group of 47 other state pension plans, with returns lagging behind most. In a 2014 conversation with then-Budget Secretary Charles Zogby, he indicated his staff had done some research into the investment fees paid by SERS and PSERS. His office determined the costs were substantial; nearly \$1 billion between the two systems, and the returns were not outsized. Support for an analysis of these fees has grown and compelled the systems and policymakers to look at this issue more seriously.

Through pension benefit reform legislation, Act 5 of 2017, the Public Pension Management and Asset Investment Review Commission was given a broad mandate to examine and make recommendations regarding investment fee transparency, pension system stress testing, active versus passive investment strategies and performance.

The report identifies positive steps that have been taken by SERS and PSERS. The Commission commends PSERS for its recent stress-testing report and its acceptance of a standard financial industry template. SERS is to be commended for maintaining rigorous fund-level benchmarking and for conducting regular transaction cost analyses, yet more can be accomplished.

Included in the findings are several areas of concern. For example, it is estimated that total fees, revenue share and investment expense for PSERS in fiscal year 2016-17 were greater than all employee contributions to the system during the same period. Also, an analysis of the systems' performance among 52 U.S. public pension plans by the Commission's consultant shows that PSERS and SERS ranked poorly in 10-year investment return performance.

A significant charge of the Commission has been to develop recommendations to reduce expenditures that will generate actuarial savings of \$3 billion over a 30-year period. Some may minimize the impact of the report's recommendations, citing that immediate relief is needed. However, the nature of these long-term obligations and what has often been a short-term perspective has helped lead us into this crisis. Perhaps the Commission's most significant finding is that the report identifies potential actuarial savings of nearly \$10 billion over the projected period.

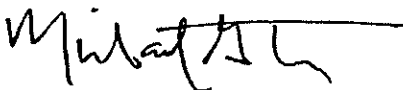
To put this number into perspective, consider the following; the average retirement benefit provided by the systems today stands at approximately \$25,500 per year. If that average increases threefold to reflect inflation over three decades, \$10 billion in savings equates to the benefit payments of thousands of employees. The payments are not due immediately, but our responsibility to fund them is. Our need to improve performance is imperative. A careful, thoughtful and disciplined approach is required and the expectation for world-class performance must be our mindset.

The ultimate responsibility for establishing and maintaining SERS and PSERS falls squarely on the shoulders of the General Assembly. As such, it is both the purview and responsibility of the legislature to respond to the effectiveness of these systems, establish mechanisms for independent examination and ultimately, consider legislation to implement meaningful reform.

It is my pleasure to present the report which follows. Many testifiers pointed to the formation of the Commission as ground-breaking and a potential template for other states, since Pennsylvania does not stand alone in its struggle to pay the cost of retiree benefits. The Commission members, who serve with varied expertise, perspective, background and resources, have contributed greatly to this undertaking. The findings would not be as extensive without the work of our consultants, the Joint State Government Commission, testifiers and dedicated staff. Treasurer Torsella, Vice Chair of the Commission, called upon his vast network in order to establish panels of extremely competent experts and his office oversaw much of the compilation of this document. I also thank the Speaker of the House of Representatives for the opportunity to work with these exceptional groups of people.

Hindsight in investing is 20/20 and past performance is not an indicator of future results. However, it has been pointed out by many that the only certainty over which we have control is cost. It has not been proven that higher investment fees have resulted in increased returns, or have reduced risk. Markets are changing, transparency is becoming more commonplace, and a greater degree of fiduciary responsibility lies with everyone in the process. The work of this Commission offers the potential for great improvement in all of these areas. The effective execution of its recommendations will, without doubt, improve our ability to provide for our workforce, reduce the burden on our citizens and position Pennsylvania as a leader in fiscal stewardship.

Sincerely,



Representative,
Michael G Tobash
Chairman, PPM AIRC



TREASURY DEPARTMENT
COMMONWEALTH OF PENNSYLVANIA
HARRISBURG, PA 17120

JOSEPH M. TORSELLA
TREASURER

December 2018

Letter from the Vice Chairman

It is my pleasure to present the final Report and Recommendations of the Public Pension Management and Asset Investment Review Commission. Established pursuant to Act 5 of 2017, the Commission was charged with the ambitious mandate to comprehensively review the investment operations of the Commonwealth's two largest public retirement funds, with the goal of identifying efficiencies and best practices in pension fund management. The attached Report provides a detailed analysis of past practices and the performance of each retirement system and outlines improvements to be considered by the General Assembly, the two systems and other policymakers.

At the onset, I wish to thank Governor Wolf for the privilege of serving on this Commission, my fellow Commissioners for making that service so productive and gratifying, and the Commission's Chairman, Representative Michael Tobash, for his patient and thoughtful leadership.

The Commission was able to identify significant cost savings measures which, if implemented, have the potential of providing nearly \$10 billion in actuarial savings over the next 30 years for both retirement systems. Those savings would represent an improvement to each fund's financial position, benefiting both retirement system members and state taxpayers.

In addition to these cost-savings initiatives, the Commission has also recommended important reporting and public disclosure enhancements intended to encourage greater public transparency of investment expenses, performance, and performance benchmarks and call attention to areas of portfolio risk.

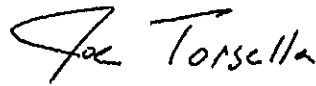
Two policy principles are repeated throughout the Commission's Report – costs and transparency matters. Both of these concepts are fundamental to prudent fiduciary oversight. Unlike economic and market conditions that are difficult, if not impossible, to predict, costs and expenses are well within the control of fund managers. Likewise, clear, open and detailed reporting of investment fund metrics, including expenses, performance, risks and robust benchmarks, is critical to informed and well-considered decisions.

My hope is that this Report represents the beginning, not the end, of an important and overdue conversation about public institutional investment management. An open and vigorous

conversation is not only important for Pennsylvania, given the challenges facing the Commonwealth's two retirement funds, but also has relevance for public institutions across the country.

Public pensions represent a promise of a secure retirement to those who dedicate their lives to public service. The attached Report is an important step in ensuring this promise is kept.

Sincerely,

A handwritten signature in black ink that reads "Joe Torsella". The signature is written in a cursive style with a large, stylized initial "J".

Joseph M. Torsella
State Treasurer

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LIST OF ACRONYMS APPEARING IN THIS REPORT

1. **ACWI** – All Country World Index
2. **ADC** – Actuarially Determined Contribution
3. **ARC** – Annual/Actuarially Required Contribution
4. **AUM** – Assets Under Management
5. **BPS** – Basis Points
6. **CAFR** – Comprehensive Annual Financial Report
7. **CIO** – Chief Investment Officer
8. **CPI** – Consumer Price Index
9. **CY** – Calendar Year
10. **DCIO** – Deputy Chief Investment Officer
11. **GASB** – Governmental Accounting Standards Board
12. **GP** – General Partner
13. **HY** – High Yield
14. **IBOR** – Investment Book of Record
15. **IFO** – Pennsylvania Independent Fiscal Office
16. **ILPA** – Institutional Limited Partners Association
17. **IMA** – Investment Management Account
18. **IMI** – Investible Market Index
19. **IRR** – Internal Rate of Return
20. **LDI** – Liability Driven Investment
21. **LP** – Limited Partner
22. **MIFID** – Markets in Financial Instruments Directive
23. **MLP** – Master Limited Partnerships
24. **MSCI** – Morgan Stanley Capital International
25. **NASRA** – National Association of State Retirement Administrators
26. **NCREIF** – National Council of Real Estate Investment Fiduciaries
27. **ODCE** – Open-end Diversified Core Equity
28. **OECD** – Organisation for Economic Cooperation and Development
29. **PE** – Private Equity
30. **PME** – Public Market Equivalent
31. **PPMAIRC** – Public Pension Management and Asset Investment Review Commission
32. **PMRS** – Pennsylvania Municipal Retirement System
33. **PSERS** – Pennsylvania Public School Employees' Retirement System
34. **REIT** – Real Estate Investment Trust
35. **SBA** – State Board of Administration (Florida)
36. **SDIC** – South Dakota Investment Council
37. **SERS** – Pennsylvania State Employees' Retirement System
38. **SPIVA** – S&P Indices Versus Active
39. **SWIB** – State of Wisconsin Investment Board
40. **TCDRS** – Texas County & District Retirement System
41. **VC** – Venture Capital



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

EXECUTIVE SUMMARY

Executive Summary

The Report and Recommendations of the Public Pension Management and Asset Investment Review Commission (Commission) marks a significant milestone in the 100 year history of the Commonwealth's commitment to ensure a secure retirement for its public servants and educators. As the first independent and detailed review of Pennsylvania's public pension systems' investment operations, with the stated goal of identifying cost savings opportunities, the Commission's Report and Recommendations provide an important roadmap to stakeholders and policymakers for the modernization and improvement of public pension management, investment benchmarking and execution, and the clear reporting of investment expenses, performance and risk. Broad in scope, the recommendations contained in this report identify an **estimated annual savings opportunity, for both state retirement systems, of \$97.3 to \$116.8 million. Expressed as actuarial savings over 30 years at the 7.25% assumed rate of return, the estimated savings opportunity would be between \$8.2 and \$9.9 billion.**

In arriving at its recommendations, the Commission conducted three public hearings and received the testimony of national and international academic experts, experienced institutional investment professionals, state pension fund managers and representatives from the Pennsylvania Public School Employees' Retirement System and the State Employees' Retirement Systems. Countless pages of studies, reports, presentations, articles and records from other jurisdictions were submitted to the Commission for review. Overcoming substantial challenges in accessing retirement system records, possessing limited resources and working within a limited time frame, the Commission was able to identify and detail important steps necessary to improve the operating efficiency and the effective management of the retirement system funds.

While the Commission was careful to draft a report that was well sourced and accurate, there are two important caveats – first, as a consequence of limited access to each systems' investment records, expenses and performance data, the Commission was compelled to rely upon outside sources, make reasonable assumptions and perform independent calculations. Doing so may have resulted in some inaccuracies or misstatements. However, any such variances are not intentional and do not detract from the general conclusions or assertions contained in the report. Pinpoint accuracy is unnecessary to demonstrate general under or over performance, or comparatively high expense ratios.

Secondly, the conclusions and recommendations contained herein are not intended to cast blame on past policies or decisions by either system. Hindsight, as the saying goes, is always 20-20. Accordingly, the Commission does not wish to second guess any decision made in good faith under circumstances that may no longer exist. Rather, the Commission's recommendations are forward looking, and conclusions are made in the service of insight: understanding past and current experience in order to chart a better course for the future. It is the objective of these recommendations to encourage improvements and foster a management culture that facilitates the adoption of "best practices" that will enhance the ability of the retirement systems to satisfy the retirement needs of future generations of public employees.

To be clear, there are many things that both retirement systems do and have done well. PSERS has adopted important elements of stress testing protocols, and has adopted policies that promote greater transparency as compared to other retirement systems. PSERS has embraced passive-based investing strategies for public equities, and has recently reported fully on "carried interest" costs of private investments. SERS is commended for acknowledging that "costs matter," for adopting comparatively robust benchmarks, and for purposefully adopting a strategy that has reduced investment expenses of their overall investment portfolio. Additionally, it is acknowledged that there are significant factors that are outside the control of either system, most significantly the Commonwealth's disruptive payment history of its portion of the actuarially determined amount to fund each pension fund.

The Commission also found, however, that both funds have underperformed relative to peers, and have “consistently underperformed simple multi-asset portfolios” on a risk-adjusted basis. While costs have decreased by over 50% over a ten-year period at SERS and are now approaching peer group averages, both funds have higher-than-average expenses. PSERS is among the highest-cost public pension funds and its selected benchmarks appear less rigorous compared to peers. The Commission also noted significant areas of risk in current allocations, practices, and strategy, especially around illiquidity, complexity and leverage: at one fund, by a standard measure, risk has nearly doubled.

In general and without limiting the detailed recommendations contained herein, the Commission’s recommendations to the General Assembly, the Governor and to the trustees of each of the two retirement system boards include:

- **Maintaining full payment of the annual actuarially determined contribution amount** necessary to fund each public pension plan as doing so is fundamental and required to ensure the future financial viability of both retirement systems. The Commission acknowledges and commends both the General Assembly and Governor for making this requirement a budgetary priority. Without full annual funding, none of the following recommendations will be sufficient to ensure the availability of retirement benefits for future generations of public servants.
- **Establishing a Consolidated Central Pension Investment Office** that would be exclusively responsible for all investment functions on behalf of and as directed by each retirement system. The Office would be staffed by investment professionals who would act in a fiduciary capacity on behalf of each state retirement system. The Office would leverage the combined size of the Commonwealth’s two pension funds to obtain more favorable investment contract terms, eliminate redundancies between the two retirement systems and develop internal capacity.
- **Enacting legislation mandating annual stress testing** of each retirement system in a manner that is aligned with the recommendations of the Society of Actuaries Blue Ribbon Panel and publicly reporting, including to the trustees of each board, the findings of such stress tests.
- **Establishing policies at both system boards that favor and encourage open public reporting best practices**, including, without limitation, public reporting of and access to all investment costs and expenses at fund and manager level, full disclosure of all costs of private market investments, quarterly investment performance by asset class (net-of and gross-of-fees) as measured against robust benchmarks, investment manager expense terms and materials submitted to board trustees during open meetings.
- **Enacting legislation mandating, as well as the repeal of existing laws that frustrate, increased public reporting of all investment expenses** (gross fees), total fund and asset class investment performance (net of fees and gross fees) as measured against similar risk alternative indices and benchmarks, disclosure of investment manager contract expense terms and mandate that all investment managers use the Institutional Limited Partner Association reporting template. Legislation should include the repeal of the Right-to-Know Law loophole that permits SERS to avoid disclosing alternative investment records.
- **Moving to fully index all public market investments in both equities and fixed income at both retirement systems.** The Commission heard compelling evidence demonstrating that active management of public securities underperforms, net of costs, in all sectors over the long term when compared to the appropriate risk adjusted index benchmark, and that there is no “persistence” of manager outperformance or reliable way to select outperforming managers in advance.

- **Adopting, at both retirement systems, measures to reduce risk**, including: revised Investment Policy Statements that include a “risk budget;” specific rebalancing policies; a diversified index policy benchmark; setting limits on the level of illiquid investments; reducing exposure to illiquid private investments from current targets to more appropriate levels at both funds; and, paying particular attention to levels of leverage and illiquid investments at PSERS, which were identified as a “significant outlier” relative to peer funds.

Additional recommendations to encourage diverse emerging manager selection, expanded use of the Commonwealth’s procurement process, and other operational efficiencies.

The General Assembly’s charge to the Commission was ambitious, directing the completion of a study and report on current pension system investment strategies, the benefits of active and passive investment strategies, alternative strategies, and the reporting of expenses, performance and risks. The Commission was also requested to publish detailed findings on – assets, returns, financial managers, consultants, requests for proposals and investment performance measured against benchmarks. In addressing these issues, the Commission identified two common policy principles that serve as the foundation for each recommendation – cost efficiency and increased transparency.

Costs Matter

Throughout this Report, the Commission has focused on investment costs and expenses. At an early stage, the Commission recognized that, as with most business enterprises, “costs matter.” Measuring and managing, and the disclosure of, costs, fees and expenses associated with the execution of differing investment strategies has assumed increasing importance to most institutional investors. The Commission is not alone. In fact, according to a recent survey by *Private Equity International*, 65% of all surveyed private equity investors have requested greater fee transparency from General Partners over the past year, with 63% of those surveyed agreeing that “fees charged by private equity funds are now difficult to justify.”ⁱ

Unfortunately, the Commission confronted the persistent belief that when making investment decisions, “you get what you pay for.” The fact is, there is no established correlation between high fees and high performance in modern investment management.ⁱⁱ Such a claim is premised on the concept that excess returns – so-called “alpha” – can be bought. They cannot. The Commission was presented with an abundance of evidence from academics that when strategies are properly adjusted for risk – leverage, illiquidity, and specific exposures – most managers underperform low cost alternatives. The assumption that high fees are a predictor of outperformance is not only wrong, but dangerously misleading when included in any serious investment management discussion.

Future economic events, market behavior and ultimately investment performance cannot be accurately predicted or controlled. However, expenses and costs are controllable. Accordingly, a focus on costs and an effort to identify strategies to reduce investment expenses has been a polestar of the Commission’s work. Beyond the statutory directive to the Commission to identify expenditure reductions to generate actuarial savings of at least \$1.5 billion over thirty years for each of the two retirement systems, the Commission sought to recommend strategic and structural changes, that if adopted, would substantially exceed this goal, as directed by Act 5’s language to recommend “the lowest amount of investment fees to be paid. . .”. Pursuing more cost efficient investment strategies, renegotiating existing fee terms, developing greater internal capacity and eliminating operating redundancies between the two retirement systems by creating a new Central Investment Office provides both pension systems the opportunity to conservatively create between \$8.2 billion to \$9.9 billion in total projected savings – and therefore a corresponding improvement in the position of the funds -- over a 30 year period.

In particular, these cost savings recommendations include:

ESTABLISHMENT OF A CENTRAL INVESTMENT OFFICE FOR SERS / PSERS		FIRST YEAR PROJECTION (MILLION DOLLARS)
Elimination of redundant expenses		9.0
In house management of indexed equities and fixed income		1.8
Leverage size for reduced external costs (PE)		10.2
TOTAL 30 YEAR ACTUARIAL SAVINGS		\$2.1 BILLION
SERS ESTIMATED SAVINGS OPPORTUNITIES		FIRST YEAR PROJECTION (MILLION DOLLARS)
Renegotiate existing public equity contracts		4.9
OR, index all public equity contracts		12.8
Indexing of existing fixed income contracts		4.5
Renegotiate existing private equity contracts upon reinvestment		12.2
PSERS ESTIMATED SAVINGS OPPORTUNITIES		FIRST YEAR PROJECTION (MILLION DOLLARS)
Renegotiate existing public equity contracts		4.9
OR, index all public equity contracts		17.2
Indexing of existing public fixed income contracts		1.8
Indexing of private high yield LPs		42.5
Renegotiate existing private equity contracts upon reinvestment		15.5
TOTAL 30 YEAR ACTUARIAL SAVINGS FOR SERS/PSERS		\$8.2 – 9.9 BILLION²

Transparency Matters

A second important principle that guided the Commission’s work is an understanding of the important connection between clear, complete, accurate and open reporting of investment data and well-considered decisions by trustees, management, stakeholders and policy makers. Peter Drucker, credited as the founder of modern business management, was fond of saying that “you can’t manage what you can’t measure.” The same can be said about investment expenses, performance and risk: if you cannot account for and measure each of these elements, investment funds cannot be prudently managed. As one consultant writes in this report, a lack of transparency “serves only one party’s interests: the asset manager’s.”

The Commission noted the efforts of other peer pension systems to make available, publicly, information and data involving investment and portfolio expenses, and performance history at asset, sub-asset and manager levels. In some cases, pension systems in other jurisdictions go as far as providing investment manager performance score cards and ranking. Practical improvements such as publicly posting board meeting materials (as in Alaska, California, Montana, Florida, Texas and Wisconsin), video recording of system

⁽²⁾ Low end of savings range based on renegotiating current mandates; higher end of range based on indexing mandates and estimated using high end of possible fee terms in order to arrive at conservative estimates (meaning, savings from indexing could be higher). Private Equity and High Yield savings of \$12.2, \$42.5, and \$15.5 million per year described above based on 5-year implementation period (see “Cost Savings” chapter). Savings for “Leverage size for reduced external costs (PE)” not included in total range of \$97.25 to \$116.83 per year or the \$8.2 to \$9.9 billion of accumulated savings over 30 years out of abundance of caution as there is overlap in mandates under estimates for “Renegotiating existing private equity contracts upon reinvestment.” 30 year total estimates determined using results in “Cost Savings” chapter and/or the future value of the first-year savings over 30 years using the 7.25% assumed rate of return. Present value of savings is between \$1 and \$1.2 billion at 7.25% rate and \$2.8 and \$3.4 billion at a 3.6% rates referenced in actuarial note for Act 5.

meetings (as in Arizona, New Mexico, South Carolina, Tennessee, and Texas), manager level performance reporting (as in Arizona, Louisiana, Michigan, Minnesota, Nebraska, New York and Washington), detailed performance reports of alternative investments (as in Connecticut, New Mexico, New York City, Los Angeles and Nebraska), publication of all fee, cost and expense terms of investment management contracts (as in Louisiana, New Jersey, Nebraska, Rhode Island and South Dakota) and all fees paid per investment manager (as in Illinois, Maryland, Missouri, North Carolina, North Dakota and South Carolina) are recommended in order to elevate the Commonwealth's retirement systems to national leadership in fund management transparency.

Unfortunately, current state laws are a roadblock against greater open access to pension fund investment records. Embedded within each system's retirement code are statutory provisions that permit both systems to broadly shield any "sensitive investment or financial information" from public disclosure pursuant to a Right-to-Know request, if either system deems the record to potentially cause "substantial competitive harm" or "substantial detrimental impact" to the related investment. While the statute neither articulates an independent standard nor provides any guidance defining either "substantial harm" or "detrimental impact," both systems have broadly interpreted such language as precluding the public reporting of much underlying investment manager performance and cost information. SERS, in particular, has adopted a very aggressive interpretation of the statutory provisions to support its refusal of information requests from the Commission as well as members of its own Board.

Inexplicably, while state law requires PSERS to report alternative investment records, including expenses and valuation, no such requirement applies to SERS. Because SERS has no comparable legal requirement to publicly disclose alternative investment records, very little information related to individual alternative investment mandates are publicly reported or made available to stakeholders. Any effort to increase public disclosure of system investment costs, performance and risks must include a reevaluation of the current statutory framework relied upon by both systems to maintain the confidentiality of many investment records.

Conclusion

Throughout its work, the Commission has recognized that the abstractions of investment theory and the jargon of investment professionals often obscure what matters most: the needs of the many Pennsylvanians, beneficiaries of the systems, who have dedicated their lives to public service. In considering appropriate levels of investment management fees and expenses, the Commission was considering the livelihood of tens of thousands of public servants who have contributed to these systems in the assurance of a safe and secure retirement. They, along with the taxpayers they have faithfully served and whose hard-earned dollars also support these systems, deserve our best efforts to learn from the past in order to deliver the future we have promised.

The Commission recognizes that critical examination and change, in any enterprise, can be difficult and threatening. But, as the Commission has heard over and over, the process of squarely examining facts, even uncomfortable ones – whether through stress-testing, transparency around fees and performance, or considering the risks in an allocation or strategy – is healthy and necessary. It is only through honest self-reflection and external accountability that any organization will take steps to improve. As one consultant wrote, "the process of achieving fee and cost transparency can be one of the most powerful catalysts for Boards and legislators to become reinvigorated and re-empowered to consider, from first principles, how they should design their organizations to achieve their investment objectives."

This report and these recommendations are offered in the hopes that they do just that: reinvigorate and re-empower all stakeholders to consider, from first principles, how Pennsylvania's public pension funds should operate, so that we indeed live up to the promises made to their beneficiaries.

Commissioner Gallagher, at the request of his appointing legislative caucus, has submitted, to be reflected as part of the record and incorporated in this report under Appendix III: “An Independent Review of the PPMAIRC Report Submitted by Commissioner Gallagher.”, a divergent view as to some of the recommendations and findings within the final report. Because not every recommendation or finding of fact is disputed, the submitted report is intended to be an overlay to the underlying, larger report.

The included report, “An Independent Review of the PPMAIRC Recommendation Report,” was prepared by Stephen L. Nesbitt, CEO, Cliffwater LLC. Mr. Nesbitt is an institutional investment advisor to large public and private pension funds. His review provides additional context to parts of the report that, Commissioner Gallagher and his appointing legislative caucus believe, needed further qualification.



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

INTRODUCTION

Introduction

The year 2017 brought fundamental change for Pennsylvania’s two largest public pension systems – the Public School Employees’ Retirement System (PSERS) and the State Employees’ Retirement System (SERS) – as the General Assembly enacted sweeping legislation intended to ensure the future ability of both funds to meet retirement commitments made by the Commonwealth to state workers and public school employees. Following several years in which the state fell short of its funding commitment to both retirement systems, Act 5 was passed with broad bipartisan support by the legislature.ⁱⁱⁱ The goal of Act 5 was to provide new and sustainable retirement options and benefit structures for future employees, to stabilize the long-run financial health of the retirement funds, and to improve the operation and governance of both systems. In order to achieve additional operating and management improvements for the systems, as well as significant cost-savings, Act 5 established an independent, quasi-legislative commission tasked with investigating, researching and recommending specifically identified improvements to oversight and investment practices at both systems.

Designated as the “Public Pension Management and Asset Investment Review Commission,” this commission was established to study the operations of the Commonwealth’s statewide pension systems and report its findings and recommendations to the General Assembly, Governor and both retirement systems. The five-member Commission is composed of appointees, who are to be an “investment professional [or] retirement advisor,” designated by each of the following: the Governor, the President Pro Tempore of the Senate, the Minority Leader of the Senate, the Speaker of the House, and the Minority Leader of the House. Notably, the Commission is independent from the retirement systems. The legislature could have delegated the Commission’s responsibilities to either or both of the retirement systems, but chose differently. Instead, Act 5 established a commission that would provide an independent and up-to-date review of the retirement systems’ operations, without attachment or association with past investment or management decisions. Each Commissioner’s work was voluntary; no Commissioner received compensation for his work.

The members of the Commission bring a diverse background of financial and public policy experience to this endeavor:

James J. Bloom is with the Pennsylvania Department of Banking and Securities. For over a decade prior, Mr. Bloom was the president of a government affairs, business consulting and business management firm. Mr. Bloom has over 35 years of experience in the financial services industry and is intimately familiar with SEC rules and regulations. Mr. Bloom served as a Treasurer, Finance Committee Chair, Investment Committee Chair, Audit Committee Chair and Chief Executive Officer of several for profit and not for profit companies and organizations. Mr. Bloom has held Series 7 and 63 investments licenses and a life insurance license.

Bernard Gallagher is a Senior Budget Analyst for the Appropriations Committee in the state House of Representatives, and has been an appointed designee since 2010 for the Public School Employees Retirement System and since 2014 for the state employees’ system board. In his previous public sector experience, Gallagher served as a nonpartisan principal budget analyst for the Colorado General Assembly. In the private sector, Gallagher modeled business and revenue strategies for the corporate travel industry and analyzed price volatility in the energy industry at the U.S. Energy Information Administration. Gallagher has received trustee-specific institutional investing and governance training at the Kennedy School of Government at Harvard University, Haas School of Business at UC-Berkeley, the International Centre for Pension Management at the University of Toronto, Rotman School of Business, and is a certified Pennsylvania Public Retirement Plan Professional through the Pennsylvania Association of Public Employees’ Retirement Systems (PA-PERS).

Michael Tobash is serving his fourth term as the State Representative of the 125th legislative district serving a portion of Schuylkill and Dauphin counties. Tobash has established himself as a leader on pension issues, advocating significant reform measures. He is a deputy chair on the House Republican Policy Committee and majority chair of the Sub-Committee on Technical Education and Career Readiness. His private sector experience comes through FINRA licensing Series 6, 63, 65, and 26 as a Registered Representative and Registered Investment Advisor with a national broker dealer. He is the principal of Tobash Agencies, specializing in property and casualty insurance and individual and group retirement planning. Tobash has served as the Chairman of the Commission.

Michael J. Torbert has over 33 years experience as a Vice President/Senior Investment Officer and Wealth Advisor for several bank investment management and trust divisions and financial firms in the Lehigh Valley. In that capacity, he served on investment committees and managed portfolios ranging up to \$15,000,000 in assets. He serviced in the U.S. Navy. Worked for several large Plastics Companies in sales and marketing and traveled extensively throughout the U.S. and Canada over 12 years before joining the investment business in 1984. He has served and still serves on non-profit, educational and financial industry boards. He held Series 7, 63 and 66 Investment licenses, a PFP Certificate and Life Insurance license.

Joseph M. Torsella was elected State Treasurer in 2016. As State Treasurer, he is the sole statutory custodian of over \$100 billion in public funds, with independent management authority over \$20 billion in assets, and is a board member of the Public School Employees Retirement System, the State Employees Retirement System and the Pennsylvania Municipal Employees Retirement System. Prior to his election as State Treasurer, Torsella served as U.S. Ambassador to the United Nations for Management and Reform, President and CEO of the National Constitution Center, and a Deputy Mayor of the City of Philadelphia. Torsella has served as the Vice-Chair of the Commission.

The Commission was statutorily assigned an extensive and complex list of tasks to accomplish within a six-month period,^{iv} including the following:

- Evaluate the performance and investment strategies of SERS and PSERS to benchmarks, considering investment expenses associated with active and indexing strategies;
- Compare costs and benefits of both active management and indexing investment strategies in relation to future investment activities of SERS and PSERS;
- Study future investment strategies with the objective of maximizing future rates of return, net of fees;
- Issue recommendations to improve fee transparency consistent with the reporting guidelines of the Institutional Limited Partners Associations;
- Recommend implementation of the recommendations of the Society of Actuaries Blue Ribbon Panel on stress testing;
- Report findings on pension fund assets, returns, management, requests for proposals and benchmarks; and,
- Recommend the lowest amount of investment fees and costs to be incurred to achieve each fund's anticipated annual rate of return, and develop recommendations to reduce expenditures to generate an actuarial savings of \$1.5 billion, per fund, over 30 years.

The completed report and resulting recommendations of the Commission are intended to serve as the foundation for additional improvements to the retirement systems. The Commission's report of findings and recommendations are to be submitted to the Governor and the General Assembly. Additionally, both retirement systems are directed to consider the recommendations of the Commission, implement each recommendation deemed appropriate and "strive to achieve actuarial savings of \$1.5 billion over 30 years" while maintaining the assumed annual rate of return for each fund. Improved investment efficiency is an explicitly stated objective of Act 5.

In seeking to fulfill its statutory mandate, the Commission conducted three lengthy hearings with 19 hours of testimony. At each hearing, materials and testimony from international academic experts and national industry leaders on pension management, institutional investment strategies, retirement fund operations and regulatory oversight was provided. In addition to representatives from SERS and PSERS, over 25 expert

witnesses testified before the Commission, from 4 countries, 14 states and 5 public retirement funds. The Commission also received and reviewed in excess of 5,000 pages of studies, articles, reports and presentations from countless academic sources, industry professionals and public pension experts, as well as more than 200 pages of written materials submitted directly from testifiers.

The work of the Commission has not been without challenges. The Commission was expected to complete its work within a short six-month period: a limited period in which to comprehensively identify recognized expert witnesses, schedule their appearance and conduct hearings; research, review and analyze relevant academic studies and industry papers; and draft, consider and issue a comprehensive report and recommendations that address each statutorily identified matter.

No budget appropriation was provided to pay for the cost of retaining independent financial experts and consultants. The State Treasurer, an appointee of the Governor, was able to allocate sufficient funds and direct Treasury Department resources to assist the Commission in satisfying its legislative mandate, and in so doing retained the services of several financial consultants and academic experts.

The Commission also encountered difficulty in obtaining investment data and financial information from the two retirement systems. The source of much of the resistance to completely satisfying information requests can be attributed to the broad statutory authority contained within the two retirement codes that permits both retirement systems to shield investment-related information from public disclosure – such as individual fund manager fees, investment expenses, performance and the identity of underlying investments. Multiple non-disclosure agreements were negotiated and executed to permit underlying investment fund data to be shared with Treasury’s expert consultants. Where information was not provided from the retirement systems, consultants supplemented information from subscription database services and publicly posted investment reports from other state funds.

Fortunately, the Commission was able to overcome these challenges. If fully implemented, the recommendations are intended to significantly enhance the performance, management and oversight of SERS and PSERS, and would strengthen both systems, benefiting both their beneficiaries and taxpayers. More than a set of specific list of recommendations, however, this report marks an important milestone – the first and only independent study and critical review of the investment management of the Commonwealth’s two largest retirement systems.

A critical review, in this context, does not mean to suggest that past decisions have been made in bad faith or for wrong motives. Pennsylvania’s pension systems, like others around the country, are full of talented, hardworking and dedicated men and women who are motivated by a noble mission: ensuring that we can keep the promises made to other employees who similarly gave their careers to public service. But a critical review, in the sense of an unflinching and honest appraisal of what has worked and what hasn’t, does not diminish their efforts. It is, in fact, exactly what we owe to such an important mission. In public pension management as in every area of public policy, it is only by honestly examining the lessons of the past that we can steer towards a better future.

Such a review is also what we owe to the citizens of the Commonwealth, because understanding the state and improving the health of Pennsylvania’s public pension fund management should concern every citizen. Although the language of investing is often obscure and technical, the stakes could not be higher or the outcomes of more common concern.

From Orange County, California, to Wall Street, financial history – public and private – is littered with examples of avoidable catastrophes in which intelligent, usually well-intentioned people believed that they’d discovered the secret to “beating the market” without undue risk, until their complex cocktails of leverage, risk, and secrecy exploded. Yet even in the midst of every financial scandal or crisis, other investors, grounded in common sense and good judgment, have managed to avoid such pitfalls, and to quietly and steadily build wealth.

We believe that Pennsylvania’s public pension funds can not only be in the second group, but can chart a new course to take their place among its leaders. The Commission therefore hopes this report will be the beginning, not the end, of an important and long overdue policy dialogue as to how best to ensure the future viability of Pennsylvania’s promise of a secure retirement to its public employees and educators.

On a final note, Commissioner Gallagher, at the request of his appointing legislative caucus, has submitted, to be reflected as part of the record and incorporated in this report under Appendix III, a divergent view as to some of the recommendations and findings within the final report. Because not every recommendation or finding of fact is disputed, the submitted report is intended to be an overlay to the underlying, larger report.

The included report, “An Independent Review of the PPMAIRC Recommendation Report,” was prepared by Stephen L. Nesbitt, CEO, Cliffwater LLC. Mr. Nesbitt is an institutional investment advisor to large public and private pension funds. His review provides additional context to parts of the report that, Commissioner Gallagher and his appointing legislative caucus believe, needed further qualification.

A NOTE ABOUT THE COMMISSION’S WORK

The statutory mandate to the Public Pension Management and Asset Investment Review Commission is broad, covering many aspects of public pension management, oversight and operation. However, it is noteworthy that Act 5’s directives to the Commission do not include any reference or mandate to consider or review pension benefit levels. Consequently, this Commission has not sought to investigate existing or future retirement benefits. Rather, it has been the exclusive focus of the Commission to consider recommendations intended to improve public pension management with the objective of ensuring the continuity of the existing benefit structures for future generations of state employees and public school workers.

Accordingly, it would be inappropriate for any portion of this report or resulting recommendations from this Commission to be cited or referenced in support of any change in the existing schedule of retirement benefits or plan design. Each of the members of this Commission is sensitive to the concern that the Commission’s work could be misappropriated as part of a legislative agenda that was neither contemplated nor advocated by the members of the Commission.



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

BACKGROUND

Background

Retirement security for Pennsylvania's public employees has been an important state policy priority for over 100 years. Beginning with the legislative establishment of the Public School Employees' Retirement Board in 1917, the Commonwealth has recognized the importance of providing, to those whose careers have been dedicated to public service, a fair and secure retirement. Six years later, in 1923, the General Assembly created the State Employees' Retirement System. Collectively, as of 2018, both retirement systems estimate that they serve over 725,000 public educators, school employees, state workers and retirees.

Each retirement system oversees investment offices that together manage over \$85 billion in total fund assets – PSERS, \$55.6 billion; SERS, \$29.4 billion. Combined, the retirement funds of PSERS and SERS would rank 9th in size nationally among state retirement funds. As of last year, the average annual retirement defined benefit paid to qualifying annuitants is modest: in the case of a retired PSERS member, \$25,000; for a retired SERS member, it was \$28,400. In each case, the average career length for either a PSERS or SERS member is between 22-23 years.

Funding for the two retirement funds is statutorily provided, consisting of an annual employee contribution and assessment paid by the employer. In the case of SERS, the average state employee contribution rate is 6.25% of salary, automatically deducted from their biweekly pay. For public school employees, the average contribution rate is 7.57% of salary. The rate of contribution for employing state agencies, public school districts or other public schools consists of two components – a “normal” cost for benefits, and an “unfunded liability” cost to cover the shortfall between projected assets and liabilities. Together, these two components account for a total “composite” rate of payroll, as an annual contribution to the retirement funds.

The 2017-18 employer contribution rate to SERS was 4.91% of payroll for benefits earned during the period and a rate of 28.33% of payroll for the unfunded liability component. Collectively, the employer composite rate to SERS was 33.24% of payroll. As to PSERS, the employer composite rate is 33.43% of payroll, consisting of approximately 8.3% of payroll for benefits and 25.1% of payroll that is attributed to the unfunded liability.

Unfunded Liability

Over the years, several terms have been used to define the contribution rate that employers must provide to adequately fund a public pension plan. The rate has been defined as the annual required contribution or actuarially required contribution (ARC) and more recently by the Governmental Accounting Standards Board as the actuarially determined contribution amount necessary to fund the public pension plan. Regardless of the term used, the rate refers to the amount needed to be contributed by employers to prudently fund a public pension plan utilizing accepted actuarial standards. The contribution rate represents the amount needed to fund benefits over time.^{vi} An employer that has paid the contribution rate in full has made an appropriation to the pension fund to cover the benefits accrued that year and to pay down a portion of any liabilities that were not pre-funded in previous years. Conversely, when an employer does not pay the contribution rate in full, the unfunded liability of the system will grow and require greater contributions in future years, thus increasing the long-term costs of funding a pension plan.

Unfortunately, this is exactly what has occurred with both of the Commonwealth's largest retirement funds. The annual contribution to both retirement funds has repeatedly fallen short, often far short, of the actuarially determined amount, contributing to the accrual of a substantial unfunded liability. In the case of PSERS, as of June 2017, existing fund assets were approximately \$44.5 billion short of projected liabilities. Expressed as a percentage, PSERS was actuarially underfunded by 43.7% (in other words, it was 56.3% funded). For SERS, as of December 2017, it was approximately \$19.66 billion short of projected liabilities, or was actuarially underfunded by 39.3% (it is 60.7% funded).

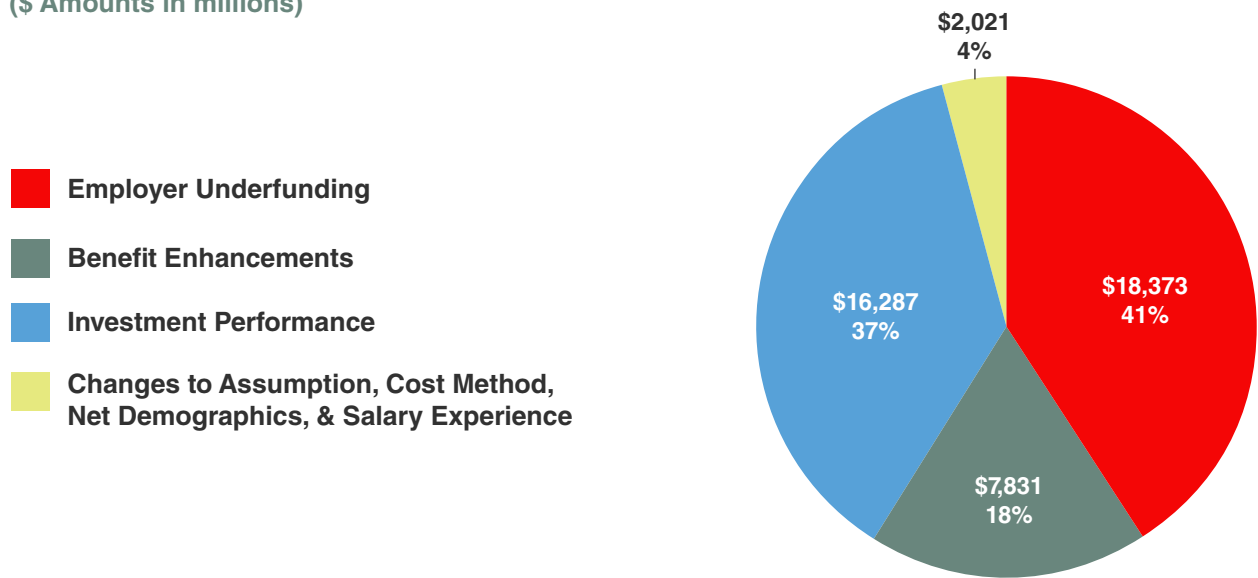
The unfunded pension liability that has impacted both funds was not a sudden occurrence. Rather, it was the direct and foreseeable consequence of past policy decisions, principally deferring actuarially determined contributions in favor of other budgetary priorities, as well as of investment underperformance. On a ten-year basis, neither fund has met its actuarially assumed rate of return: PSERS' ten-year annual return has been 5.03%, while SERS has returned 4.1%.

Using PSERS' experience to demonstrate the financial consequences to both retirement funds, the following are a series of graphs developed by PSERS that illustrates the sources of underfunding, PSERS' historical funding levels, the years and amounts of funding shortfalls, and the impact on current employer contribution levels.

This first chart identifies the primary contributing causes of the existing unfunded liability of PSERS. The largest single cause of the existing unfunded liability is employer contribution shortfalls (41%), with underperformance of investments the second largest factor (37%).

Figure 1: PSERS Sources of Unfunded Liability

PSERS SOURCES OF UNFUNDED LIABILITY TOTAL \$44,512 AS OF JUNE 30, 2017
 (\$ Amounts in millions)



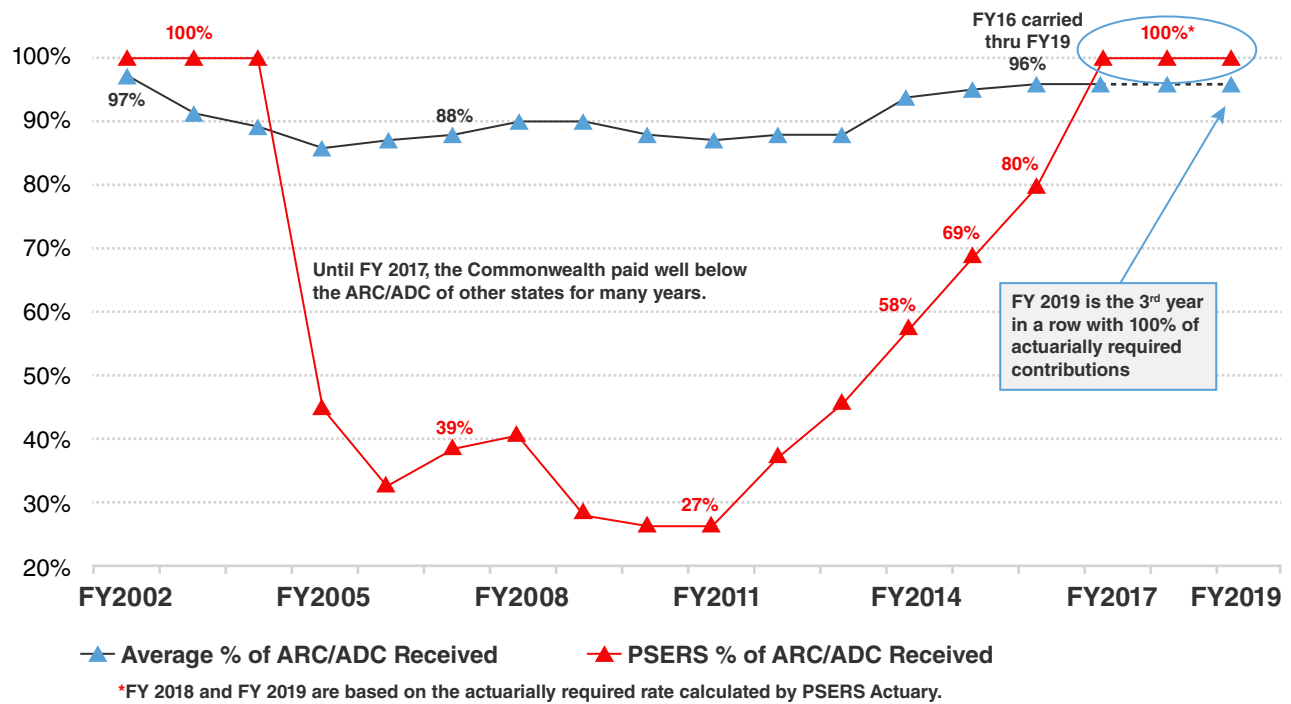
Source: PSERS

The second chart marks the employer contribution rate made to PSERS as compared to the national average received by other public pension plans. A significant point illustrated by this graph is that the largest contribution deficit occurred during the economic downturn of the 2008-09 national recession. At a time of significant investment loss and liquidity demands on the retirement funds, the employer contributions dropped to 70% below the annual actuarially determined amount. During the same period, the national average contribution was no less than 80% of the actuarially determined amount. This graph also marks the recent return to 100% funding over the past three fiscal years, an important and welcome new chapter.

Figure 2: Percentage of ARC/ADC Received, PSERS v. National Average

AVERAGE % OF ANNUAL REQUIRED CONTRIBUTION (ARC)/ACTUARIALLY DETERMINED CONTRIBUTION (ADC) RECEIVED

- Other Public Plans vs. PSERS % of ARC/ADC Received Fiscal Year Ending June 30th



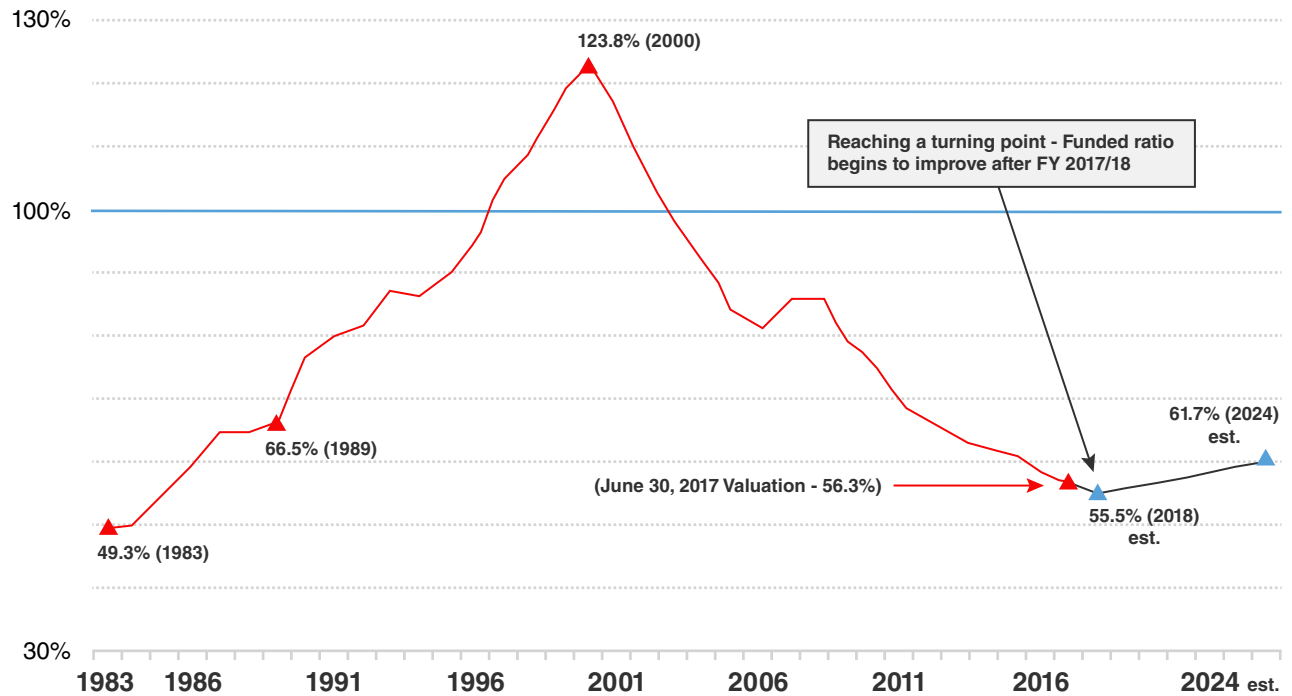
Source: PSERS

The graph below marks the historical funding level of PSERS. Notably, the current underfunded level is not an historical low. In 1983 PSERS was only 49.3% funded. However, that deficit was erased by 1996, and PSERS' funded level peaked at 123.8% in 2000. Also notable, it is only with the 2017/18 fiscal year that the funded level is projected to – modestly – begin to improve.

Figure 3: History of PSERS Funding Ratio

HISTORY OF PSERS FUNDED RATIO BEGINNING 1983

Funded Ratio = Actuarial Value of Assets/Actuarial Accrued Liabilities Fiscal Year Ending June 30th

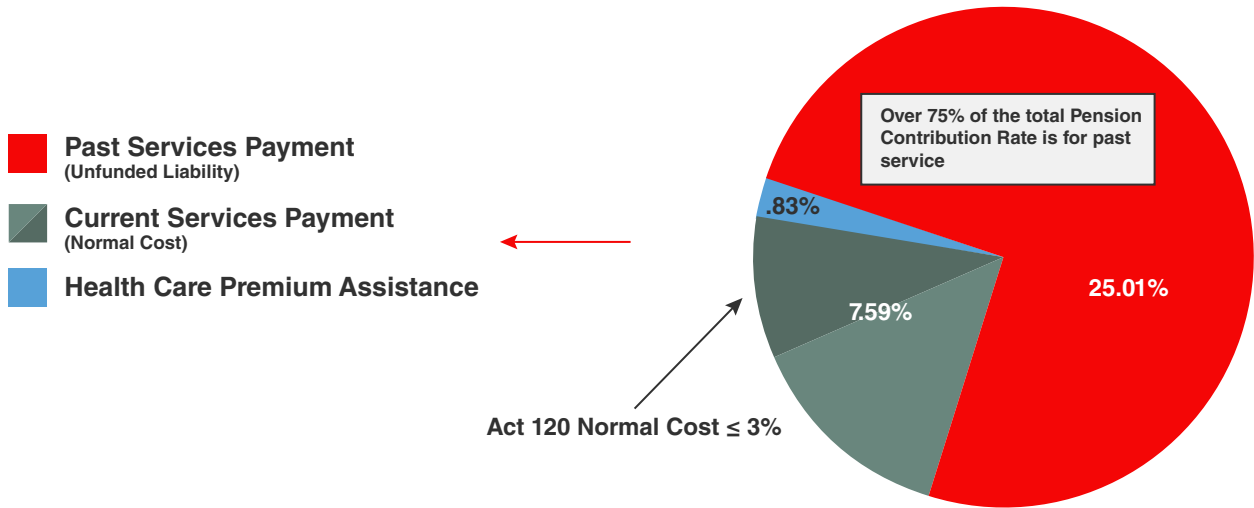


Source: PSERS

This last chart highlights the consequences associated with past funding and investment performance shortfalls. Significantly, over 75% of every employer dollar contributed to the fund is associated with payment of the unfunded liability.

Figure 4: Components of PSERS Total Employer Contribution Rate

COMPONENTS OF PSERS TOTAL EMPLOYER CONTRIBUTION RATE FY 2019
TOTAL EMPLOYER CONTRIBUTION RATE 33.43%



Source: PSERS

Act 5 of 2017

With broad bipartisan support, the General Assembly enacted Act 5 of 2017.^{vi} Advocated as an “important” and “historic” proposal, the Act was designed to address “structural” problems associated with significant unfunded liabilities at both retirement funds. It was also meant to provide for the “long-term financial solvency” of the funds, Changing the benefit schedule for future employees, altering the governance boards for both systems and establishing this Commission to study investment management of the two systems, Act 5 was ambitious in its scope.

The central component of Act 5 is the creation of a hybrid retirement benefit structure for both systems. Under Act 5, beginning in 2019, new state and school employees will be offered a choice among two hybrid options that combine a reduced defined benefit with a defined contribution component and a third stand-alone defined contribution option. The defined benefit plans currently administered by SERS and PSERS, which provide a guaranteed monthly pension payment to retired employees based upon an average of their three highest salary years calculation, will no longer be made available to new employees entering the pension systems. In addition to changing the defined benefit structure for new employees in both retirement systems, Act 5 raised the retirement age for new employees from 65 years to 67, and changed the calculation basis of final average salary from the highest three years to the highest five years.

The movement of all new employees into either a hybrid defined benefit / defined contribution plan or a stand-alone defined contribution plan is anticipated to reduce employer contributions and employer risk. According to the actuarial note by the Independent Fiscal Office, for fiscal years 2018-19 through 2049-50, the benefit structure change is anticipated to reduce employer contributions by \$1.2 billion on a cash flow basis and \$592 million on a present value basis.^{viii} Additionally, the Independent Fiscal Office estimates that by the end of fiscal year 2049-50, the financial position of the two retirement systems will improve slightly, by \$4.2 billion on a cash flow basis and \$1.4 billion on a present value basis.

However, it is the work of this Commission that has the greater potential of improving the financial position of the two funds in the nearer term. Act 5 charged the Commission with a broad review of investment operations at both funds, and a specific charge to identify cost-savings in investment fees and expenses. The Independent Fiscal Office acknowledged the mandate to the Commission to develop recommendations to reduce expenditures to generate actuarial savings of at least \$1.5 billion for each retirement system over 30 fiscal years.^{ix} The recommendations contained in this report identify an estimated annual savings opportunity, for both retirement systems, in the range of \$97.3 to \$116.8 million, or, expressed as an actuarial savings over 30 years, between \$8.2 and \$9.9 billion.³

It is this savings expectation and comprehensive investment review, intended to ensure the future financial stability of both retirement funds, which creates the background for this Commission's work.

⁽³⁾ Low end of savings range based on renegotiating current mandates; higher end of range based on indexing mandates and estimated using high end of possible fee terms in order to arrive at conservative estimates (meaning, savings from indexing could be higher). Private Equity and High Yield savings of \$12.2, \$42.5, and \$15.5 million per year described above based on 5-year implementation period (see "Cost Savings" chapter). Savings for "Leverage size for reduced external costs (PE)" not included in total range of \$97.25 to \$116.83 per year or the \$8.2 to \$9.9 billion of accumulated savings over 30 years out of abundance of caution as there is overlap in mandates under estimates for "Renegotiating existing private equity contracts upon reinvestment." 30 year total estimates determined using results in "Cost Savings" chapter and/or the future value of the first-year savings over 30 years using the 7.25% assumed rate of return. Present value of savings is between \$1 and \$1.2 billion at 7.25% rate and \$2.8 and \$3.4 billion at a 3.6% rates referenced in actuarial note for Act 5.



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

RECOMMENDATIONS OF THE COMMISSION

Recommendations of the Commission

Over the past six months, the Public Pension Management and Asset Investment Review Commission has received extensive expert testimony and compiled research and best practices in each of the issue areas identified in Act 5. As part of this process, the Commission received considerable input on how to satisfy the objectives of the Act. Specifically,

(3.1) The commission shall evaluate and make recommendations on:

(i) Improving investment fee transparency on alternative investments as specified in the Standardized Reporting Guidelines of the Institutional Limited Partners Association.

(ii) Implementing the recommendations of the Society of Actuaries Blue Ribbon Panel on stress testing, to test the ability of the plan to withstand a period of investment returns above or below the level of assumed return.

(4) Publish extensive and detailed findings online, including findings about:

(i) assets;

(ii) returns;

(iii) financial managers;

(iv) consultants;

(v) requests for proposals; and

(vi) investment performance measured against benchmarks.

(5) Recommend the lowest amount of investment fees to be paid by the board for the board to achieve the board's anticipated annual rate of return and to develop recommendations to reduce expenditures to generate actuarial savings of \$1,500,000,000 over 30 years from the effective date of this section.

The Commission has carefully considered numerous recommendations and suggestions for meeting the goals of Act 5. Recommendations were evaluated as to the following criteria:

- *Legal and Practical. Solutions should be both lawful and capable of being implemented.*
- *Purposeful. Recommendations should support and enhance the ability of retirement systems to provide promised retirement benefits.*
- *Effective. Proposals should improve investment decision making, operational execution and management accountability.*
- *Sustainable. Any changes made to how the pension systems carry out their missions should promote sustainable, long term solutions.*

In addition to these three criteria, recommendations are made consistent with the following principles:

- *The State has, and wishes to maintain, a commitment to providing fair and secure retirement benefits to those whose careers have been dedicated to public service.*
- *Maintaining trust amongst stakeholders is critical to facilitating best decision making and fostering support for the plans.*
- *Ongoing and rigorous review of investment decision making processes and assumptions improves investment management, reduces unnecessary or unrewarded risks, and equips the plans to thrive in changing and complex financial markets.*

- Consistent with the mandate of Act V, fees and other costs must be monitored and managed. Reducing costs is one of the only certain ways to enhance the investment portfolio's expected return without increasing its risk.

With these principles and criteria in mind, and based upon the preceding Report, the Commission makes the following recommendations to present to the Governor and General Assembly:

Notes

Except where otherwise stated, the Commission's recommendations are not exclusively directed to the General Assembly, but may be implemented pursuant to an Executive Directive issued by the Governor, by resolution adopted by either of the two retirement system's Board of Trustees, or by retirement system staff practice. In most cases, the Commission's focus was on the content of the recommendation, not the means by which they are to be adopted.

Full Funding of the Retirement Funds

- We recommend that the Commonwealth annually maintain full payment of the actuarially determined contribution amount necessary to fund each public pension plan as a fundamental and necessary requirement to ensure the future viability of both retirement systems.
- We recommend that the General Assembly consider additional legislation mandating full funding of each retirement fund, pursuant to Act 120 of 2010, as an annual budgetary priority.
- We recommend that the General Assembly consider legislation requiring the pre-funding of any future benefit structure enhancement or cost-of-living increase.
- We recommend that the General Assembly consider the creation of a rate stabilization fund as a precaution against annual underfunding of the two retirement systems during period of state budgetary stress.

Other Recommendations

- We recommend, with recognition that pension fund management is complex and that best practices are continuously evolving, that at the termination of this Commission, work continue through the establishment of a review commission to explore questions beyond the purview of PPMAIRC.
- We recommend that Pennsylvania lead an effort to form a consortium of major state pension funds to reset the balance of power between asset owners and investment managers.

Stress Testing

- We recommend that the General Assembly enact legislation requiring an annual stress test of each system, broadly aligning with the Blue Ribbon Panel (Panel) recommendations and including at least a 2-percentage point variation in a baseline benchmark return, as well as a quantifiable contribution risk such as the 80 percent measure recommended by the Panel. Although the Panel recommends a 3-percentage point variation, a 2 percent variation would be consistent with practices in states that have enacted similar legislation. In addition, assumptions used in baseline analysis calculations made by the Systems should be reported, as these may include actuarial assumptions differing from those recommended by the Panel.

- We recommend that the Systems’ stress tests report the impact of the stress on other financial measures—including expected contributions in dollars, expected contributions as a percentage of payroll, funded ratios, ratio of benefit payments to payroll, ratio of funding liability to payroll, and the ratio of the market value of assets to payroll—and cover a period of at least 30 years, in accordance with the Panel recommendations.
- We recommend that stochastic models be used in addition to—not in place of—deterministic modelling. We commend PSERS for its recent stress testing report and encourage them to continue to do stress testing consistent with the Blue Ribbon Panel recommendations.
- We recommend that the Systems make their stress test reports publicly available. Reports should be provided to stakeholders and policy makers, including plan beneficiaries, the Governor, the Legislature, Board of Trustees, staff, the Auditor General, and the general public.
- We recommend that the Systems’ stress test charts be simple to understand, with the policy question or decision that the chart addresses featured prominently and clearly at the top of each chart.
- We recommend that the Systems’ stress tests be conducted by an experienced actuary, not an investment consultant. Although investment consultants can provide useful input, only actuaries have the tools and techniques to conduct stress tests of a pension fund.
- We recommend that the Systems conduct and publish “reverse” stress tests showing the market events and funding scenarios that would cause certain undesirable outcomes, including but not limited to the funds’ investment portfolios to become more illiquid than a Board-determined threshold limit (expressed as a multiple of annual distributions).

Transparency

Although nothing precludes the Funds from implementing the following recommendations on their own, we recommend that the General Assembly act to require full public disclosure of fee and performance data by the funds through legislation, to institutionalize and make permanent these practices.

Transparency of decision-making processes:

- We recommend that complete board materials be posted on each system’s public websites, including manager presentations with proposed fee terms, no less than one week before each board or investment committee meeting, and that materials remain online for a period of seven years.
- We recommend that each public board and committee meeting be live streamed and video and audio recordings of public board proceedings be published and archived.
- We recommend that all investment marketing (“pitch”) materials, investment agreement terms, including side letters, related to fees, costs, expenses, performance and risk be publicly available, that fee terms not be redacted in contracts posted to e-contracts website, and that both retirement systems utilize a common standard checklist for transparency issues when evaluating managers (see Appendix I for sample).
- We commend the Systems for disclosing investment policy guidelines and asset allocation plans as well as other statements of their processes, and we recommend that they continue.

Transparency of performance reporting:

- We commend the Systems for disclosing total fund performance and performance of certain asset classes relative to benchmarks, and recommend that they continue to do so.

- We recommend that both retirement systems publish net-of-fee and gross-fee returns when reporting investment performance, and that the General Assembly consider enacting legislation to require that.
- We recommend that, to facilitate understanding by stakeholders and policymakers, each fund should report total fund performance against a risk-appropriate and commonly understood reference portfolio benchmark as Rhode Island, such as a global 60/40 or 70/30 index, with and without leverage if used, and for one, three, five, seven, ten, fifteen, twenty, and twenty-five year periods, as well as year by year.
- We recommend that both retirement systems publish returns, costs and fees of individual investments relative to a similar risk public markets alternative, on a levered and unlevered basis.
- We recommend that returns of internal investments are reported in the same manner as other investments – by investment, by asset class, by vintage year (if appropriate) and as a portfolio – on a levered and unlevered basis.
- We recommend that performance reports for the two retirement systems also include a rolling 3- and 5-year return comparison in graphic form, and annual returns for the last 5 years, in addition to the returns over 3-, 5-, 10-, 15-, and 20-year periods ending at the current period, in situations where they do not do so already.
- We recommend that both retirement systems publicly post detailed quarterly portfolio performance reports received from general consultants, with per-manager returns versus benchmarks, and alternative investment performance reports received from specialty consultants, including public market equivalent (PME) values for each individual fund/manager based on a board-approved index.
- We recommend the General Assembly repeal statutory provisions within the two retirement codes that permit both retirement systems to shield investment performance, risk and expense information from public disclosure pursuant to a Right-to-Know Request. Specifically, 71 Pa. C.S.A. § 5902 (e) and 24 Pa. C.S.A § 8502 (e).
- We recommend the General Assembly enact legislation that designates all retirement system records related to investment performance, risk and expense information as public records, using Arkansas (broadly identifying “all records” kept by the retirement system as open to the public), Nevada (declaring “books of the retirement system” are public records), Texas (affirmatively listing most all investment records as “not exempt from disclosure”), and, New York (mandating “records of the retirement system” as public) as examples of model legislation.
- At a minimum, we recommend the General Assembly enact legislation that would apply the provisions of the Public School Employees’ Retirement Code (24 Pa. C.S.A § 8502 (e)(5)), which designates valuation and expense information related to alternative investments as public records, to SERS’ alternative investments. Inexplicitly, SERS is presently not subject to this disclosure requirement.

Transparency of fees, costs, and expenses:

- We recommend that both retirement systems require all external managers to use the ILPA template. We commend PSERS for its policy, and urge that it be continued, and recommend that SERS also require, rather than request, this of managers.
- We recommend that both retirement systems publicly disclose all travel or other expenses incurred by staff and paid for by an external investment manager, fund or consultant.

- We recommend that both retirement systems utilize and report information from the ILPA template for each manager for the public reporting of fees, costs, and expenses of its alternative investments, including carried interest. In addition, we recommend that the General Assembly consider enacting legislation to require that information be reported in this manner. For traditional investments, we also recommend that the Systems publish investment management fees, costs, and expenses both by manager and aggregated by asset class, separately identifying base management, performance/carried interest, and other expenses (as reported by CalPERS, Missouri, and South Carolina). In addition, we recommend that the General Assembly consider enacting legislation to require the publication of this information.
- We recommend that policymakers and stakeholders should be prepared and willing to defend the systems against false comparisons that may be made as a result of increased transparency on fees. Increased disclosure comes with a risk of unflattering but also unfair comparisons to less transparent systems. The solution is not to avoid transparency, but for policymakers to avoid “penalizing” Pennsylvania’s funds for doing the right thing.

Portfolio Implementation

- We recommend that the Boards of SERS and PSERS review their Investment Policy Statements and ensure that:
 - o There is a risk budget that specifies the tolerable volatility, downside risk, and illiquidity and the associated simple benchmark portfolio
 - o There is a diversified policy benchmark that is composed of investable index funds
 - o Systematic risk calculations are defined and targets established
 - o Idiosyncratic risk limits are defined
 - o There is a specified rebalancing policy.
- We recommend that the level of illiquidity in combination with leverage at PSERS be reviewed and addressed immediately.
- We recommend that the level of illiquidity at SERS be comprehensively reviewed and reevaluated.
- We recommend that both funds report the levels of return-seeking and risk-mitigating assets, as well as those levels for just liquid assets.
- We recommend that new risk reports be developed so that the amount of liquidity and leverage is transparent, and the allocations and systematic risks of the portfolio on a look-through basis is clear. Risk reports should identify how risk is allocated across the portfolio, specify the risks (by investment or asset class) that are not captured in the standard deviation metric, and provide appropriate ways to measure or monitor those risks. Identifying sources of risk mitigation within the portfolio is also relevant, while quantifying how much of the risk is hedged.
- We recommend that internal investment management be limited to index investments until risk controls and compliance procedures can be verified or established that are consistent with more complex strategies. At a minimum, we recommend no expansion of internal strategies beyond indexing until this step is taken.
- We recommend both funds limit new commitments in private markets until risk controls, liquidity management and evaluations are fixed.

- We recommend that the fiduciary Boards should oversee and explicitly authorize any tactical asset allocation decisions the investment staff makes, track how these decisions have performed, and establish clear limits to deviations from the strategic asset allocation.
- We recommend that a new body such as this Commission, with appropriate expertise, resources and time, further study issues around private market investing more broadly, and that private markets investments be limited until there is better evidence both that private markets investing provides a risk-adjusted return above public markets and that SERS and PSERS have processes that are rigorous enough to ensure selection of above median managers, on a risk-adjusted basis.
- We recommend that SERS and PSERS collaborate on a detailed CEM administrative and investment cost benchmarking analysis, and make the detailed report(s) available to the public (not only the Executive Summary).
- We recommend that the Boards see an annual report on manager contracts, which identifies changing terms.
- We recommend that costs be linked to performance in a report similar to the Novarca study that identifies whether managers outperform and how much of the value they capture.
- We recommend that the General Assembly investigate the feasibility of establishing a common investment performance reporting period for both retirement systems that complements existing employer budgeting periods.

Active and Indexing

- The Commission recognizes that some level of investment in private markets, which are by definition actively managed, is likely reasonable for the two funds, and therefore that there is an appropriate role for active management in those allocations.
- Based on the compelling and substantial evidence and information presented to the Commission, we recommend that SERS and PSERS move to fully indexing all public market investments. Evidence clearly indicates that active management underperforms in the long run, and that outperformers cannot be reliably predicted in advance.
- We commend SERS for its strong movement toward indexing public equities in recent years, and recommend that it complete the move in that direction by indexing the remaining portions of its public equity portfolio that are currently actively managed. If this recommendation is adopted, SERS would save roughly \$12.2 million annually, for a savings of \$1.2 billion over 30 years.
- We recommend that SERS index its fixed income portfolio, for a savings of \$4.5 million annually, and \$449 million over 30 years.
- We commend PSERS for using an index approach for the passive portion of its “Passive Plus” management of all U.S. Equities, and we recommend that PSERS fully index its public equity portfolio, for an estimated savings of \$17.2 million annually, and \$1.7 billion over 30 years.
- We recommend that PSERS index the public security portion of its fixed income portfolio, for a savings of \$1.8 million annually, and \$179 million over 30 years. Even more savings would be had if they also convert all of their private market fixed income mandates (see Fee Analysis Chapter).
- We recommend that for every non-public investment considered, there is a careful pre-investment selection of a risk appropriate (levered if needed) investable market index or indices.

Performance Evaluation

- We recommend that returns be measured and reported such that actual investments can be compared for risk and return versus a low-cost, index implementation, including:
 - o Gross-fee and net-of-fee performance should be reported.
 - o Report manager returns relative to both a risk matched benchmark established at the time of the investment and relative to the investible liquid allocation it replaces.
 - o Returns for the portfolio, asset classes, and individual mandates should include annual returns, 1-, 3-, 5-, 10-, 15-, and 20-year returns ending in the current period, along with rolling 5-year returns.
 - o Attribution analysis should be performed for each manager to identify whether the drivers of performance were aligned with expectations.
- We recommend that where portfolio leverage is used, both levered and unlevered returns should be reported, against an appropriately levered or unlevered benchmark.
- We recommend private markets, including private equity, performance be measured against relevant stylistic benchmarks, as well as the liquid public market Kaplan-Schoar PME values, where the choice of the market index is first that which is consistent with the risk taken by the manager and second, with the index that the manager replaces in the diversified portfolio benchmark.
- We recommend private market risk reports measure and describe subscription lines with performance adjusted for the use of those financing facilities as well as other uses of leverage.

Performance and Asset Allocation

- We recommend that each fund revisit and reconsider its asset allocation in light of the findings in the consultant report as to past risk-adjusted and relative performance of the current models.
 - o At SERS, we recommend that such a reconsideration focus on the role of illiquid investments in the portfolio, particularly private equity. We note the finding that through the 2008 financial crisis, SERS allocation, heavy in illiquid investments, performed worse than a balanced public market index. We do not recommend that SERS exit private equity as an asset class, and note that SERS performance in this asset category has been stronger than PSERS. However, we recommend that SERS carefully reconsider the risks of its current allocation targets to illiquid private investments, particularly private equity, and reduce them to more appropriate levels, noting that the 2017 allocation was found to be “in line” with peers.
 - o At PSERS, where one measure of total fund risk was found to have “nearly doubled” in recent years and unusual levels of portfolio complexity noted, we find greater cause for concern, and we recommend that such a reconsideration focus on the role of illiquid investments more broadly, particularly private equity, hedge funds, and commodities. We note the troubling finding that PSERS level of illiquid investments overall at 43% (not including unfunded commitments to these investments) is a “significant outlier” and far more than either SERS or peer funds. We therefore urge that PSERS carefully reconsider the risks of its current allocation targets for illiquid private investments, and reduce them to more appropriate levels.
- We also recommend that PSERS, as a matter of priority, revisit and reexamine its use of leverage. The use of leverage – borrowing – by U.S. pension funds is extremely rare, and the extent to which PSERS uses leverage (effectively borrowing against over 17% its portfolio) is an anomaly, the potential risks of

which are not widely understood by stakeholders. As the report notes, leverage can be “treacherous” and has sometimes led to catastrophic outcomes. We recommend that a PSERS review of leverage clearly examine and communicate risks, and ensure that robust board-level guidelines are in place and understood by all stakeholders.

- We commend SERS for maintaining a more rigorous fund-level benchmark, and note the finding that SERS performance weakness appears to have been more of “execution” rather than “strategy.” We recommend SERS continue to use such a rigorous benchmark, and focus its efforts on continuing to improve execution.
- We recommend that PSERS reconsider and revise its fund-level benchmark, found to be the lowest among a peer group over every period. We note the finding that PSERS performance weakness appears to have been both of “strategy” and “execution,” and recommend PSERS comprehensively reexamine both.
- We recommend that the investment management of the systems be redirected towards simplicity. Because complexity increases costs and risks without any assurance of higher returns, because the Consultant report shows that lower-cost simpler portfolios in fact would have performed “significantly better on a risk-adjusted basis than the current complex strategies,” and because findings in the Consultant report suggest the funds do not currently have the expertise and oversight in place to properly oversee their current complex (particularly in the case of PSERS) portfolios, we recommend the funds take a new and simpler approach.

Cost-savings Options

- We note the findings that there is a fundamental “mismatch” between oversight capacities for such complex portfolios as PSERS has adopted, particularly internal management, derivatives, and illiquid investments, and that such capacities appear “stretched” at SERS, particularly in the large number of allocations to private equity and real estate. We therefore recommend that new commitments of capital to these strategies, at either fund, are limited until these issues are addressed.
- We note the findings that sufficient accountability, risk monitoring, and management structures are not currently in place, and we recommend that certain “innovation” cost-savings options, such as further internal management, co-investments, seeding new managers and/or forming exclusive relationships with new firms, should NOT be pursued at this time.
- We note that the cost-savings recommendations in the Consultant report below are limited in that they were only able to analyze public mandates, and the recommendations are made in the context of presuming no change to current allocations or strategies. Thus, the following recommendations should be understood as options that may be superseded by recommendations found elsewhere in this report.

Cost-savings Analysis

- We note the Consultant report’s finding that in practice at both SERS and PSERS, “active mandates that cost more do not necessarily represent better value for money” and indeed, at one asset class at PSERS, the cheapest mandates were the best performing.
- We recommend that PSERS comprehensively review and revise its benchmarks for asset classes, sub-asset classes and managers, particularly all benchmarks used for performance-based compensation, noting the report’s finding that PSERS benchmarks across the board are not “sufficiently granular.”

- We note the report’s finding that in the PSERS high yield allocation, managers have been paid 93% of the “alpha over the 10-year period ending June 30, 2018 (100% in the 10-year period ending June 30, 2017)”, and we recommend that performance pay arrangements at both funds be rigorously reviewed, appropriately benchmarked, and entered into only after modeling total costs to the fund of different options. We recommend that all fees, whether base or performance, be considered and tracked, and do not recommend pursuing fee “savings” that are simply shifting costs from base fees to performance fees.
- We recommend that both funds adopt the following best practices to minimize fees:
 - track the age of all fee schedules, and reviewing at least every two years
 - track the age of all manager relationships, and considering longevity of relationship in recurring fee reviews and negotiations
 - require all asset managers to confirm in writing that they do not receive commissions, rebates and the like in connection with fund investments
 - require all asset managers to confirm in writing that they have not paid fees, commissions and the like in connection with obtaining investments into their funds
 - establish a fee budget, at the fund level, for all investment managers, subject to waiver by the board
 - prohibit the use of bundled brokerage by brokers and managers.
- We commend SERS for conducting regular transaction cost analysis, and recommend that PSERS do the same.
- We recommend that both funds establish a better process for considering specific alternatives to each proposed investment under consideration, which the Consultant report findings suggest need improvement. Any proposed investment should be evaluated not in a vacuum, but against a specific low-fee equivalent-risk alternative, as a way of strengthening a commitment to cost discipline and better evaluation of expected and realized performance.
- We recommend that both funds evaluate procurement guidelines for asset management services.
- We recommend that both funds adopt the practices detailed in the Consultant report to negotiate harder on private markets investments, particularly when the Systems together would constitute one of the top investors in terms of asset size, including but not limited to: seeking to pay fees based only on invested rather than committed capital; seeking fee reductions during the investment phase; capping monitoring, oversight, and legal fees; negotiating carry terms more carefully and modeling different scenarios; seeking full transparency on waterfall terms, and whether other waterfall terms have been offered to other investors; recalculating GP-determined carry payments; having a process to ensure that all terms contained in marketing materials or arrived at in negotiations are legally documented and monitored; and monitoring and auditing all fees and costs charged by general partners in limited partnership structures.
- We recommend that both funds retain the services of an outside expert who, with proper access to full information, could assist them in developing and implementing further cost-savings.
 - We recommend that SERS, with the assistance of an outside expert, immediately renegotiate public security mandates identified in the Consultant report that are mispriced to achieve at least \$4.87 million in savings on an annual basis, or \$584 million compounded over 30 years, while noting that this recommendation is not meant to preclude action on other savings recommendations elsewhere in this report that may supersede it.

- o We recommend that deploying these and other approaches, SERS, with the assistance of an outside expert, renegotiate all new (or renewed) private equity investment agreements to achieve at least \$12.18 million in savings on an annual basis, or \$926 million compounded over 30 years.
- o We recommend that PSERS, with the assistance of an outside expert, immediately renegotiate the public security mandates identified in the Consultant report that are mispriced to achieve at least \$4.91 million in savings on an annual basis, or \$560 million compounded over 30 years, while noting that this recommendation is not meant to preclude action on other savings recommendations elsewhere in this report that may supersede it.
- o We recommend that deploying these and other approaches, PSERS, with the assistance of an outside expert, renegotiate all new (or renewed) private equity investment agreements to achieve at least \$15.48 million in savings on annual basis, or \$1.17 billion compounded over 30 years.
- o We recommend that PSERS, with the assistance of an outside expert, immediately restructure its high yield allocation as suggested in the Consultant report, to achieve savings of at least \$42.5 million on an annual basis, or \$3.23 billion compounded over 30 years, while noting that this recommendation is not meant to preclude action on other savings recommendations elsewhere in this report that may supersede it.
- We recommend that, in the absence of the legislatively-created consolidated Central Pension Investment Office, the systems establish structures to share manager selection, monitoring, and risk control work between the two Systems.

Consolidation of Pension Investment Operations

It is recommended that the General Assembly enact legislation to establish a consolidated central pension investment office (“Office”) to manage and execute all investment mandates on behalf of and as directed by each of the Commonwealth’s retirement systems. While maintaining the existing governance structure for both retirement systems, the Office would avoid duplication of investment operations, enhance internal execution capacities, and leverage their combined fund size. The Office would have the following responsibilities:

- The Office would be responsible for the management, implementation, and execution of all investment mandates on behalf of both Systems pursuant to each retirement board’s adoption of asset allocation plans;
- The Office should be composed of high caliber investment professionals;
- The Office would be subject to a fiduciary standard requiring it to act in the sole and best interest of each client System and shall maintain vigorous reporting and disclosure standards consistent with those recommended in the Commission’s report; and
- The Office, in consultation with the respective System, should be the sole contracting authority to retain external investment management and consulting services on behalf of the Systems.

Procurement

- We recommend that both PSERS and SERS consider the benefits and limitations of adopting open competitive-bidding processes for investment managers.
- We recommend that SERS adopt an open competitive-bidding process for all investment consultants. (PSERS already has this in place.)

- We recommend that both PSERS and SERS publish policy documents that address the following:
 - o Circumstances (if any), for which asset classes, and for which categories of investment professionals are RFIs and RFPs issued?
 - o Publish all RFIs and RFPs. Publish the names of all respondents.
 - o Publish the contents of the responses.
 - o Identify the criteria and justification for exercising the single source / sole source exemption.
- We commend PSERS for urging investment management firms to comply with the CFA Manager Code and recommend that SERS do the same. We recommend SERS and PSERS include a firm's compliance with the CFA Manager Code as part of the evaluation and due diligence process.

Diversity

We recommend that the Pennsylvania General Assembly follow the lead of other states by enacting legislation to encourage diversity and inclusion efforts to increase the use of minority- and woman-owned asset management managers and firms. These initiatives include but are not limited to:

- Encouraging the Commonwealth's public pension systems and other investment boards to use minority investment managers in managing their assets, encompassing all asset classes, and to increase the racial, ethnic, and gender diversity of their fiduciaries, to the greatest extent feasible within the bounds of financial and fiduciary prudence, and to take affirmative steps to remove any barriers to the full participation in investment opportunities.
- Requiring the public pension systems and other investment boards to report annually on the ethnicity and gender of the members of their own staffs and boards as well as money managers they hire.⁴
- Requiring the public pension systems and other investment boards to obtain diversity information on each current and prospective manager and produce a minority inclusion report annually.
- Creating a Commonwealth online database of minority- and woman-owned asset managers.
- Adopting minimum goals for the utilization of minority- and woman-owned asset management firms.

⁽⁴⁾ (For reference, the Chicago Teachers' Pension Fund Response to the 2017 Senate Committee on Public Pensions and State Investments Minority and Female Investment Hearing Questionnaire can be found at https://www.ctpf.org/sites/main/files/file-attachments/2017_senate_questionnaire_report_final_vk3_0.pdf)



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

STRESS TESTING

I. Stress Testing

The Importance of Stress Testing

Stress testing is a tool for understanding risk. A stress test evaluates how a pension fund's assets and liabilities – and any associated changes to funding needs – are expected to respond to a specific set of events. As an example, a stress test might consider the impact on a pension funds' assets and liabilities of experiencing a 3-year period where the total return of the portfolio is 3% per annum below the current actuarial assumed rate of return. In contrast to other commonly used and reported risk measures, such as volatility, which measure average expected deviations from current return expectations, stress tests are more intuitive and useful for many decision makers.^x In general, stress tests measure the financial impact of moderate to severe adverse experience relative to key actuarial assumptions. Stress tests enable decision makers to identify a variety of specific and understandable scenarios in order to evaluate directly whether or not the probability and severity of certain adverse events are tolerable, to inform decision making, and to take appropriate steps to mitigate risk.

Stress testing is a crucial planning tool to help ensure fund solvency in good times and bad. All stakeholders—state lawmakers, taxpayers, plan beneficiaries, employers, and employees—can use stress test results to understand the risks being assumed by a pension fund and how they may impact the need for future funding to maintain a healthy plan. Pension fund board members and staff can use the results of stress tests to understand the financial risks facing the systems they oversee and to ensure that assets will be adequate to cover liabilities over both the short term and the long term.

For state lawmakers and officials who are tasked with writing the annual state budget, stress tests are particularly useful in giving insight into the circumstances that could impact the actuarially required contribution or the funding ratio. Stress tests also give insight into the potential implications of policy decisions. As actuary Joe Newton of GRS Consulting testified to the Commission, stress testing is a critical tool to show lawmakers the importance of maintaining discipline in contributing ARC even during favorable economic periods. He spoke of his

HISTORY OF STRESS TESTING

The concept of mandated stress testing of financial institutions is a relatively new concept that did not gain widespread industry acceptance in the United States until after the 2008-2009 recession. As part of the federal Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, regulatory provisions were enacted to protect the stability of the U.S. financial system. A central component was the requirement that large banks and bank holding companies undergo periodic "stress tests" to assist regulators and banks to better understand the impact of economic "shocks" to the banking system.^{xi} Acknowledging that regulators and bank directors cannot predict or control every economic risk, mandated stress testing is intended to evaluate the strength of a bank's financial position and balance sheet in order to reduce financial stress during challenging economic conditions.

Conceptually, financial stress testing is intended to (1) verify and identify specific structural risks within the financial institution; (2) provide greater understanding and insight into the management and operation of the institution; and, (3) maintain and improve risk management practices as a constant, even during periods of high profitability^{xii} Each of these objectives is applicable to public pension funds.

The Commission heard from Prof. Chester Spatt, a former member of the Federal Reserve Board's Model Validation Council, which was charged with evaluating and providing expert advice on banking stress testing models. Prof. Spatt testified that similar to banks, public pension funds are expected to maintain payment commitments during all types of economic conditions, including periods of economic stress. Also like banks, pension fund regulators and managers are unable to predict or identify every risk or its impact on investment fund portfolios, their liquidity and valuation. Citing the experience in the banking industry following the recent recession, Prof. Spatt advocated, as a best practice adopted in other state jurisdictions, the mandatory stress testing of each pension fund's investment portfolio and ability to fulfill annuitant payment commitments.

work in Hawaii, where several years of strong returns meant that decision makers could have reduced the state's contribution in the short term, but forward-looking projections of risks and funding levels ensured that they took the long view:

In Hawaii, we worked and worked and worked for years to get a solution put in place. And the solution is going to work and it's going to take time, but it's going [to] work. But the first two years after the solution was put in place, they had really good market returns. So all of a sudden, it looked like maybe they didn't have to go so far, maybe. . . the contribution rate didn't have to go quite so high. And so you get all the talk, "well, let's pull back on that." No, no, no. Stress tests can help you say "no." You have a 28-year problem, stop worrying about it, and let's move forward. Don't try to gobble at little cookies. Get your hand out of the cookie jar, and let's go forward, right?"^{xiii}

Similarly, stress testing can give insight into the implication of other policy decisions, such as changes in benefits. As David Draine, a Senior Officer at Pew Charitable Trusts, testified before the Commission:

Stress testing analysis can also avoid policy changes that add risk or unexpected cost in otherwise healthy pension systems. Pennsylvania has experience with this. In 2000, the state's pension plans were reporting a surplus, but subsequent decisions to provide the largest unfunded benefit increase in any state and to artificially lower contributions until 2010 contributed to a massive swing from surplus to funding gap. If policymakers and the public had more complete information about the cost of these changes and the risk of future downturns that would erase some of the investment gains from the late 90s, perhaps those decisions could have been avoided, leaving Pennsylvania in a much stronger position today.^{xiv}

The pension funds' boards, working through staff and consultants, are responsible for the asset allocation and risk controls of the investment portfolio. They need to understand what types of risks are tolerable and make tradeoffs between expected risk and expected return. To do this well, they need to understand how different potential investment portfolio structures will perform under certain economic and market stresses. For example, a higher allocation to illiquid investments exposes a pension fund to greater risk of not having cash on hand to make benefit payments. This risk could be particularly undesirable if that event – not having cash on hand to make benefit payments – is more likely to happen at the same time that tax revenues decline significantly, because of the budgetary strain placed on the state to make a higher ARC at a time when resources are scarce. Stress tests should be used by investment professionals to study the impact of specific investment assumptions – what may happen to the portfolio, for example, in a global decline of public markets, or a period of stagnant growth accompanied by significant inflation, or if private equity does not outperform public equity over the next 10 years, or if private markets' distribution rates decline significantly and contribution rates increase significantly relative to the assumptions. In these ways, stress tests can be used to determine better portfolio structures, including reasonable limits on the levels of illiquidity, leverage and volatility.

Stress testing is a critical tool to help all stakeholders – plan sponsors, investment staffs, boards, taxpayers, and beneficiaries – understand what can go wrong or right and how those events will change the funded status or the current ability to fund benefit payments from assets. It enables more informed planning and decision making. The Society of Actuaries Blue Ribbon Panel on Public Pension Plan Funding ("the Panel") says regular stress testing is "a means to analyze potential management strategies, with the objective of helping users assess how well the trust stands up to 'stress,' i.e., a period of market returns significantly above or below a baseline assumed return."^{xv}

What a Pension Fund Stress Test Should Measure

Pension fund stress tests measure the impact of specific events or sets of events (inputs) which can affect the aggregate measures of the pension fund's health (outputs) typically by affecting the value of the pension fund's assets, liabilities, and liquidity.^{xvi}

Inputs: The variables or inputs that can impact the aggregate measures of a pension fund's health are numerous. The value and liquidity of the assets of a pension fund are impacted, for example, by the total fund performance,⁵ the volatility of investment returns, the level of illiquid investments and contingent liabilities (such as unfunded commitments or derivative contracts that have legal claims on the assets of the fund), and the level and consistency of contributions (including the amortization rate). On the liability side, inputs typically include actuarial assumptions including mortality/longevity expectations and future employment and wage levels, as well as inflation rates.

Outputs: Stress tests typically produce outputs that represent aggregate measures of the health of a fund, including the liquidity of the fund (*i.e.*, is there enough liquidity to pay current expenses while rebalancing to continue the assumed investment strategy), the funding ratio, the probability of achieving full funding within a certain number of years, pension costs (including projected employer contributions), and the present value of the promised benefits and the costs of operating and investing the fund. As will be discussed below, the Blue Ribbon Panel lists the following as important outputs:

- Expected contributions (in dollars)
- Expected contributions as a percentage of payroll
- Funded ratios
- Ratio of benefit payments to payroll
- Ratio of funding liability to payroll
- Ratio of the market value of assets to payroll

Deterministic v. Stochastic Simulations: Typically stress tests measure the impact of a specific set of events. They are conducted using a deterministic simulation of how a portfolio performs under those

WHAT DOES STRESS TESTING TELL YOU?

It is commonly accepted that an investment portfolio for a young person starting out in a financially lucrative career can be less liquid and higher risk than that of an 80-year-old individual that must live off of his or her life savings. The difference between those two portfolios is intuitive: the younger person can tolerate a more severe decline in their investment portfolio because they can fund their living expenses from income in such a circumstance, whereas the older person cannot. This analysis is effectively a kind of mental stress test which highlights and responds to risks that other measures, such as volatility and Sharpe ratios, hide. In the world of pension funds, there are more variables that must be considered, and intuition alone is often insufficient. Formal stress testing provides needed discipline and information. It is an important risk analysis tool for determining appropriate asset allocations given the specific pension fund's circumstances.

"REVERSE" STRESS TESTING

Another way to go about stress testing is to start with the negative outcome and work backwards to determine what inputs are needed to avoid it. Because most stakeholders can agree on what qualifies as a negative outcome, this type of "reverse stress testing" can be even more effective than starting with inputs and identifying probabilities of projected outcomes. Newton described the process in his testimony:

Define a bad outcome [...] we're currently putting in 30 percent of pay, we don't want to put in 34 percent of pay. Great, there's your line. What scenarios create 34 percent of pay? [...] decision-makers, I find, can relate to that quicker. Because they can say, 'Okay, how likely is that outcome? What can we do to manage that outcome? But we can all agree that's a bad outcome.' 'We're currently 60 percent funded; we don't want to be below 50 percent.' Okay, well, then draw that line. What scenarios push you below 50 percent?'^{xvii}

⁽⁵⁾ There are numerous expected return and correlation assumptions that aggregate to a particular portfolio structure's expected investment return and volatility. Stress tests can be used to measure the impact of deviations from expectations of any of these assumptions.

precise circumstances in which the probability of the event is not part of the analysis. In a world of uncertainty, it is also possible to test how aggregate measures are impacted by changes in the probabilities assigned to future events. This is done through stochastic simulations where the distributions of future returns and risks are different than they are in the baseline. The Blue Ribbon Panel acknowledges that stochastic study can be a powerful decision making tool, and in fact is “more sophisticated” than deterministic stress testing,^{xviii} but that deterministic stress tests are more useful for communicating among diverse stakeholder audiences.

An important characteristic of a robust stress test is that it accounts for multiple specific scenarios of events. In his testimony before the Commission in July, Kenneth Kent, an actuary who has conducted past analyses for the Commonwealth, explained why having multiple projections to compare to a baseline is important: “Without projections, you have no idea if your funding policy works. Baseline projections are never right. Uncertainty increases over time. [...] forward-looking potential outcomes are important decision-making factors.”^{xix}

Blue Ribbon Panel Recommendations & Other Best Practices

The Society of Actuaries chartered the Blue Ribbon Panel on Public Pension Plan Funding in April 2013 with a call to:

- *Develop recommendations for plan trustees, legislators and plan advisors on how to improve plan financial management and strengthen plan funding going forward*
- *Assess the principal factors influencing the changing funding status of plans.*^{xx}

The Panel, which included actuaries, economists, former pension plan trustees, and government finance experts, were guided by the principle that “plans should keep the pension promises made to participants.” The Panel’s primary objective was to “develop recommendations that will enhance stakeholders’ understanding of the financial position and risk profile of the trust, support decisions to make plans financially stronger, and improve the ability of funding entities to respond to adverse conditions.”^{xxi}

As a result of this mission, the Society of Actuaries’ Blue Ribbon Panel on Public Pension Plan Funding released recommendations in 2014 regarding improvements in disclosure and risk- measurement practices—including stress testing—with the intention of ensuring that stakeholders have the information necessary to make informed decisions on public pension funding.^{xxii}

According to Robert Stein, former chair of the Panel, failure of investments to meet the target rate of return and failure of a state to make ARC are the two greatest risks to a pension system.^{xxiii} The Panel’s formal recommendation on stress testing is that public pension stress tests evaluate three different scenarios:

1. The effect of the state paying only 80 percent of ARC.
2. The effect of investment returns being three percentage points above the baseline.⁶
3. The effect of investment returns being three percentage points under the baseline.

For each of these scenarios, the Panel recommended conducting the stress test for a total projection of 30 years: 20 years in which the “stress” occurs annually, and an additional ten years to observe any residual effects from the stress.

The Commission heard testimony arguing that extreme scenarios can be no more telling than more moderate or realistic scenarios (e.g., observing 20 years of stress is not a more useful exercise than observing a short period of stress, and that observing three percentage points below the baseline is not a more useful exercise

⁽⁶⁾ The baseline is not the plan’s assumed rate of return, but a forward-looking analysis based on the U.S. Treasury rate and risk premia as well as other actuary assumptions; the investment return used in the baseline is typically lower than most plans’ assumed rate of return. Methodology for developing the baseline is described in Appendix III of the Blue Ribbon Panel report.

than observing one or two percentage points below the baseline). In fact, actuary Joe Newton of GRS argued that an extreme scenario can have the effect of either desensitizing lawmakers to the reality of risks, or overwhelming them in their efforts to make decisions/find reasonable solutions. This commentary was echoed by SERS in a document submitted to the Commission, which stated that “the three tests recommended by the panel are not relevant enough for most governmental plans because they consider excessively long periods of time (20 years).”^{xxiv}

Considered to be a more moderate set of best practices than the Blue Ribbon Panel recommendations, the Actuarial Standards Board has issued Actuarial Standard of Practice (ASOP) No. 51, which states that scenario analysis, including stochastic modeling and stress testing, should be used as part of risk assessments; the standard does not offer a specific scenario to test but does recommend stress testing for investment, interest rate, and contribution risk (“where contributions are not made in accordance with funding policy”), as well as a lower discount rate based on bond market yields and U.S. Treasury rates.^{xxvi} ASOP No. 51 took effect on November 1, 2018. Additionally, GASB Statement No. 67 requires a sensitivity analysis of pension funding under a scenario showing +/- 1 percent of the discount rate, as well as a 10-year lookback at actual v. actuarially determined contributions, and actual contributions as a percent of payroll, to illustrate the impact of investment and contribution risks.^{xxvii} A comparison of the Blue Ribbon Panel recommended risk measures and disclosures with GASB 67 requirements and ASOP No. 51 is excerpted below.

EFFECTIVE USE OF STRESS TESTING — SEAT BELT SAFETY EXAMPLE

The following example was provided by Joe Newton of GRS Consulting to highlight what makes a stress test so useful and where they can go wrong.

A company wants to gauge the effectiveness of its seat belts and airbags. Now, if they go to extremes in their testing, the results are predictable. Run the car into a wall at 200 mph, and the vehicle is smashed to smithereens. Run the car into the wall at 10 mph, and there may not even be a ding in the bumper. Neither test reveals anything important about the effectiveness or potential design flaws of the seat belts and airbags.

In contrast, by testing within reasonably expected conditions, the company determines that existing technology provides a fine line between success and failure. At 53 mph, everyone lives. At 55 mph, everyone dies. So now the company wants to figure out how to raise the crash survival speed to 65 mph. They will run all sorts of design variations until the goal is accomplished.

This serves to explain stress testing. Run it at extreme circumstances, catastrophic or soft, and absolutely nothing is learned, or worse, the results could be used to mislead constituents into a false sense of safety or risk.

In the pension fund world, the safety features are the portfolio structure, the speed of the crash event is the economic crisis scenario being tested, and the outcome is the financial impact on contributions and future returns. The goal of stress testing is to understand how well the portfolio structure will stand up to different size and type economic events and for what size events there will be a real problem. Pension fund boards must then attempt to find portfolio structure designs that enable success under most scenarios without taking undo risk.^{xxv}

Figure 5 : Approaches to Measuring Risks for Public Pensions

APPROACHES TO MEASURING RISKS FOR PUBLIC PENSIONS
SOA BLUE RIBBON PANEL'S 2014 RECOMMENDATIONS COMPARED TO CURRENT AND PROPOSED ACCOUNTING REQUIREMENTS AND ACTUARIAL GUIDELINES

BLUE RIBBON PANEL REPORT CATEGORY (Purpose) ^a	BLUE RIBBON PANEL RECOMMENDATION	GOVERNMENTAL ACCOUNTING STANDARDS BOARD (GASB)	ACTUARIAL STANDARDS BOARD (ASB) ACTUARIAL STANDARD OF PRACTICE (ASOP) NO. 51 AND PROPOSED REVISIONS TO ASOP NO. 4 ^f	
			AREA OF RISK	METHOD FOR ASSESSING RISK
RISK MEASURES AND ANALYSES				
Measures of Risk to Financial Position (Understanding Current Risk Levels)	(1) Standard deviation of expected returns on asset portfolio; (2) Plan Liability and normal cost at risk free rate; (3) Standardized plan contribution.	Sensitivity of the net pension liabilities to changes in the discount rate at +/- 1% vs. single discount rate. ^b Single (blended) discount rate is determined by comparing projections of the plan's fiduciary net position to projected benefit payments. ^c	Investment risk defeasement measure (included in exposure draft of proposed changes to ASOP No.4) supplement disclosure of obligation (plan liability) measures to reflect the cost of defeasing investment risk. ^g	Calculating liabilities using discount rates consistent with market yields for a bond portfolio whose cash flows match benefits expected to be paid; based on yield for U.S. Treasuries or fixed-income securities that receive one of the two highest ratings.
Stress Testing (Measuring Investment and Contribution Risk)	Financial projections over 30 years using baseline investment return assumptions as well as returns at +/- 3% investment returns vs. baseline and 80 to 100% of ARC payments.	10-year schedules comparing actual contribution amounts with actuarially determined contribution requirements and ratios of actual contributions to payroll allows tracking of the past impact of investment and contribution risk. ^d	Investment, Interest rate, & Contribution risk (ASOP No.51); Definition of Contribution Risk cites instances "where contributions are not made in accordance with funding policy."	Stress testing, scenario, and stochastic analysis
ENHANCED DISCLOSURE				
Un-Discounted Cash Flows (Providing Data for Independent Assessment of Plan Obligations)	Disclosure of projected benefit payments for current employees to allow for independent assessment of plan obligations.	N/A	N/A	Unit credit method in ASOP No.4 §3.11 (b) uses un-discounted cash flows but does not require thee calculations to be disclosed.
Financial and Demographic Trends	10 years historical data of assets, benefit payments, and liabilities to payroll, as well as recommended contributions to revenue; and actual to recommended contributions.	10-year schedule of changes to net pension liability by source. ^e	Longevity and Other Demographic Risk (ASOP No.51 S 3.2); Plan maturity measures (ASOP No.51 3.7) five ratios.	(a) Assets/payroll; (b) retired liability to total liability (AAL basis); (c) Cash flow to assets; (d) benefit payments/ contributions; (e) durations of AAL.

Source: Pew Charitable Trusts 2018⁷

By the time of this writing, five states (California, Connecticut, Hawaii, New Jersey, and Virginia) have enacted legislation that requires public pension systems to conduct stress testing.⁸ While there is considerable variation among these laws, all require regular stress testing, most of them require stress tests to be posted publicly or reported to the elected officials such as the legislature or governor and require the projections of pension contributions and/or pension costs – which are of interest to state budget writers—under various scenarios. Tables comparing these states and their requirements are presented here.

⁽⁷⁾ For original matrix and associated footnotes, see Appendix I.

⁽⁸⁾ Colorado law also requires that its pension employees' retirement system undergo a sensitivity analysis, which is similar to a stress test. Washington state law does not specifically require stress testing, but the Office of the State Actuary regularly conducts risk assessments of its public pension systems as part of its biennial "Report on Financial Condition and Economic Experience," which is required by statute. As a result, a total of seven states have some kind of formal risk assessment requirement.

Figure 6: States with Stress Testing Laws for Public Pensions

STATE	FREQUENCY	ACCESSIBILITY	INPUTS & SCENARIOS	OUTPUTS
California	Annual	Reported to the Legislature, Governor, and Chair of the California Actuarial Advisory Panel; presented in a public hearing within 30 days of report	1. The investment return assumption used to determine contribution rates, +/-2% 2. Amortization period for any unfunded liabilities, based on estimated average remaining service periods of employees covered by the contributions 3. Discount rate utilized by the board for reporting liabilities, -2% below actuarially assumed ROR	1. Calculation of contribution rates. 2. Calculation of contribution rates. 3. Liabilities 4. Market value of the assets and explanation of how the actuarial value assigned to those assets differs from the market value of those assets
Connecticut	Annual	Reported to General Assembly, posted publicly online	Inputs not specified. "Various economic and investment scenarios."	Benefit levels, pension costs, liabilities, debt reduction.
Hawaii	Annual	Conducted by actuary, submitted to Legislature.	At least four scenarios, including baseline assumptions; investment returns -2% below assumed RoR with no adjustment to contributions; a one-year investment loss of 20% followed by a 20-year period of investment returns -2% below plan assumptions, with no adjustment to employer contributions; a discount rate equal to the 10-year average of the yield of thirty-year Treasury notes.	Include assets; liabilities; pension debt; service costs; employee contributions; employer contributions; net amortization; benefit payments; payroll; funded ratio; accrued liability; total plan normal cost for all benefit tiers; employer normal cost for all benefit tiers
New Jersey	Regular	Approved by actuaries of the State-administered retirement systems and posted publicly online	25 years of past performance data 25 years, including gross and net of fee investment returns, and returns by asset class	"Investment performance"
Virginia	Regular	Not specified, but report is available online.	Inputs not specified. "Various economic and investment scenarios."	Benefit levels, pension costs, liabilities, debt reduction.

Source: California: Cal. Gov't. Code § 20229 (Deering, Lexis through 2018 Reg. Sess.); Connecticut: Act of October 31, 2017, Public Act No. 17-2, § 109 (June 2017 Spec. Sess.); Hawaii: Haw. Rev. Stat. § 88-105.5 (Lexis through 2018 Sess.); N.J. Rev. Stat. § 43:3C-26 (Lexis through 218th First Ann. Sess.); Virginia: Va. Code Ann. § 51.1-124.30:1 (Lexis through 2018 Spec. Sess. I).

Figure 7: States with Risk Assessment Laws

STATE	FREQUENCY	ACCESSIBILITY	INPUTS & TEST CONDITIONS	OUTPUTS
Colorado	Annual	Conducted by actuary and reported to Governor, the joint budget committee, the legislative audit committee, and the finance committees of the senate and the house of representatives, or any successor committees. Report to public annually on status of plan to reach full funding	Inputs not specified, although separate statute requires that economic and investment assumptions be independently reviewed every 3 years. Conditions: "sensitivity analysis to determine when, from an actuarial perspective, model assumptions are meeting targets and achieving sustainability."	Not specified.
Washington	Biennial	Not specified.	Not specified.	Not specified.

Source: Colorado: Colo. Rev. Stat. § 24-51.4(a)(III) and § 24-51-614(6) (Lexis through 2018 Legis. Sess.); Washington: Wash. Rev. Code Ann. § 41.45.030 (Lexis through 2018 Reg. Sess.).

Evaluation of PSERS & SERS Stress Test Practices

Both SERS and PSERS responded to the Commission’s request for information on their stress testing practices. The Commission considered their practices as reflected by their responses with respect to the Blue Ribbon Panel recommendations and other practices mentioned above. The Systems’ stress test reports and information on their practices, which are included in Appendix II, are discussed below and evaluated in three areas: (1) content, primarily whether or not they meet the Blue Ribbon Panel recommended practices; (2) accessibility, *i.e.* the availability of the reports and the frequency with which they are produced; and (3) presentation, *i.e.* the usefulness of the reports to a wide group of stakeholders.

A. SERS Stress Test Evaluation

System Practices v. Blue Ribbon Panel Recommendation

SERS’ answers “SERS-001-1.1 SERS Stress Test Analysis,” “SERS -001-1.2 SERS Investment Fee Reduction Plan,” and “SERS -001-1.3 2018-03 PASERS - The Analytic Foundation for the 2018-2019 SERS Strategy Investment Plan”, as well as “SERS-004” – a questionnaire that includes several questions on stress testing -- are included in Appendix II.^{xxviii} The Commission evaluated these documents and practices in terms of the specific recommendations of the Blue Ribbon Panel. SERS’ current practices do not comport with the Panel recommendations, as presented in the table below:

Figure 8: SERS’ Stress Testing Practices

AREA OF CONSIDERATION	SERS PRACTICE
BLUE RIBBON PANEL GUIDELINE	
Baseline Calculation Report – key aggregate metrics under a set of actuarial assumptions and a benchmark return derived from market yields	An ad hoc stress test, in response to a board inquiry, was completed examining the impact of various 1-year horizon equity events.
20 Years of a Specific Stress Event, 30 Years of Projections	The asset-liability study, last completed in 2015 and appended to SERS-001-1.3 2018, includes a report of projected plan aggregate statistics in 2034 resulting from: <ul style="list-style-type: none"> • 20 years of falling short of the actuarial assumed rate of return by 1%^{xxvi} • Contributions remain at 25% of salary
<ul style="list-style-type: none"> • Stress Event 1: Earning 3% less than the benchmark return for 20 years 	The asset-liability study also includes a stochastic analysis using the current assumption about expected returns and variance-covariance. This does not test for average returns being lower than expected and it is impossible to interpret the percentile results in terms of realized returns. The study does show some very limited analysis of an overall increase in correlations and overall increase in volatility.
<ul style="list-style-type: none"> • Stress Event 2: Earning 3% more than the benchmark return for 20 years 	
<ul style="list-style-type: none"> • Stress Event 3: Receiving contributions at 80% of recommendation 	
Accessibility: Frequency & Availability	Asset-liability studies appear to be completed only once every several years. Stress testing should be part of a rigorous risk analysis and not completed ad-hoc at the request of a Board member. Stress tests are not readily available to public.
Presentation & Usefulness	Analysis of issues is lacking: for example, on page 9 of Stress Test Analysis, the Fund would experience a negative liquidity position with a 10th percentile equity event, but no further analysis or discussion of policy implications is provided.

Specifically, SERS' practices vary from the Panel's stress test recommendations in the following ways:

- The asset-liability study looks at 20-year projections as compared to the 30-year projections suggested by the Blue Ribbon Panel.
- The stress test analysis (SERS-001-1.1) focuses primarily on short-term equity stress. The Panel suggests that both financial and contribution stress be studied, as well as other risks such as longevity. Changes in interest rate levels, credit spreads, and equity levels can all be considered together and are particularly important because non-traditional assets, which comprise a significant portion of SERS' investments, may be more sensitive to some of those variables. The 2008 financial crisis is a good example of conditions that should be modeled.
- Neither document captures the key recommendation of the Panel, projecting a baseline return that is distinct from the actuarially assumed rate of return. The BRP recommends modelling funding statistics related to realizing that baseline return, realizing 3 percent per annum more than that return for 20 years and realizing 3 percent per annum less than that return for 20 years, looking over a 30-year horizon. It also recommends calculating the sensitivity to funding at only 80 percent of the recommended funding levels. It does not appear that SERS makes or reports either of these calculations.

Accessibility of Stress Test Reports: Frequency & Availability

The Commission also considered whether stress tests are conducted regularly and how widely they are made available.

- **Frequency:** While the Blue Ribbon Panel is silent on the frequency with which stress tests are conducted, best practices, the practices of other states, and common sense imply that these tests should be conducted on a regular basis. A form of stress tests—again, not in accordance with Panel recommendations—are included in documents that are produced no more frequently than every other year: Stress testing is included as a part of the investment strategy plan produced “at least every other year” and as a part of asset-liability studies, which are conducted “generally every three or four years” (SERS-004 question #1). On an ad hoc basis and “at the request of the Board” (SERS-004 question #1), SERS will conduct “customized” stress tests such as the one shown in SERS-001-1.1. Of the states that have recently enacted stress testing or other risk assessment requirements, four states (CA, CO, CT, and HI) require annual testing; two states (NJ and VA) require “regular” stress testing and one (WA) undergoes biennial testing.
- **Availability:** SERS' stress test reports are presented to trustees and are not available online. The Blue Ribbon Panel endorsed the practice of publishing stress tests: “The Panel believes that recommended risk measures, analyses and other risk management information should be shared with others responsible for funding decisions: elected and civil service officials as well as other parties of interest, including taxpayers/service recipients, plan members and union officials, other stakeholders, and the media.”^{xxx} All but one of the seven states with stress test or similar risk assessment laws require that results be reported to the public or to an elected official (such as a governor, auditor, or legislature).

Presentation & Usefulness

The Commission considered whether or not SERS' stress test reports would be useful for the wide audience of stakeholders interested in the health of the pension fund. SERS current practices, while professionally prepared, are opaque, highly technical, and lack independence.

- The stress test analysis (SERS-001-1.1) was prepared by SERS' general investment consultant rather than an independent party or actuary. The Panel recommends that an actuary is in a unique position to conduct the independent analysis necessary for a robust stress test.
- The stress test analysis is insufficiently detailed: for example, on page 9 it shows the Fund would experience a negative liquidity position with a 10th percentile equity event, but has no further analysis or discussion of policy implications.
- The stress tests that appear in the asset-liability study and the asset allocation study are highly technical and would be difficult for a lay reader to understand without context or explanation. In

addition, they appear intended more to help the Board to compare and contrast asset allocations, rather than for a policy-maker audience trying to garner insight into specific risks facing the systems.

- State legislators and the public are particularly interested in pension funds from the perspective of the cost of contributions. The Panel recommends that stress testing include baseline financial measures that would be of interest to legislators and the public, including expected contributions (in dollars), expected contributions as a percentage of payroll, funded ratios, and the ratio of benefit payments to payroll. Five of the seven states with recent stress test or similar risk assessment laws included requirements that analyses measure the impact of various scenarios on projected pension costs or contributions. SERS' stress tests do not measure the contribution risk (risk of deviating from the recommended contribution level), nor do they regularly measure the impact of stress scenarios on the contribution by the employer or the state.

B. Evaluation of PSERS Stress Test Practices

System Practices v. Blue Ribbon Panel Recommendation

- PSERS submitted three documents to the Commission, including a 2017 asset-liability study (PPMAIRC PSERS-001 #1), a 2017 asset-liability follow-up report (PPMAIRC PSERS-004 #8B Aon2), and a 2018 asset-liability study (PSERS-Asset-Liability Study Results (20180723) FINAL), as well as a questionnaire (PPMAIRC PSERS-004 Responses).^{xxxi} Results of the Commission's consideration are presented below.

Figure 9: PSERS Stress Testing Practices

AREA OF CONSIDERATION	PSERS PRACTICE
BLUE RIBBON PANEL GUIDELINE	
Baseline Calculation Report – key aggregate metrics under a set of actuarial assumptions and a benchmark return derived from market yields	PSERS provided copies of the 2017 and 2018 asset-liability studies conducted by AON. The analysis covers 30 years of projections.
20 Years of a Specific Stress Event, 30 Years of Projections	Page 92 of the 2018 study includes stress tests similar to that recommended by the Blue Ribbon Panel stress tests. There are two deficiencies: PSERS use their actuarially assumed rate of return for the baseline rather than the calculation that BRP recommends. PSERS reports on some but not all of the aggregate measures recommended.
<ul style="list-style-type: none"> • Stress Event 1: Earning 3% less than the benchmark return for 20 years 	There is also a stochastic analysis of the current assumptions.
<ul style="list-style-type: none"> • Stress Event 2: Earning 3% more than the benchmark return for 20 years 	There is a section in the 2018 analysis on deterministic scenarios labeled base, blue skies, recession and black skies. The return assumptions are described on page 86 and 88 and address only short term stress of less than 5 years.
<ul style="list-style-type: none"> • Stress Event 3: Receiving contributions at 80% of recommendation 	
Accessibility: Frequency and Availability	Annual; published on website.
Presentation and Usefulness	There is important information in these reports, but it is difficult to locate, digest, and interpret buried within 100+ pages.

Source: PSERS

The Commission notes:

- PSERS' latest asset-liability report does stress tests consistent with the Blue Ribbon Panel recommendations, although it is noted that PSERS uses their normal actuarial assumptions including their normal actuarially expected rate of return rather than the baseline calculations recommended by the BRP. The outputs of the stress test also do not include all of the aggregate measures recommended.
- The results of this work are important and should be featured more prominently than in the appendix of a 100+ page document.

Accessibility of Stress Test Reports: Frequency & Availability

- *Frequency:* PSERS stress tests are included in their asset-liability study, conducted annually by their general investment consultant.
- *Availability:* PSERS informed the Commission that these documents are available on the PSERS website.

Presentation & Usefulness

In terms of presentation, a shorter, more concise deliverable would be more useful to constituents and policy makers. The presentation should include brief objective commentary on specific stressors and specific risks to monitor and/or results that stand out as positive or negative. These analyses are designed to highlight areas where investment allocation or policy changes need to be considered and clarity is critical. As Robert Stein observed:

There is a lot of good work in these reports and very much complex modeling. But even as a knowledgeable reader, I find the core issues, recommendations and basis therefore, and implications to the overall condition of the plans, i.e., considering both contribution and funded ratio outlook, difficult to extract and focus on. Good and clear communication should not take 100 pages.^{xxxii}

The Commission considered the Blue Ribbon Panel's example stress test reports, and included these in Appendix I.

Additionally, as with SERS, the fact that the stress tests are conducted by PSERS' investment consultant presents an opportunity for bias. In general, investment consultants may have reasons for favoring one allocation or strategy over another. Actuaries' focus is on risk measurement, whereas the focus of investment professionals is to develop an asset allocation that best meets the trustees' risk appetite. Investment professionals have greater capital market understanding and expertise than actuaries. An actuary can and should incorporate information provided by investment professionals about risks associated with variability of investment returns (along with other risk factors as mentioned above).

Testifiers at the July 2018 Commission hearing noted that all pension funds already work with outside actuaries, and therefore have the necessary tools in place to conduct stress tests.^{xxxiii} Stein stated not only that the Blue Ribbon Panel views stress testing as an "essential tool when considering plan changes," but that it is "Really the best way, maybe the only good way, to get objective evidence of the affordability and sustainability of proposed plan changes, and that an analysis should be done, of course, before those plan changes are adopted."^{xxxiv}

It is especially important for mature public pension such as Pennsylvania's to regularly conduct rigorous stress tests. Because retirees outnumber active employee, mature plans have a negative cash flow. According to Pew,

For states like Pennsylvania with low funded levels that may already be at budget capacity for funding pensions, it may be difficult for their retirement systems to achieve fully funded status and the attendant reduction in costs within a 30-year time horizon if returns fall short of current targets. As a result, the state's continued attention to managing unfunded liabilities, including a current study to lower investment fees and to adopt regular stress test reporting, is essential.^{xxxv}

Recommendations

- We recommend that the General Assembly enact legislation requiring an annual stress test of each system, broadly aligning with the Blue Ribbon Panel (Panel) recommendations and including at least a 2-percentage point variation in a baseline benchmark return, as well as a quantifiable contribution risk such as the 80 percent measure recommended by the Panel. Although the Panel recommends a 3-percentage point variation, a 2 percent variation would be consistent with practices in states that have enacted similar legislation. In addition, assumptions used in baseline analysis calculations made by the Systems should be reported, as these may include actuarial assumptions differing from those recommended by the Panel.
- We recommend that the Systems' stress tests report the impact of the stress on other financial measures—including expected contributions in dollars, expected contributions as a percentage of payroll, funded ratios, ratio of benefit payments to payroll, ratio of funding liability to payroll, and the ratio of the market value of assets to payroll—and cover a period of at least 30 years, in accordance with the Panel recommendations.
- We recommend that stochastic models be used in addition to—not in place of—deterministic modelling. We commend PSERS for its recent stress testing report and encourage them to continue to do stress testing consistent with the Blue Ribbon Panel recommendations.
- We recommend that the Systems make their stress test reports publicly available. Reports should be provided to stakeholders and policy makers, including plan beneficiaries, the Governor, the Legislature, Board of Trustees, staff, the Auditor General, and the general public.
- We recommend that the Systems' stress test charts be simple to understand, with the policy question or decision that the chart addresses featured prominently and clearly at the top of each chart.
- We recommend that the Systems' stress tests be conducted by an experienced actuary, not an investment consultant. Although investment consultants can provide useful input, only actuaries have the tools and techniques to conduct stress tests of a pension fund.
- We recommend that the Systems conduct and publish “reverse” stress tests showing the market events and funding scenarios that would cause certain undesirable outcomes, including but not limited to the funds' investment portfolios to become more illiquid than a Board-determined threshold limit (expressed as a multiple of annual distributions).



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

TRANSPARENCY

II. Transparency

Why Transparency Matters

Transparency refers to the way in which information – data, analyses, or processes – is disclosed. Full transparency means that pertinent information is complete, accurate, easily understandable and accessible. Transparency is critical to improved investing outcomes, because it gives decision makers and stakeholders the information that they need, in a format that they can use, to make prudent decisions and evaluate performance.

Complete information means that all pertinent information is included. Accuracy means that information is correct, that calculations are made with processes that can be monitored and verified, and that any assumptions used in calculations are identified and explained. Critical to transparency is that the information is easily understandable: an unnecessary overloading of data lacks as much transparency as omitting relevant facts. Of course, if decision makers and interested parties cannot access the information easily and in a timely fashion, then transparency is thwarted rather than advanced.

A call for transparency has become common in many public policy debates. Often lost, however, is an identification of the underlying objective associated with the demands for greater openness and transparency. In other words, why is transparency important? In the realm of public pension funds, transparency leads to better management of the pension assets, better budgeting for and planning of contributions, and better oversight of both. Transparency serves to keep public pension systems accountable to their beneficiaries, their overseers, and their public.

There are two ways in which full transparency enables better management and oversight of public pension funds. First, full transparency facilitates good decision making. It is impossible to make the best decisions – or to evaluate decisions made – without knowing all of the material facts. Second, full transparency is critical for establishing and maintaining trust among all stakeholders: beneficiaries, boards, staff, employees, employers, taxpayers, legislators and other elected officials. When information is incomplete or selectively reported, it raises questions for all involved. What is missing and why? In all transactions, but especially those involving public dollars, trust is fundamental. That trust can be easily eroded, with devastating consequences.

What Transparency Means for Public Pension Fund Management

In discussing transparency for public pension fund management, we need to go beyond the concepts of complete, accurate, understandable and accessible to define *what* information is shared *with whom*, *in what format* and *when*.

What: Stakeholders are entitled to a transparent disclosure of investment risks and exposures, investment performance, fees and costs, and the decision-making processes governing them:

Investment Risks and Exposures: Stakeholders should clearly understand the risks being taken with public pension fund assets. In today's financial markets, the following risk information is the minimum required for prudent investment management.

- Allocations and Systematic Investment Risk – Exposures/allocations – reported both in dollar value and as a percentage of total assets, as well as aggregate risk metrics⁹ – to broad asset classes, geographies, investment styles, sectors and industries. These allocations detail not only current net asset values, but also exposures from unfunded commitments, the leverage used both directly and indirectly to achieve the exposure, and the liquidity profile within each allocation. Gross long and gross short positions must also be disclosed.¹⁰

⁽⁹⁾ Aggregate risk metrics would be measures such as net US Equity beta, duration, spread duration, inflation expectations sensitivity and currency exposures. Calculations and assumptions used to estimate those measures should be clearly disclosed and defined. Sophisticated investors measure and monitor these risk exposures looking through to the holdings of underlying investments of any investment fund.

⁽¹⁰⁾ A position that is 1000 times long Facebook and 1000 times short Amazon may have zero equity beta, but it is far from a riskless position.

- **Diversification Risk** – disclosures on diversification including the maximum exposure to any one investment manager, one company or investment vehicle, the exposure to internal active investment management, internal index management, and the exposures to any one industry or sector.
- **Liquidity Risk** – In addition to reporting current liquidity estimates with the allocations, a separate analysis of liquidity is required when leverage and/or illiquid investments are employed. This involves clear calculations of the liquidity of the portfolio under different scenarios – including tests of assumptions related to the pacing of private markets capital commitments and distributions, broad market events and their impact on the value of the portfolio and on contingent liabilities,¹¹ and funding policy, and the interactions between them – to ensure sufficient liquidity to pay benefits and maintain an appropriately balanced portfolio. Liquidity needs are best understood in the context of cash flow statements and forecasts and stress tests of them.
- **Leverage Risk** – Related to liquidity is the need to understand leverage and any contingent liabilities. From Lehman Brothers’ bankruptcy, the Orange County bankruptcy, to the failure of Long Term Capital Management, most past significant financial crises have been related in some way to a lack of understanding of and preparation for the risks associated with leverage and liquidity. Leverage can be direct borrowing, but it is also embedded in unfunded capital commitments, exposure to swaps, futures, options and other derivative contracts. Details of these exposures is critical to prudent management. (See footnote 4.)

Investment Performance: Stakeholders need to be able to examine pension fund investment performance and feel confident that the board and staff do, too. The purpose, as will be discussed in greater detail in a later section of this report, is to evaluate critically: How have investment decisions fared? Should any processes or assumptions that have been driving those decisions be re-evaluated? Disclosure should include an evaluation of the performance of the systematic risk exposures (often referred to as asset allocation), of portfolio allocations to particular market segments, of individual managers, of the manager selection process, and of internal asset management decisions. This performance information should include risk measures and adjustments including benchmark returns, net-of-fee returns, and gross-fee returns, the latter being particularly important for measuring and evaluating risk. Top performers are unafraid of having their records evaluated critically by others, or of having their assumptions challenged in order to improve their own thinking.

Fees/Costs: Without a comprehensive reporting of investment costs and expenses, it is simply impossible to accurately measure and evaluate performance, either internally or externally. As Dr. Ashby Monk testified, “because much of the compensation data has been buried in fund footnotes, hidden in net asset value calculations, waived away as profit sharing or ignored by pension. . . the information was thus not reported. Not measured. Not tracked. And not managed.”

- Both gross-fee and net of fee returns matter for proper evaluation of performance. Some pension funds, including PSERS, have defended the non-reporting and/or monitoring of certain fees and investment costs by claiming that it is only net-of-fee returns that matter.^{xxxvi} In fact, net of fee returns often mask the quality of the investment decisions by distorting and hiding the real risks of the underlying investment. The Governmental Accounting Standards Board in its Statements 25 and 67, which provide guidelines for which pension performance is reported, has stressed the value in stakeholders having information on both gross and net performance.^{xxxvii} It is worth noting that SERS’ consultant, RVK, provides reporting on both a gross and net basis for the Commonwealth’s Deferred Compensation program.
- Investors must understand all fees and costs charged by a manager in order to form an intelligent judgment as to the manager’s ability to consistently outperform a low fee alternative with similar risk characteristics. Active management by definition involves taking risk with the goal of generating

⁽¹¹⁾ *Contingent liabilities exist in many forms. An important example is that from a swap contract where the investor agrees to receive/pay the positive/negative returns from a broad market index (over the implied financing rate). When the index declines, the investor is obligated to make a payment from other assets of the investor and must have the liquidity to do so.*

investment return outperformance. As the fee paid to the active manager increases, the higher the (gross of fees) excess returns over the alternative must be in order to deliver the same net of fee performance.

- Alignment of interests or lack thereof between manager and investor cannot be understood without full transparency of fees and costs. When an investment manager earns fees from additional activities related to the management of the assets, it is possible, even likely, that there will be conflicts of interest. For example, an investment manager earning monitoring or consulting fees related to its investment in a particular company may be incentivized to hold the company longer. Base asset management fees can incentivize asset gathering and performance-based fees share upside returns but not downside risk. Without transparency of all fees and costs, neither the pension fund staff nor board members have the ability to monitor or manage these conflicts.

Processes and Decisions: A critical component of evaluating performance is monitoring the quality of past decision making and processes, and using the information to refine assumptions, procedures, and implementation where necessary. Knowing exactly what the decision-making processes are, what risk controls are in place, and what compliance systems are used to ensure smooth operations should be part of that evaluation – particularly when public assets and liabilities are at stake.

- Board decisions: Public pension decisions and the process that leads to them should be transparent. Board meetings are public for a reason. The public has a right to observe the debate of an engaged board that adds value through probing questions and not simply accepting whatever is presented to them. The materials presented at board meetings, the data to make the decisions, should be accessible in unredacted format. The board is also responsible for ensuring sufficient risk controls in the form of investment policies and compliance procedures and these should be publicly available.
- Portfolio Implementation: In addition to setting risk limits and setting current risk exposure targets, a pension fund board oversees portfolio implementation. As such, the processes for manager (including internal management) evaluation, selection, and monitoring should be written and publicly available. Procedures for disclosing any conflicts of interests should be clear and verifiable, and any additional diligence consistently done to eliminate conflicts of interest should be disclosed.
- Risk Measuring, Monitoring and Controlling: Performance evaluation, risk monitoring, portfolio rebalancing, and compliance are critical functions of a well-managed investment portfolio. Decisions and processes related to these functions need to be fully disclosed.

With whom: All stakeholders have a right to know that public money is being managed prudently. Unlike private pension funds, endowments or foundations whose constituents are limited, public pensions are unique investment entities with a wide group of stakeholders, including not only the current and past employees, but all taxpayers in the state and their representatives in the General Assembly. Benefits are a legal obligation that must be fulfilled even if at the expense of other state spending. Poor investment results risk higher taxes, lower state services, and/or changes to retirement benefits or employee contributions. It is imperative, therefore, that all stakeholders feel confident that best practices are used and resources are effectively deployed. Full transparency with all stakeholders is critical to ensuring that trust.

It is also critical for a pension system to be transparent with itself. Board members and investment staff must know what the system does well, what it does not do well, and how to act accordingly. Transparency fosters a culture of honesty, a pursuit of continuous improvement, and an openness to – not defensiveness against – challenging thinking.

In what format and when: Information needs to be easily accessible in a timely manner in a format that is easy to use. Decisions based on out-of-date information will not be as good as decisions with the most current information. The decision points that the data impact should be noted. Since best practices are continually

evolving, the systems should regularly review and revise what is being shared and in what format and where. As an example, there is currently tremendous effort across the country to develop real time dashboards for the use of many institutional investors.

Concerns about Transparency

Some concerns have been raised about providing full transparency, some with more evidence than others. But a closer examination suggests that these objections do not justify avoiding transparency, especially when weighed against its benefits.

- **Access to managers.** Some have claimed that providing transparency on manager fee terms and performance will lead to managers refusing to permit funds from investing with them. The idea is that managers are loathe to reveal their “trade secrets” – for example, proprietary pricing models. But fee structures of *managers* are not trade secrets of the *underlying businesses*. Secrecy around the former only serves the interests of the assets managers at the expense of public investors. Requiring transparency on the names of managers, their fee structures, and their performance is not comparable to asking for the formula to make Coca Cola. While there may be instances where managers have refused to take an investment, there are also many instances where the lack of transparency hid issues, ultimately at great cost to investors, as in the memorable case of the Madoff scandal. Moreover, one should ask if public funds should, in any case, invest with managers who insist on hiding their performance and fees. Finally, the experience of funds that have moved toward full transparency suggests that the reduction in available managers is quite limited: Rhode Island, which posts fee terms, fees paid, and performance per manager on its website, has found that doing so has not meaningfully affected either access to managers or performance.^{xxxviii} CalPERS has reported it has only missed out on three “opportunities” due to the California transparency requirements.^{xxxix} So while there may be a slight tradeoff, the evidence suggests it is a manageable and worthwhile one.
- **No one else does it.** There is some sentiment that until all public pension funds are transparent, none should be. This misunderstands the nature of leadership: changes in practice by individual funds is in fact how changes in practice by funds overall will occur. Moreover, the evidence shows that many peer institutions are being transparent. A review of over 60 pension plans and investment boards/councils shows the following:
 - **Decisions:** 39% post full board packets, many including investment manager presentations with proposed fees, and 30% provide live stream, video, audio, and/or full transcripts of board meetings.
 - **Performance:** 44% publish quarterly performance reports that show each manager’s performance against its benchmark, many on both a gross and net basis.
 - **Fees/Costs:** While not a majority, a significant and growing number of leading funds are reporting carried interest/performance fees for private equity, including CalPERS, South Carolina, Missouri, Arizona, Texas County, Rhode Island, etc. See discussion of ILPA below.
- **Transparency is expensive.** The cost of transparency has been either directly or indirectly mentioned as a rationale to maintain the status quo, in that there may be additional staff that may need to be hired and technology platforms that may need to be purchased in order to provide stakeholders with increased access to information. Rhode Island reports that its transparency efforts required minimal staff time and only \$30 per month in additional website costs.^{xl} An even starker example is the \$3 billion Santa Barbara County Employees’ Retirement System. The System has essentially “flipped the switch” on the permission settings for its online board meeting management platform (“BoardDocs,” also used by SERS for its Board meetings) from “private” to “public.”^{xli} What this means is that the stakeholders can see an overwhelming majority of the documents that are provided to the

board, without the need to develop and administer separate websites. While there are certainly more user-friendly options, this is a striking example to illustrate that increased transparency can often be provided without significant cost.

Transparency Practices at SERS, PSERS, and Best Practice Funds

This section provides an overview of key transparency practices of SERS and PSERS compared to other pension funds and investment boards known for best practices. Both funds publish per-manager asset management fees, PSERS was an early leader in posting versions of investment memoranda publicly, and PSERS established a committee in October 2018 with the stated objective of “making PSERS a national public pension fund leader in fee and performance disclosure and transparency.”^{xliii} PSERS, however, can improve in several key areas of transparency. SERS, when measured against many of the best practices discussed below, remains arguably among the least transparent of funds.

Decisions:

Although board meetings are open to the public, SERS and PSERS do not stream Board meetings, nor do they publish any detailed materials presented at the meeting. The only information provided to the public is summary level agenda, typically only a page or two. Minutes are posted afterwards, often four to six months later because minutes are not finalized/approved until the subsequent board meeting. These minutes are also typically summary level consisting of only a few pages. To its credit, PSERS has posted Board resolutions that include staff recommendation memorandums for managers approved at board meetings since 2006. However, resolutions are only for those managers that have been approved by the Board, are heavily redacted, and do not include the original presentations, *i.e.*, “pitch materials” that the manager presented to the system. By contrast, many peer pension funds and investment boards in recent years have begun live streaming and/or posting video of board proceedings online, along with the complete or near-complete packets of materials provided to board members. These packets include detailed performance reports and “pitch materials” by managers presenting before the board, many of which include the proposed fee terms on which the board will be voting to invest member funds.

Funds such as the Nebraska Investment Council (which manages \$27 billion of public funds) publishes board agendas in PDF form that include embedded links to documents presented or discussed during board meetings, including comprehensive performance reports and manager presentations that contain proposed fee terms.^{xliii} The Florida State Board of Administration, while it does not include proposed fee terms in board packets, does include a complete written transcript of the previous board meeting in its board packet. The Investment Advisory Council for the Florida State Board of Administration publishes a video file that contains audio of the Council’s meetings matched up with any presentations made during the meeting – essentially providing an archived webinar of the meeting for interested parties.^{xliv}

Investment Performance: SERS^{xlv} and PSERS^{xlvi} have traditionally provided fund performance by asset class on an annual basis in the CAFR and quarterly online.

Figure 10: SERS periodic reporting of performance

Recent Performance

Each quarter, the SERS board is provided with an update about the fund’s returns, based on asset class. Such information is preliminary, unaudited and subject to change. We do, however, share the information in post-board-meeting press release and provide the most recent four updates here, for your information. To confirm actual annual performance, please see our comprehensive annual financial report.

2017 QUARTER FOUR	Total Fund	5.2%
	Cash	0.3%
	Fixed Income	0.5%
	Global Public Equity	5.2%
	Multi-Strategy	3.7%
	Private Equity	3.3%
	Real Estate	0.0%

Source: SERS

Figure 11: PSERS periodic reporting of performance

PSERS' PERFORMANCE (Net of Fees) AS OF JUNE 30, 2018

ASSET CLASS	QUARTER	FISCAL YEAR TO DATE *	1YEAR	3 YEARS (Annualized)	5 YEARS (Annualized)	10 YEARS (Annualized)
Equities						
U.S. Equities	4.32%	14.02%	14.02%	12.19%	13.51%	10.21%
Non-U.S. Equities	0.82	10.44	10.44	7.55	9.91	6.10
Private Equity / Venture Capital / Private Debt	1.97	16.26	16.26	11.21	10.03	7.48
Fixed Income	1.43	6.42	6.42	6.07	5.97	7.21
Master Limited Partnership	13.94	0.27	0.27	(5.31)	0.73	N/A
Infrastructure	11.37	1.39	1.39	N/A	N/A	N/A
Commodities	(2.01)	5.36	5.36	0.11	(2.10)	(5.76)
Real Estate	3.70	13.63	13.63	10.26	12.20	2.50
Risk Parity	1.20	6.76	6.76	4.60	6.02	N/A
Absolute Return	0.37	4.85	4.85	3.34	4.20	5.01
TOTAL	2.08%	9.27%	9.27%	6.84%	7.62%	5.03%

*-- PSERS' Fiscal Year ends on June 30.

Source: PSERS

A growing number of funds, in efforts to be more transparent, publish the comprehensive general consultant reports on a quarterly basis, in some cases even monthly. These reports provide performance for each manager of the pension fund compared to its assigned benchmark, in many cases on both gross- and net-of-fees bases. The publishing of consultant reports provides additional accountability to ensure that managers are not consistently underperforming their benchmarks without repercussion. For example, the Montana Board of Investments publishes the performance report that it receives from its consultant, RVK (also the general consultant for SERS), that includes per manager performance on both a gross and net basis.

Figure 12: Excerpt from Performance Report for the Montana State Board of Investments

MONTANA BOARD OF INVESTMENTS COMPARATIVE PERFORMANCE DOMESTIC EQUITY MANAGERS AS OF MARCH 31, 2018

DOMESTIC LARGE CAP EQUITY	QTD/ CYTD	FYTD	1 YEAR	3 YEARS	5 YEARS	7 YEARS	10 YEARS	2017	2016	2015	2014	2013	SINCE INCEP.	INCEP. DATE
BlackRock MSCI US Equity Index (CF)-Net	-0.63	10.61	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10.61	07/01/2017
MSCI US Index (USO) (Gross)	-0.63	10.60	14.03	10.55	13.23	12.65	9.52	21.90	11.61	1.32	13.36	32.61	10.60	
Difference	0.00	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01	
BlackRock MSCI US Equity Index (CF)-Gross	-0.63	10.61	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10.61	07/01/2017
SPOR S&P 500 ETF (SPY) - Net	-2.82	8.31	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.31	07/01/2017
S&P 500 Index (Cap Wld)	-0.76	10.58	13.99	10.78	13.31	12.71	9.49	21.83	11.96	1.38	13.69	32.39	10.58	
Difference	-2.06	-2.27	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-2.27	
Domestic Equity Pool STIF - Net	0.35	0.95	1.19	0.65	N/A	N/A	N/A	1.00	0.50	N/A	N/A	N/A	0.65	04/01/2015
ICE 1 Mo LIBOR Index (USD)	0.42	1.09	1.36	0.75	0.52	0.44	0.55	1.15	0.52	0.21	0.16	0.19	0.75	
Difference	-0.07	-0.14	-0.17	-0.10	N/A	N/A	N/A	-0.15	-0.02	N/A	N/A	N/A	-0.10	
T. Rowe U.S. Structured Research (SA) - Net	-0.15	11.28	15.87	11.74	13.96	13.16	10.06	23.94	10.68	3.30	12.58	33.23	9.22	06/01/2006
S&P 500 Index (Cap Wtd)	-0.76	10.58	13.99	10.78	13.31	12.71	9.49	21.83	11.96	1.38	13.69	32.39	8.66	
Difference	0.61	0.70	1.88	0.96	0.65	0.45	0.57	2.11	-1.28	1.92	-1.11	0.84	0.56	
T. Rowe U.S. Structured Research (SA) - Gross	-0.08	11.50	16.16	12.04	14.28	13.49	10.39	24.24	10.98	3.61	12.92	33.63	9.55	06/01/2006
IM U.S. Large Cap Core Equity (SA+CF) Median	-0.44	10.79	14.02	10.23	13.32	12.73	9.75	21.82	10.50	1.39	13.43	32.98	9.00	
Rank	34	43	30	15	25	25	25	22	45	23	59	45	26	
Jacobs Levy Partial L/S (SA) - Net	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	04/01/2018
MSCI US Index (USD)	-0.63	10.60	14.03	10.55	13.23	12.65	9.52	21.90	11.61	1.32	13.36	32.61	N/A	
Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Jacobs Levy Partial L/S (SA) - Gross	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	04/01/2018
IM U.S. Large Cap Core Equity (SA+CF) Median	-0.44	10.79	14.02	10.23	13.32	12.73	9.75	21.82	10.50	1.39	13.43	32.98	N/A	
Rank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Jacobs Levy Partial L/S (SA) - Net	-1.72	10.34	12.54	9.40	13.73	12.80	10.59	22.86	10.30	0.01	15.38	37.55	10.46	03/01/2008
MSCI US Index (USO)	-0.76	10.58	13.99	10.78	13.31	12.71	9.49	21.83	11.96	1.38	13.69	32.39	9.37	
Difference	-0.96	-0.24	-1.45	-1.38	0.42	0.09	1.10	1.03	-1.66	-1.37	1.69	5.16	1.09	
Jacobs Levy Partial US (SA) - Gross	-1.51	11.01	13.43	10.20	14.55	13.62	11.39	23.79	11.09	0.72	16.21	38.53	11.26	03/01/2008
IM U.S. Large Cap Core Equity (SA+CF) Median	-0.44	10.79	14.02	10.23	13.32	12.73	9.75	21.82	10.50	1.39	13.43	32.98	9.57	
Rank	79	47	60	51	20	22	8	26	44	58	15	11	9	

Net performance shown is net of all manager fees and expenses (Net-All). Gross returns are compared to median performance of similar managers. A peer group of similar managers may not exist for all funds. Fiscal year ends on 6/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences.

Source: Montana State Board of Investments

To reiterate, the periodic reporting of performance by each individual manager – compared to their benchmark and on both a gross and net basis – provides accountability for all parties responsible for a pension fund’s investments: from the manager, to the pension fund staff and management, to the trustees who hired the manager, and finally to the taxpayers who are ultimately responsible for financial consequences made by these parties. Comprehensive, yet well-designed and easy-to-understand reporting helps create a culture of “crowdsourcing” the investment manager monitoring program. This means that many eyes are potentially looking for any irregularities, such as consistent underperformance that is being permitted on a long-term basis.

Some funds have taken the best practice of reporting performance per manager and improved it even more by posting investment manager “report cards” or manager “watch lists.” These reports provide a concise listing of managers with simple indicators to show whether or not they are performing as should be expected. An excerpt from one of these reports publicly made available by the Los Angeles City Retirement System is below.

Figure 13: Excerpt of Manager Report Card from LA City Employees’ Retirement System

MANAGER REPORT CARD

NON-U.S. EQUITY MANAGERS	INCEPTION DATE	MANDATE	CURRENT QUARTER (Net)		1 YEARS (Net)		3 YEARS (Net)		5 YEARS (Net)		SINCE INCEPTION (Net)	ANNUAL MGT FEE PAID \$ (000)	2016
			Index	Universe	Index	Universe	Index	Universe	Index	Universe			
Axiom International	Mar - 14	Emerging Markets	✗	✓	✗	✓	✗	✗	N/A	N/A	✗	1,866.9	Performance compliant with LACERS’ Manager Monitoring Policy
Q.M.A.	Apr - 14	Emerging Markets	✗	✗	✓	✓	✗	✗	N/A	N/A	✓	1,219.4	Performance compliant with LACERS’ Manager Monitoring Policy
DFA Emerging Markets	Jul - 14	Emerging Markets	✓	✓	✓	✗	✓	✗	N/A	N/A	✓	1,188.2	Performance compliant with LACERS’ Manager Monitoring Policy
AQR	Feb - 14	Non-U.S. Developed	✗	✗	✓	✗	✓	✓	N/A	N/A	✓	2,314.2	Performance compliant with LACERS’ Manager Monitoring Policy
Oberweis Asset Mgt.	Jan - 14	Non-U.S. Developed	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	568.5	Performance compliant with LACERS’ Manager Monitoring Policy
Barrow, Hanley, Mewhinney & Strauss	Nov - 13	Non-U.S. Developed	✗	✗	✓	✗	✗	✓	N/A	N/A	✓	2,097.9	Performance compliant with LACERS’ Manager Monitoring Policy
Lazard Asset Mgt.	Nov - 13	Non-U.S. Developed	✓	✓	✓	✓	✗	✗	N/A	N/A	✓	2,467.4	Performance compliant with LACERS’ Manager Monitoring Policy
MFS Institutional Advisors	Oct - 13	Non-U.S. Developed	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	2,313.6	Performance compliant with LACERS’ Manager Monitoring Policy
SsgA (Passive)	Aug - 93	Non-U.S. Developed	✓	✓	✓	✗	✓	✗	✓	✗	✓✓	368.9	Performance compliant with LACERS’ Manager Monitoring Policy

Note: Managers are placed on Watch List for concerns with organization, process and performance. Managers are normally on the Watch List for 12 months though may be longer if managers issues remain but not severe enough to warrant termination recommendation.

- Annual Management Fee Paid as fiscal year ending June 30, 2017.
- Where net of fees performance is not available gross of fee returns are evaluated.

LEGEND	
✓	Outperformed
✗	Underperformed
=	Equal to
✓✓	Gross Return

Source: Los Angeles City Employees’ Retirement System

Alternative Investment Portfolio Performance: The quality of public reporting for alternative investments by SERS and PSERS lags a number of peers, in particular at SERS. PSERS, to its credit, publishes quarterly fund-level performance information on its private market and real estate investments.

SERS points to the lack of a provision in the State Employees' Retirement Code that, by contrast, is contained in the Public School Employees' Retirement Code, mandating transparency on alternative investments as a defense of its policy of only disclosing incredibly limited data on its private equity and real estate investments (see sidebar).^{xlviii} The image below shows performance information on private equity investments that was provided by SERS to the Commission. This information is similar to what is made publicly available online and in the Comprehensive Annual Financial Report; however, the information is barely legible, with information necessary to evaluate individual fund performance redacted.

Figure 14: Excerpt from SERS Private Equity Performance Report provided to the Commission

Commonwealth of Pennsylvania State Employees' Retirement System
Schedule of Private Equity Investments by Sector
As of June 30, 2017

Investment	Vintage	Commitments	Contributions ⁽¹⁾	Distributions	Market Value	Unrealized Gain/(Loss)	IRR ⁽¹⁾	TVM	Upper Quartile (I)	Upper Quartile (II)	Quantile Ranking (TVM)
Buyout											
ABRY Broadcast Partners III	1997	25,000,000	20,394,093	28,932,345							
ABRY Partners IV	2000	35,000,000	22,500,122	74,633,973							
ABRY Partners V	2004	45,000,000	36,658,306	81,985,960							
ABRY Partners VI	2008	50,000,000	54,962,201	105,219,560							
ABRY Partners VII	2011	30,000,000	34,226,469	39,158,084							
ABRY Partners VIII	2015	25,000,000	21,020,610	3,599,240							
ABS Capital Partners III	1999	35,000,000	27,764,683	18,757,336							
ABS Capital Partners IV	2000	35,000,000	28,789,304	68,253,149							
ABS Capital Partners V	2005	20,000,000	19,404,254	48,986,604							
ABS Capital Partners VI	2009	40,000,000	35,589,138	17,444,057							
Advent International GPE VI-A	2008	35,000,000	34,034,207	52,362,090							
Advent International GPE VII-B	2012	40,000,000	34,073,050	15,159,252							
Advent International GPE VIII-B	2016	50,000,000	10,770,205	-							
Advent Latin American Private Equity Fund IV	2007	30,000,000	29,810,236	32,090,921							
Advent Latin American Private Equity Fund V	2010	15,000,000	13,058,177	2,670,000							
Advent Latin American Private Equity Fund VI	2015	25,000,000	4,521,463	375,000							
Alpha Private Equity Fund 4	2002	26,508,000	35,605,050	77,986,040							
Alpha Private Equity Fund 5	2006	57,796,800	62,184,152	82,402,625							
APAX Capital Rescue III (France)	1990	5,000,000	5,103,877	11,622,162							
APAX Europe IV	1999	32,424,000	29,909,800	40,876,051							
APAX Europe V	2000	53,742,000	68,764,274	150,017,403							
Apax Europe VI	2004	76,349,190	74,145,979	134,550,076							
Apax Europe VII	2007	132,170,735	131,963,257	145,885,152							
Apax Excelsior VI	2000	35,000,000	33,957,540	56,527,379							
Apollo Investment Fund IV	1997	75,000,000	72,079,063	124,814,033							
Apollo Investment Fund V	2000	50,000,000	42,484,039	122,268,807							
Apollo Investment Fund VI	2005	40,000,000	38,289,202	52,606,408							
Apollo Investment Fund IX	2017	85,400,000	-	-							
Asia Alternatives Capital Partners	2006	50,000,000	23,406,269	34,732,699							
Asia Alternatives Capital Partners II	2007	50,000,000	26,583,518	20,136,025							
Asia Alternatives Capital Partners III	2012	50,000,000	45,804,166	16,768,065							
Asia Alternatives Korea Buyout Investors (Hahn & Co)	2011	7,000,000	8,017,051	4,096,324							
Asia Pacific Growth Fund III	1999	15,000,000	14,627,000	16,708,736							
Audax Private Equity Fund	2000	35,000,000	33,157,787	55,936,816							
Audax Private Equity Fund II	2005	25,000,000	25,506,073	45,110,929							
Audax Private Equity Fund III	2007	37,000,000	39,579,527	73,271,872							
Audax Private Equity Fund V	2015	50,000,000	10,928,119	280,051							
Bain Capital Asia Fund	2007	12,000,000	11,020,944	15,143,534							
Bain Capital Europe III	2008	72,432,276	62,972,190	112,389,602							
Bain Capital Fund IX	2006	75,000,000	72,937,500	107,913,972							
Bain Capital Fund VII	2000	25,000,000	23,562,500	47,998,008							
Bain Capital Fund VIII-E	2004	12,144,000	12,299,670	19,631,405							
Bain Capital Fund X	2007	90,000,000	86,374,239	100,560,312							
Bain Capital IX Co-Investment Fund	2006	15,000,000	14,456,250	21,969,013							
Bain Capital X Co-Investment Fund	2007	5,000,000	1,225,000	1,061,774							
Baring India Private Equity Fund III Limited	2008	5,000,000	4,829,380	3,515,232							
Baring Vostok Private Equity Fund IV	2007	30,000,000	27,455,543	14,782,880							

Source: SERS, StepStone

Conversely, the Los Angeles County Employees Retirement Association (LACERA) is a good example of a fund that provides comprehensive and transparent reporting with various metrics to analyze performance. Various data points are provided for the sophisticated reader, and color codes are provided for those who may not be familiar with how to interpret the various metrics. SERS holds at least 90 of the private equity funds also held by LACERA that would be included in this report – approximately 20-25% of the funds in its entire portfolio shared by this one peer pension fund alone.

It is possible to pay for subscriptions to databases that provide more complete information about SERS' investments than SERS provides to the Pennsylvania public, legislators, beneficiaries, and even the Board. Industry research platforms aggregate data obtained from more transparent funds, from funds through Right-to-Know requests, and even from the investment managers who voluntarily provide the information themselves. The information from these platforms can be used to essentially create a shadow investment performance profile for SERS. While this information may not always match SERS holdings and performance exactly due to potentially different fee terms and slight intricacies in the timing of reporting performance, staff working in support of the Commission was able to find data on over **90% of the funds held by SERS, 85% with detailed performance information.** An example of the detailed information on funds held by SERS that is available to paid subscribers is shown on page 78.

SERS' RIGHT-TO-KNOW LAW LOOPHOLE

Pennsylvania law permits both retirement systems to shield most investment records from the public. The Public School Employees' and the State Employees' Retirement Codes contain identical provisions that authorize both retirement systems to exclude "sensitive investment or financial information" from any Right-to-Know request. If either Board determines that a record could harm that investment, the record would be exempt from disclosure.^{xlviii} The statutory grant of broad discretion to both retirement systems to avoid public disclosure of most investment cost and performance information is extraordinarily broad and unusual among most state jurisdictions.

However, there is an important exception favoring public disclosure. Applicable only to PSERS, the Public School Employees' Retirement Code provides that "[n]otwithstanding" any of the exclusions from public disclosure, information related to alternative investment vehicles, including valuation, performance, fees and costs, are public records and therefore "subject to public access under the Right-to-Know Law."^{xlix} This provision does not apply to SERS. Consequently, SERS, and only SERS, is statutorily exempt from publically disclosing most information related to alternative investments, an investment class that constitutes over 30% of SERS' entire investment portfolio.

Even outside of the context of a Right-to-Know request, SERS has interpreted the phrase "sensitive investment or financial information" to be a grant of confidentiality to most information involving alternative investment fees, expenses, cost structures, performance history, even the identity of sub-asset class managers. This Right-to-Know exemptions has frustrated inquiries into its private equity and alternative investments by this Commission as well as SERS Board members and other stakeholders. SERS has sought to exclude this information from publication, citing a threat to investment deal opportunities, despite the fact that the same information is widely available by subscription from financial database providers.

There is no evidence that the publication of investment records, including alternative investment information, relating to performance, value and expenses hampers or otherwise undermines investment opportunities or performance. PSERS has operated for years without its alternative investment records being exempt from public disclosure. In fact, a significant number of state jurisdictions explicitly and statutorily provide broad public access to investment records of their public pension systems, including, by way of example, California, Texas, Arkansas, Nevada, Idaho, Alabama, New York, Iowa, Kansas, Michigan and Kentucky.¹ Pennsylvania's law is unique.

Figure 15: Excerpt from a LACERA Private Equity Performance Report

Portfolio Investment Report

As of December 31, 2017
(\$ in millions)

INVESTMENTS	COMMITMENT DATE	VINTAGE YEAR	STATUS	STRATEGY	COMMITMENT	CUMULATIVE CONTRIBUTIONS	CUMULATIVE DISTRIBUTIONS	MARKET VALUE	EXPOSURE	TOTAL VALUE	DPI MULTIPLE	TVPI MULTIPLE	SINCE INCEPTION RET/IRR	IRR QUANTILE RANKING	PRIVATE EQ BENCHMARKS				IS-PME
															UPPER IRR	MEDIAN IRR	LOWER IRR	IS-PME	
1986 Vintage																			
Warburg Pincus Capital Company, L.P.	1/1986	1986	Exited	Buyout - Global	\$500	\$500	\$218.4	\$-	\$-	\$2,184	4.37x	4.37x	18.41%	2nd	19.1%	12.4%	5.0%	1.24	
Cosley Partners I, L.P.	12/1986	1986	Exited	Venture Capital - Balanced	150	150	27.3	1.82x	1.82x	273	1.82x	1.82x	9.53%	3rd	13.6%	10.3%	6.0%	0.84	
Cosley Partners 2, L.P.	12/1986	1986	Exited	Venture Capital - Balanced	150	150	21.8	1.45x	1.45x	218	1.45x	1.45x	5.66%	4th	13.6%	10.3%	6.0%	0.66	
1986 Vintage Total					800	800	267.5			2,675	3.34x	3.34x	15.72%					1.02	
1987 Vintage																			
Media Communications Partners, L.P.	1/1987	1987	Exited	Venture Capital - Balanced	250	250	40.3	1.61x	1.61x	403	1.61x	1.61x	7.25%	3rd	19.5%	13.4%	3.1%	0.72	
1987 Vintage Total					250	250	40.3			403	1.61x	1.61x	7.25%					0.72	
1988 Vintage																			
Prudential Venture Partners II	1/1988	1988	Exited	Venture Capital - Late Stage	500	500	116.4	2.33x	2.33x	1,164	2.33x	2.33x	23.45%	2nd	24.5%	10.5%	4.1%	1.38	
GSX Investments, L.P.	1/1988	1988	Exited	Buyout - Small	1500	1500	290.5	1.93x	1.93x	2,905	1.93x	1.93x	13.13%	2nd	15.1%	10.7%	10.1%	1.01	
1988 Vintage Total					2000	2000	406.9			4,069	2.18x	2.18x	15.24%					1.09	
1989 Vintage																			
Sondigital Communications II, L.P.	1/1990	1990	Exited	Venture Capital - Balanced	7.5	7.5	16.7	2.22x	2.22x	16.7	2.22x	2.22x	12.98%	3rd	33.1%	20.2%	9.4%	0.74	
1992 Vintage																			
Oak Investment Partners V, L.P.	11/1991	1992	Exited	Venture Capital - Balanced	11.3	11.3	17.1	1.52x	1.52x	17.1	1.52x	1.52x	10.55%	3rd	32.6%	13.4%	8.2%	0.76	
Kiddi Kamm Equity Partners, L.P.	12/1991	1992	Exited	Buyout - Small	15.0	14.9	.6	0.04x	0.04x	.6	0.04x	0.04x	-49.85%	4th	51.6%	21.4%	12.6%	0.02	
Sevin Rosen Fund IV, L.P.	1/1992	1992	Exited	Venture Capital - Early Stage	5.0	5.0	51.2	10.18x	10.18x	51.2	10.18x	10.18x	87.17%	1st	19.1%	17.4%	13.9%	0.90	
Symantec Corp.	1/1992	1992	Exited	Co-Investments	5.6	5.6	2.2	0.40x	0.40x	2.2	0.40x	0.40x	-28.51%	4th	51.6%	21.4%	12.6%	0.32	
Summit Ventures III, L.P.	1/1992	1992	Exited	Venture Capital - Balanced	25.0	20.0	78.8	3.98x	3.98x	78.8	3.98x	3.98x	61.71%	1st	32.6%	13.4%	8.2%	2.13	
Kleiner Perkins Guilford & Byers VI, L.P.	5/1992	1992	Exited	Venture Capital - Balanced	5.0	5.0	16.6	3.31x	3.31x	16.6	3.31x	3.31x	39.44%	1st	32.6%	13.4%	8.2%	1.73	
United Capital Partners II, L.P.	1/1992	1992	Exited	Venture Capital - Early Stage	35.0	35.0	35.2	1.01x	1.01x	35.2	1.01x	1.01x	0.00%	4th	51.6%	21.4%	12.6%	0.00	
Vericel Capital Partners II, L.P.	1/1992	1992	Exited	Buyout - Small	14.2	14.2	8.3	0.59x	0.59x	8.3	0.59x	0.59x	-23.34%	4th	51.6%	21.4%	12.6%	0.40	
ASC Network Corporation	12/1992	1992	Exited	Co-Investments	5.0	5.0	8.5	1.70x	1.70x	8.5	1.70x	1.70x	21.42%	3rd	51.6%	21.4%	12.6%	0.92	
FISD Data Corporation	12/1992	1992	Exited	Co-Investments	5.0	5.0	24.9	4.98x	4.98x	24.9	4.98x	4.98x	91.84%	1st	51.6%	21.4%	12.6%	1.50	
1992 Vintage Total					116.0	111.0	242.5			242.5	2.19x	2.19x	29.03%					1.50	
1993 Vintage																			
Berkshire Fund III, L.P.	10/1992	1993	Exited	Buyout - Large	5.0	4.8	18.5	3.82x	3.82x	18.5	3.82x	3.82x	55.07%	1st	19.1%	17.4%	13.9%	2.01	
Landmark Equity Partners III, L.P.	1/1993	1993	Exited	Secondaries	10.0	10.3	26.8	2.60x	2.60x	26.8	2.60x	2.60x	35.08%	2nd	48.2%	21.6%	14.0%	1.46	
The 1818 Fund II, L.P.	1/1993	1993	Exited	Buyout - Small	15.0	12.9	24.0	1.68x	1.68x	24.0	1.68x	1.68x	12.15%	4th	19.1%	17.4%	13.9%	0.90	
Vestar Equity Partners, L.P.	1/1993	1993	Exited	Buyout - Mid	8.0	6.8	23.9	3.51x	3.51x	23.9	3.51x	3.51x	56.48%	1st	19.1%	17.4%	13.9%	2.00	
Welsh, Carson, Anderson & Stowe VI, L.P.	1/1993	1993	Exited	Buyout - Large	10.0	10.0	20.7	2.07x	2.07x	20.7	2.07x	2.07x	13.94%	3rd	19.1%	17.4%	13.9%	0.92	
Reich IV, L.P. Specialty Retail Group III, L.P.	6/1993	1993	Exited	Venture Capital - Balanced	5.0	5.0	10.9	2.19x	2.19x	10.9	2.19x	2.19x	32.26%	3rd	32.6%	13.4%	8.2%	3.77	
Enterprise Partners III, L.P.	12/1993	1993	Exited	Venture Capital - Early Stage	10.0	10.0	74.2	7.42x	7.42x	74.2	7.42x	7.42x	63.67%	2nd	71.7%	38.1%	16.8%	3.44	
1993 Vintage Total					68.0	64.8	239.5			239.5	3.70x	3.70x	39.68%					1.65	
1994 Vintage																			
Blackstone Capital Partners II, L.P.	1/1993	1994	Exited	Buyout - Global	25.0	26.3	59.0	2.24x	2.24x	59.0	2.24x	2.24x	37.56%	1st	29.1%	15.4%	6.7%	1.47	
Kleiner Perkins Cuffield & Byers VII, L.P.	5/1994	1994	Exited	Venture Capital - Balanced	3.8	3.8	121.6	32.42x	32.42x	121.6	32.42x	32.42x	124.57%	1st	72.1%	36.1%	9.8%	13.61	
Oak Investment Partners VI, L.P.	10/1994	1994	Exited	Venture Capital - Balanced	10.5	14.0	40.7	2.91x	2.91x	40.7	2.91x	2.91x	34.57%	3rd	72.1%	36.1%	9.8%	1.52	
Landmark Equity Partners IV, L.P.	12/1994	1994	Exited	Secondaries	3.7	3.7	16.2	1.47x	1.47x	16.2	1.47x	1.47x	15.81%	3rd	37.4%	21.7%	6.9%	1.00	
Best Friends Pet Care	12/1994	1994	Exited	Co-Investments	3.7	3.7	1.1	0.00x	0.00x	1.1	0.00x	0.00x	0.00%	4th	29.1%	15.4%	6.7%	0.01	
1994 Vintage Total					38.9	38.8	237.6			237.6	4.08x	4.08x	54.09%					2.37	
1995 Vintage																			
Wesley, Carson, Anderson & Stowe VII, L.P.	1/1995	1995	Exited	Growth Equity	24.8	24.0	181.7	7.57x	7.57x	181.7	7.57x	7.57x	103.98%	1st	84.8%	28.9%	14.1%	4.39	
Apollo Investment Fund III, L.P.	3/1995	1995	Exited	Buyout - Large	20.0	20.0	43.5	2.18x	2.18x	43.5	2.18x	2.18x	17.71%	2nd	23.9%	10.8%	3.1%	1.39	
GS Capital Partners II, L.P.	4/1995	1995	Exited	Buyout - Mid	15.0	17.2	24.7	1.43x	1.43x	24.7	1.43x	1.43x	9.62%	3rd	23.9%	10.8%	3.1%	0.98	
Sierra Ventures V, L.P.	4/1995	1995	Exited	Venture Capital - Early Stage	5.0	5.0	21.3	4.25x	4.25x	21.3	4.25x	4.25x	80.00%	2nd	84.8%	28.9%	14.1%	2.56	
Oyress Merchant Banking Partners, L.P.	11/1995	1995	Exited	Buyout - Mid	10.0	10.5	12.6	1.21x	1.21x	12.6	1.21x	1.21x	2.57%	4th	23.9%	10.8%	3.1%	0.79	
MetroPCS	11/1995	1995	Exited	Co-Investments	5.8	5.9	54.5	9.21x	9.21x	54.5	9.21x	9.21x	26.34%	1st	23.9%	10.8%	3.1%	4.23	
1995 Vintage Total					100.5	102.3	362.6			362.6	3.54x	3.54x	43.13%					2.39	
1996 Vintage																			
Questor Partners Fund, L.P.	1/1996	1996	Exited	Buyout - Small	30.0	30.3	42.9	1.41x	1.41x	42.9	1.41x	1.41x	15.70%	1st	14.0%	8.6%	-0.5%	1.00	
Comerstone Equity Partners VI, L.P.	1/1996	1996	Exited	Buyout - Global	25.0	25.0	40.4	1.55x	1.55x	40.4	1.55x	1.55x	22.58%	3rd	20.1%	12.6%	8.5%	1.31	
Accora V, L.P.	3/1996	1996	Exited	Venture Capital - Early Stage	9.0	9.0	176.6	19.62x	19.62x	176.6	19.62x	19.62x	188.44%	1st	177.6%	64.0%	22.9%	12.36	
Burdmann, Bowers, Sherrill & Co., L.P.	3/1996	1996	Active	Venture Capital - Small	28.0	29.3	51.7	1.77x	1.77x	51.7	1.77x	1.77x	14.35%	2nd	14.0%	8.6%	-0.5%	1.29	
Geacapital IV, L.P.	3/1996	1996	Active	Venture Capital - Early Stage	9.0	9.0	14.6	1.62x	1.62x	14.6	1.62x	1.62x	14.17%	4th	177.6%	64.0%	22.9%	1.15	
Carlyle Partners II, L.P.	4/1996	1996	Exited	Buyout - Global	30.0	33.9	81.6	2.40x	2.40x	81.6	2.40x	2.40x	25.74%	1st	14.0%	8.6%	-0.5%	1.70	
Sevin Rosen Fund V, L.P.	4/1996	1996	Exited	Venture Capital - Early Stage	10.0	10.0	11.1	1.10x	1.10x	11.1	1.10x	1.10x	9.29%	4th	177.6%	64.0%	22.9%	0.89	
Berkshire Fund IV, L.P.	5/1996	1996	Exited	Buyout - Large	20.0	19.2	49.9	2.60x	2.60x	49.9	2.60x	2.60x	33.41%	1st	14.0%	8.6%	-0.5%	1.81	
Indigo N.V.	9/1996	1996	Exited	Co-Investments	8.4	7.0	9.3	1.32x	1.32x	9.3	1.32x	1.32x	5.11%	3rd	14.0%	8.6%	-0.5%	0.74	
Worldview Technology Partners I, L.P.	9/1996	1996	Exited	Venture Capital - Balanced	8.5	8.5	32.2	3.79x	3.79x	32.2	3.79x	3.79x	68.50%	2nd	177.6%	64.0%	22.9%	2.66	
Apollon Partners, L.P.	1/1997	1996	Exited	Buyout - Small	20.0	19.6	36.4	1.88x	1.88x	36.4	1.88x	1.88x	13.62%	2nd	14.0%	8.6%	-0.5%	1.54	
1996 Vintage Total					222.9	222.8	607.7			607.7	2.70x	2.70x	37.42%					1.81	

Anyone with access to this data is able to calculate reasonably accurate performance results. For example, estimated Kaplan-Schoar PME values for the SERS and PSERS private equity portfolios can be computed using statistical techniques and KS-PME values from investors in the same funds as SERS/PSERS (such as LACERA, discussed earlier). The results of these estimates using public data compared to values reported by SERS and PSERS are as follows:

Figure 17: SERS PME Estimates versus reported values

SERS PRIVATE EQUITY PERFORMANCE VS:	S&P 500	RUSSELL 3000	RUSSELL 2000
KS-PME –Estimate July 2018	1.22	1.20	1.15
KS-PME – SERS Reported October 2018	1.26*	N/A	N/A

* reported as 1.3, rounded up from actual value 1.26

Sources: Analysis of data from Preqin, SERS

Figure 18: PSERS PME Estimates versus reported values

PSERS PRIVATE EQUITY PERFORMANCE VS:	S&P 500	RUSSELL 3000	RUSSELL 2000
KS-PME –Estimate July 2018	1.10	1.09	1.07
KS-PME – PSERS Reported October 2018	1.10	1.09	1.05

Sources: Analysis of data from Preqin, PSERS

The purpose of this exercise, particularly in the case of SERS where even basic performance information on individual private equity performance is not made available publicly, let alone PME values, is to demonstrate that **a significant amount of the data on investments is already in the public domain and the information is reasonably accurate.** This casts doubt on the wisdom of treating this information as confidential and unavailable to Pennsylvanians, and makes efforts to do so futile. Retirees of SERS should not require paid subscriptions to specialty investment research platforms in order to monitor performance of individual private equity fund investments. The information should be made public, as it is at many funds including PSERS.

Fee Terms: Both SERS and PSERS do not appear to maintain a comprehensive report of fee terms negotiated with its managers. When asked by the Commission for a “comprehensive report that shows the complete cost terms (all levels of fees whether paid directly or indirectly and allocations of returns) for each investment manager,” PSERS responded that it “doest [sic] maintain complete cost terms for each individual investment manager,” and SERS provided a report that included effective management fees for only public equity and fixed income managers (not the actual terms, as will be discussed in the “Cost-saving Analysis” of this report).

By contrast, a number of pension funds and investment boards do report the fee terms they have negotiated with their managers. The methods of transparency in reporting fee terms differ – some funds/boards such as Louisiana and New Jersey provide separate reports of fee terms. The Nebraska Investment Council discloses its fee terms in performance reports prepared by its consultant, Aon Hewitt (the consultant also for PSERS), which is among public materials presented at board meetings and available on its website.

Figure 19: Excerpt of the Nebraska Investment Council reporting of fee terms

PRIVATE EQUITY

PARTNERSHIP NAME	VINTAGE YEAR	COMMITMENT	FEE SCHEDULE ¹ (on an Annual Basis)	YTD MANAGEMENT FEE	TOTAL FEES (BPS)
Merit Mezzanine Fund V, L.P.	2010	15,000,000	1.75% Years 1-6 1.575% Year 7 1.40% Year 8 1.225% Year 9 1.05% Year 10	8,245	175
Ares Mezzanine Partners, L.P.	2011	15,000,000	1.50% Years 1-5 1.00% Years 6-10	0	150
Lightyear Fund III, L.P.	2011	20,000,000	1.75%	30,541	175
Ares Corporate Opportunities Fund IV, L.P.	2012	20,000,000	1.50% Years 1-5 0.75% Years 6-10	20,528	150
Dover Street VIII, L.P.	2012	25,000,000	0.50% Year 1 1.00% Year 2 1.25% Years 3-10	77,322	50
Green Equity Investors VI, L.P.	2012	20,000,000	1.50% Years 1-6 1.00% Years 7-8 0.75% Years 9-10	69,112	150
McCarthy Capital V, L.P.	2012	20,000,000	2.00%	59,164	200
New Enterprise Associates 14, L.P.	2012	20,000,000	1.25% Years 1-12	43,750	125
Accel-KKR Capital Partners IV, L.P.	2013	12,500,000	2.25%	30,948	225
Beecken Petty O'Keefe Fund IV, L.P.	2013	20,000,000	2.00%	44,172	200
Pine Brook Capital Partners II, L.P.	2013	30,000,000	1.96% blended rate	145,224	196
Wayzata Opportunities Fund III, L.P.	2013	25,000,000	1.50%	24,463	150
CVC Capital Partners VI, L.P.3	2014	19,599,150	1.50% Years 1-6 1.25% Years 7-10	33,462	150
New Mountain Partners IV, L.P.	2014	30,000,000	1.75% Years 1-5 1.00% Years 6-10	0	175
Quantum Energy Partners VI, LP	2014	30,000,000	1.65% Years 1-5 1.50% Years 6-10	43,458	165
The Energy and Minerals Group III, L.P.	2014	35,000,000	1.64% blended rate Years 1-5 1.50% Years 6-10 1.00% Years 11-12	111,448	164

1. Most funds have management fee offsets which will reduce the absolute dollars paid by the client.

2. Fund of funds that does not include fees paid to underlying managers.

3. Commitments to Bridgepoint Europe IV and CVC European Equity Partners V were both EUR 20.0mm. The USD commitments were converted at an exchange rate of 1.30 USD/EUR.

The commitment to CVC Capital Partners VI was EUR 15.0mm with a converted exchange rate of 1.30661 USD/EUR. The commitment to Bridgepoint Europe V was EUR 20.0 mm with a converted exchange rate of 1.25353 USD/EUR.

* Estimated management fee. The manager does not break out fees for this fund.

Source: Nebraska Investment Council

Asset Management Fees: SERS and PSERS do publish the asset management fees for investments on a per manager basis; with this practice and to their credit, SERS and PSERS are more transparent than many peer funds. They also report a higher percentage of management fees than a number of other peers (see sidebar, “What are GASB 25 & 67?”). The information provided by SERS and PSERS, however, provides limited contextual benefits, since information is not made publicly available on per-manager holdings or on per-manager performance compared to their assigned benchmarks. Without transparency to fees and costs within the context of the performance (absolute and relative to a risk appropriate benchmark) on a per manager basis, stakeholders are not able to answer the question “Are we getting what we pay for?”

Carried Interest and Other Costs: Neither SERS nor PSERS has historically publicly reported “carried interest” payments to managers for private equity, real estate and commodities. As shown in the image below, PSERS does not report carried interest/performance fees for alternative investments, real estate, or commodities in its CAFR. SERS simply shows a total of fees paid by asset class.^{li}

Figure 20: PSERS transparency of investment expenses in its CAFR

SUPPLEMENTARY SCHEDULE 2 SUMMARY OF INVESTMENT EXPENSES*
YEAR ENDED JUNE 30, 2017 (dollar Amounts in Thousands)

EXTERNAL MANAGEMENT	INVESTMENT MANAGEMENT		OTHER EXPENSES	TOTAL
	BASE	PERFORMANCE		
Domestic Equity	\$1,494	\$1,490	-	\$2,984
International Equity	19,771	5,392	-	25,163
Fixed Income	87,464	21,061	-	108,525
Real Estate	50,609	-	← -	50,609
Alternative Investments	102,714	-	← -	102,714
Absolute Return	78,202	50,784	-	128,986
Commodities	4,132	-	← -	4,132
Master Limited Partnership	8,295	238	-	8,533
Risk Parity	19,632	3,466	-	23,098
Total External Management	372,313	82,431	-	454,744
Total Internal Management	-	-	12,787	12,787
Total Investment Management	372,313	82,431	12,787	467,531
Custodian Fees	-	-	2,476	2,476
Consultant and Legal Fees	-	-	4,484	4,484
Total Investment Expenses	\$372,313	\$82,431	\$19,747	\$474,491

Source: PSERS

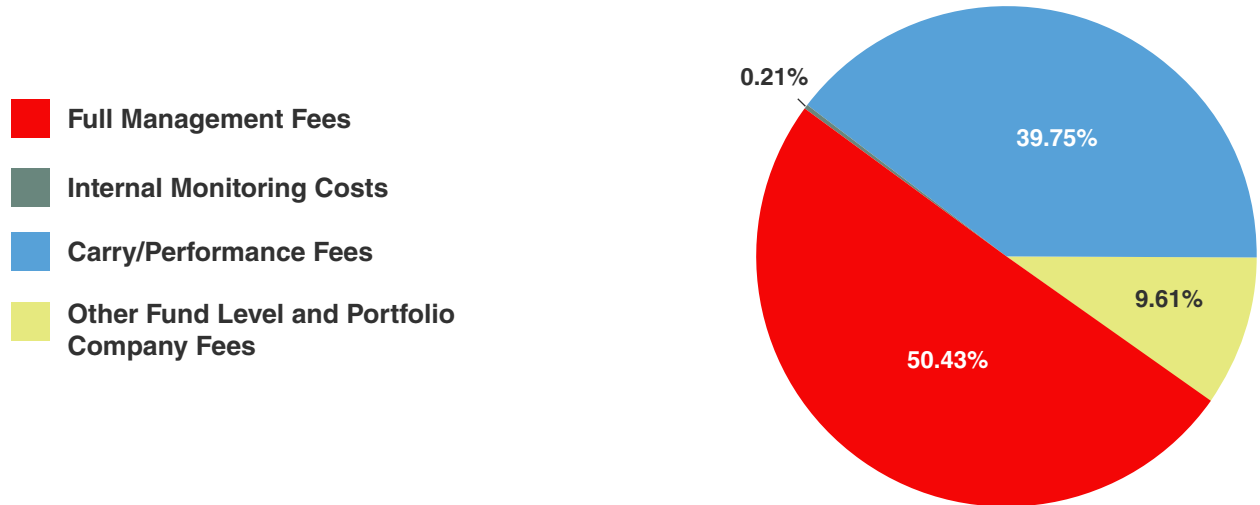
A number of pension funds, including SERS and PSERS, have cited GASB 25/67 – among other accounting standards and peer practices – as a rationale for not reporting all management fees, carried interest/performance fees, and other costs for private equity, real estate, and commodities (see sidebar, “What are GASB Statements 25 & 67?”).^{liii} Until this Commission heard testimony on the subject, neither SERS nor PSERS had even reported total carried interest to their respective boards. PSERS has claimed that they monitor, track and verify carried interest payments internally, while SERS has disclosed that they do not.^{liiii}

Each of these practices is problematic, but for different reasons. Given that the SEC found that “General Partners had violations of law or material weaknesses in controls over 50% of the time,” SERS’ failure to monitor and verify GP calculations of carried interest implies that there is a real danger of overpaying.

Aside from the issue of public disclosure, carried interest represents a significant cost of fund investments in private equity and other alternative investments – costs any fiduciary board should fully understand. In its 2015 report “The Time Has Come for Standardized Total Cost Disclosure for Private Equity,” CEM Benchmarking estimated that carried interest represents nearly 40% of the median annual cost of private equity.^{liiv}

Figure 21: Private equity estimated full costs

MEDIAN ANNUAL COST BASED ON NET ASSET VALUE



Source: CEM

Some funds, understanding that carried interest does represent significant cost, do report on it. While a minority in number, they include a number of large peer funds: CalPERS (\$326 billion), CalSTRS (\$219 billion), Arizona SRS (\$37 billion), South Carolina Retirement System (\$31 billion), and Texas County (\$30 billion). An early leader on fee transparency, South Carolina reports fees per manager, includes their assets under management, and separates fees by management, performance (carried interest) and other, as shown on the following page.

Figure 22: Excerpt from South Carolina CAFR

SOUTH CAROLINA RETIREMENT SYSTEMS
SCHEDULE OF INVESTMENT MANAGERS AND FEES (CONT.)
FOR THE YEAR ENDED JUNE 30, 2018 (Amounts Expressed in Thousands)

INVESTMENT MANAGER	FAIR VALUE OF ASSETS UNDER MANAGEMENT AT 6/30/2018 ¹	MANAGER FEES DIRECTLY INVOICED	MANAGER FEES DEDUCTED ON A NET OF FEE BASIS ²			TOTAL INVESTMENT MANAGER FEES
			MANAGEMENT FEES	PERFORMANCE FEES	OTHER FEES	
Morgan Stanley Partnership Private Debt	6,188		105	176	121	402
Northstar Mezz V	16,997		299	401	27	727
Owl Rock Capital	68,769		807			807
Sankaty COP IV	30,056		443	3,491	27	3,961
Sankaty COP V	38,337		384	820	43	1,247
Selene I ⁴				(15)	65	50
Selene II	64,175		412	208	(1,094)	(474)
SJC DL II	16,397		44	(130)	24	(62)
WL Ross - WLR Whole Loans	9,905		79	67	79	225
WL Ross Partnership Private Debt	39,329					
PRIVATE EQUITY						
Advent - Advent International GPE VII	53,004		449	2,693	12	3,154
Apax Europe VII	8,479			(88)	3	(85)
Apax Europe VIII	78,525		607	3,163	309	4,079
Apollo Partnership Private Equity	496,575		5,768	8,961	4,374	19,103
Aquiline Financial Services II	87,445		1,035	2,526		3,561
Azalea Fund IV	8,746		265			265
BC European Cap IX	26,241		243	(1,703)	110	(1,350)
Bridgepoint Europe IV ⁶	37,745		352		45	397
Bridgepoint Europe V ⁶	68,146		1,564		484	2,048
Brookfield Capital IV	120,675		1,741	26,438	887	29,066
Carousel Capital III	55		(27)	6		(21)
Carousel Capital IV	29,080		87	3,340		3,427
CD&R VIII	24,046					
Crestview II	66,352		629	(1,751)	328	(794)
Crestview III	34,051		1,184	(1,534)	155	(195)
Digital Colony ⁷	(989)		482		468	950
Francisco Partners	6,408		373		208	581
Goldman Sachs Partnership Private Equity	28,208		377	1,410	369	2,156
Green Equity	41,910		147	3,835	252	4,234
Industry Ventures VI	19,612		206	(289)		(83)
Industry Ventures VII	37,630		275	914		1,189
Lexington Capital VII	32,752		419	(584)	104	(61)
Lexington Middle Market II	21,986		210	(494)	28	(256)
Morgan Stanley Partnership Private Equity	181,703		1,536	(271)	304	1,569
Oaktree EOF III	35,622		641	1,065	125	1,831
Pacific Equity Partners	39,737		1,004	1,317	183	2,504
Pantheon USA VII	63,762		994	539	495	2,028
Paul Capital IX	27,664		605			605
Reservoir Capital Partners (Cayman) L.P.	48,311		314	2,082	26	2,422
Truebridge Capital I	44,812		164	175	51	390
Truebridge Capital II	79,205		288	326	76	690
Warburg Pincus X	52,221		250	2,647	392	3,289
Warburg Pincus XI	49,104		(284)	2,442	197	2,355
Welsh Carson Anderson & Stowe XI	28,136		153	(290)	13	(124)
WL Ross Partnership Private Equity	202,245		432	987	375	1,794
Various Private Equity Managers ⁸	188,940		1,076	361	426	1,863

Source: South Carolina Retirement Systems

Finally, some funds continue to report a minimum level of costs (sometimes even less than typically reported by SERS and PSERS) in certain schedules of their CAFRs, while, “in the interest of greater transparency,” provide a supplemental schedule containing a comprehensive accounting of carried interest. This can result in inconsistency in determining the expense ratio of a pension fund while conducting peer-to-peer comparisons, as identified by in a partially-redacted analysis prepared by SERS that was included in the PSERS fee reduction proposal. Funds operating “in the interest of greater transparency” should be commended, even if their reporting inconsistencies may cause them to appear artificially less expensive than their less transparent peer funds.

As one example, the Texas County & District Retirement System provides in its 2017 CAFR the following (emphasis added):

The investment management fees included in Investment Activity Expenses presented in the Statement of Changes in Fiduciary Net Position represent only those paid directly from the Pension Trust Fund and do not include fees incurred and charged by general partners in partnerships investing in private equity, distressed debt, direct lending, opportunistic credit, private real estate and hedge funds as these types of fees are netted directly against returns for those investments in accordance with FASB ASC 820. In the interest of greater transparency, fees and profit shares associated with these types of investments are disclosed in Table 8, based on information requested and received from fund general partners in conjunction with the annual audit.

The investment expenses related to TCDRS’ investments in partnerships investing in private equity, distressed debt, direct lending, opportunistic credit, private real estate and hedge funds fall into the categories of management fees and profit share (also called “carried interest”).

CARRIED INTEREST: WHEN A FEE IS NOT A “FEE”

As noted, many public pension funds have historically not reported “carried interest” payments for certain categories of investment such as private equity, while they have reported it for other categories such as hedge funds, and this non-disclosure has its roots in GASB language about whether a given expense is “separable.”

In addition to the GASB justification, however, the Commission also heard from some witnesses that carried interest payments were not, strictly speaking, “fees” because they were not paid directly. In its reply to the Commission, SERS writes “while ‘fees’ are reported on the templates provided in the response to the inquiry . . . in all cases, and while ‘fees’ are generally reported in SERS’ budget materials and CAFR, the ultimate ‘fee’ that SERS actually pays as limited partner in a partnership are not, and cannot be, accurately known until the completion of the partnership, **and in most cases are \$0.**” (Emphasis added.) In testimony, a SERS official went beyond that to assert that carried interest payments were not an economic cost of any kind: “It is not a cost of investing, in my view.”

Notably, the Commission only heard this line of reasoning from private equity consultants or representatives of pension funds, whether in Pennsylvania or elsewhere. Witnesses outside of pension funds uniformly described carried interest payments as a cost to the pension funds, whether acknowledged or not. As Charlie Ellis testified:

If I can be just blunt spoken, when somebody says “fee and carried interest are different,” I agree with that mechanically, legally, and so on. But everybody I know in Wall Street and everybody I know in investment outside of Wall Street is absolutely clear, they are part of the same thing. That’s what we get paid. And the cost and risk gets absorbed by the clients. This is worth paying close attention to. You put up 100 percent of the money, you take 100 percent of the risk, you have 100 percent of the liquidity [sic], and then the managers claim a 20 percent carried interest. If that isn’t part of their compensation or the reason they’re in business, it would be news to me, and candidly, it would be news to them.

As Dr. Phalippou also testified, “Imagine that Vanguard has your money on your 401(k) and whenever there are dividends paid by the stocks they hold on your behalf, they keep these dividends and tell you, ‘Don’t worry, I’m not going to charge you any fees.’”

Carried interest payments show up on the financial statements of publicly-traded private equity General Partner firms as income; elementary accounting tells us that income on one set of books is an expense on someone else’s, in this case pension funds.

What the financial industry labels carried interest in its various manifestations — a fee in the case of hedge funds, maybe something else in the case of private equity — is irrelevant. It is a cost — and a significant one — that should be tracked, verified, managed . . . and disclosed.

Given that the Texas County & District Retirement System has a similarly-sized private equity portfolio to SERS, it provides a simple illustration of the potential scale of carried interest that is being unreported by SERS. SERS reported \$63.14 million in management fees for the fair value of its \$4.08 billion private equity portfolio. Likewise, and as shown on the following image, Texas reported \$67.79 million in management fees for the fair value of its \$3.76 billion private equity portfolio. Texas, however, also reported an additional \$153.34 million in carried interest. Again, the similarities between the portfolio sizes and management fees reported simply provides an illustration of the scale of carried interest not being reported by SERS – potentially around \$150 million. As of November 2018, SERS has yet to report its carried interest for 2017.

Figure 23: Texas County & District Retirement System Reporting of Carried Interest

TABLE 8: INVESTMENT MANAGERS' FEES
YEAR ENDED DEC 31, 2017

ASSET CLASS	FEES PAID FROM THE PENSION TRUST FUND ¹		FEES NETTED AGAINST RETURNS		FAIR VALUE AT DEC. 31, 2017
	MANAGEMENT FEES	PERFORMANCE FEES	MANAGEMENT FEES	PERFORMANCE FEES	
Equities	\$9,209,371	\$6,337,395	\$3,502,415	-	\$11,589,598,530
MLPs	4,334,337	-	-	-	916,335,125
REITs	3,818,201	-	-	-	679,400,147
Investment-Grade Bonds	2,308,108	-	-	-	Note: Fair value similar to SERS portfolio of \$4 billion
Commodities	1,348,862	-	Equals 1.8% compared to 1.6% at SERS	-	
High-Yield Bonds	1,661,396	-		-	
TIPS	174,391	-	-	-	
Cash & Equivalents	-	-	-	-	
ALTERNATIVE INVESTMENTS	MANAGEMENT FEES	PERFORMANCE FEES	MANAGEMENT FEES	GENERAL PARTNER CARRIED INTEREST	FAIR VALUE AT DEC. 31, 2017
Private Equity	122,550	-	67,653,157	153,335,839	3,755,136,247
Private Real Estate Partnerships	2,842,564	-	13,909,659	9,886,232	625,488,282
Hedge Funds	-	-	82,246,313	64,350,861	6,590,822,320
Opportunistic Credit	-	-	18,473,366	44,240,621	1,979,344,663
Distresses Debt	-	-	8,013,374	13,791,946	Potential scale of fees not being reported by SERS
Direct Lending	-	-	10,947,248	5,377,591	
TOTAL	\$25,819,780	\$6,337,395	\$204,745,532	\$290,983,090	

¹ See Nondepartmental Managers' Fees on page 51.

Source: Texas County & District Retirement System

Estimating Total Fees & Costs: As discussed previously, SERS and PSERS have not historically reported carried interest payments. The Commission requested various documents in order to develop an estimate of total fees and costs for investments made by SERS and PSERS, including carried interest for private market investments. These requests intentionally only included private market investments entered into within the past five years in order to make fulfilling the request manageable. Among the information requested, as specifically worded, included:

- Quarterly contribution/distribution reports and annual performance reports for private market investment contracts entered into within the past five years.
- The applicable offering document(s)/side letter(s)/investment management agreement(s) outlining the terms of the investment arrangement for each investment made within the past five years.
- A copy of the most recent invoice showing the fee calculation (for private equity/real estate/infrastructure/etc., please additionally provide a copy of the capital statement showing the carry calculation and a copy of the ILPA report) for each investment made within the past five years.

The information was either not provided, revised from its original format, redacted, or would only be provided upon executing a non-disclosure agreement. As a result, Dr. Ludovic Phalippou was engaged to conduct an independent analysis of fees, costs, and performance for the private equity investments of SERS and PSERS. Dr. Phalippou is a recognized expert on private equity who has developed methodologies to estimate fees, costs, and performance in private equity. He was able to provide an estimate of management fees, expenses and carried interest using only limited information on the individual investments of SERS and PSERS conservative fee terms based on industry norms. Please see Appendix I for additional information on how Dr. Phalippou conducted his analysis.

The following is a breakdown of the \$12.4 billion of estimated total fees and costs for private equity incurred by SERS and PSERS that was presented to the Commission by Dr. Phalippou on September 20, 2018:

Figure 24: Private Equity Fees and Costs at PSERS and SERS

PRIVATE EQUITY FEES	MGT FEES YEARS 1-5	MGT FEES YEARS 6-10	PORTFOLIO COMPANY FEES	OTHER FUND EXP	CARRIED INTEREST	TOTAL FEES / COSTS / EXPENSES
PSERS (since 1985)	2,376.0	1,625.5	215.0	412.0	2,873.0	7,501.5
SERS (since 1980)	1,392.8	984.8	114.4	237.2	2,179.6	4,908.8
TOTAL	3,768.8	2,610.3	329.4	649.2	5,052.6	12,410.3

Source: Dr. Ludovic Phalippou analysis using PSERS and SERS data

PSERS Estimates: PSERS in its October 2018 Board Presentation on Carried Interest – which covered private markets (comprising the private equity estimates discussed previously), private credit, and real estate – reported total management fee offsets of **\$220 million**, other fund expenses of **\$875 million**, in addition to the carried interest of **\$5.17 billion**, all of which have been previously unreported.

Figure 25: Excerpt from PSERS Carried Interest Presentation

EXCERPT FROM PSER'S CARRIED INTEREST PRESENTATIONPrivate Markets, Private edit, Private Management Fees, Carried Interest & Other Expenses
(Dollars in Millions)

2016 Calendar Year	Mgt Fees	Offsets	Net Mgt Fees	Other Fund Exp ²	Total Direct Exp. of Managing Partnership	Total Dollars Earned Incl. Carried Interest	Carried Interest ¹	Net Dollars Earned to PSERS	Carry as % of Gross
Private Markets	\$ 141	\$ (19)	\$ 122	\$ 38	\$ 150	\$ 1,154	\$ 294	\$ 860	25.48%
Private Credit	51	(1)	50	24	74	490	73	417	14.89%
Private Real Estate	60	(5)	55	17	72	647	118	529	18.24%
TOTAL	\$ 252	\$ (25)	\$ 227	\$ 79	\$ 296	\$ 2,291	\$ 485	\$ 1,806	21.17%
2017 Calendar Year	Mgt Fees	Offsets	Net Mgt Fees	Other Fund Exp ²	Total Direct Exp. of Managing Partnership	Total Dollars Earned Incl. Carried Interest	Carried Interest ¹	Net Dollars Earned to PSERS	Carry as % of Gross
Private Markets	\$ 138	\$ (26)	\$ 112	\$ 47	\$ 159	\$ 1,724	\$ 378	\$ 1,346	21.93%
Private Credit	59	(2)	58	23	81	523	89	434	17.00%
Private Real Estate	57	(30)	54	16	70	853	202	651	23.68%
TOTAL	\$ 254	\$ (31)	\$ 224	\$ 86	\$ 310	\$ 3,100	\$ 669	\$ 2,431	21.58%
198-2017 (Inception to Date as of 12/31/17)	Mgt Fees	Offsets	Net Mgt Fees	Other Fund Exp ²	Total Direct Exp. of Managing Partnership	Total Dollars Earned Incl. Carried Interest	Carried Interest ¹	Net Dollars Earned to PSERS	Carry as % of Gross
Private Markets	\$ 2,359	\$ (214)	\$ 2,145	\$ 466	\$ 2,611	\$ 19,221	\$ 3,223	\$ 13,387	19.41%
Private Credit	334	(6)	328	149	477	3,028	364	2,187	14.24%
Private Real Estate	Not Collected	Not Collected	1,085	260	1,345	11,594	1,583	8,666	15.45%
TOTAL			\$ 3,558	\$ 875	\$ 4,433	\$ 33,842	\$ 5,179	\$ 24,239	17.58%

 Not previously reported

 Previously reported

Source: PSERS

It is encouraging and commendable that PSERS recently reported its estimate of these costs (see above), for the first time, to the Board and posted the report online. Given that a number of the investments are decades old, even the amounts provided by PSERS – like those provided by Dr. Phalippou – are estimates. There are a number of assumptions embedded in both cost estimates.

At the same time, and acknowledging that practices and norms are changing rapidly, it is troubling that these costs – carried interest amounting to \$5.17 billion over nearly 40 years (\$1.15 billion from the past two years alone) – were not regularly reported to the Board, the fiduciaries of the Plan, and that SERS has not yet been reported on them to their Board. These amounts are all “significant investment-related costs” and necessary to determine gross and net performance as described by the GASB.

As to public reporting of carried interest, as numerous witnesses testified, until there is widespread and uniform reporting of these costs, the asset managers – rather than the asset owners – will continue to have the upper hand in pricing. As Dr. Monk testified, “by minimizing the importance of fees and costs and keeping them a secret from the public, we’ve allowed our pension organizations to go under-resourced. And we’ve allowed the for-profit asset management industry to enjoy an incredible advantage at the expense of this critical social welfare institution: the American public pension plan.”

It is true that as yet there are more public funds not reporting these costs than reporting them. But, again, practices are rapidly changing and the trend is toward disclosure, especially among leading funds, where the evolving best practice is disclosure. Increased adoption of the ILPA reporting template described later in this report will show that these numbers are in fact “separable.” They should be reported.

Summary of Practices

The following table provides summary information on the transparency practices of SERS and PSERS compared to other pension funds and investment boards on several topics.¹²

WHAT ARE GASB STATEMENTS 25 & 67?

The Governmental Accounting Standards Board (GASB) issued Statement No. 25 in 1994, which provided financial reporting standards for defined benefit pension plans. Statement 25 required reporting of “total investment expense, separately displayed, including investment management and custodial fees and all other significant investment-related costs.” A footnote in the statement elaborates that “Plans are not required to include in the reported amount of investment expense those investment-related costs that are not readily separable from (a) investment income (the income is reported net of related expenses) or (b) the general administrative expenses of the plan.” Pension funds have used the ambiguity in the interpretation of “readily separable” to not report carried interest withheld by investment managers, as carried interest payments are often netted from investment proceeds.

The GASB issued Statement 67 in 2012 which – among other substantial revisions -- updated the requirements for disclosure of investment expenses previously contained in Statement 25. As CEM Benchmarking described in its 2015 report *The Time Has Come for Standardized Total Cost Disclosure for Private Equity*, GASB Statement 67 does not explicitly provide a list of exclusions from reporting, such as carried interest. Additionally, “readily separable” was changed from the previous reporting requirements to simply “separable.” The import of this change could be interpreted that the ease of identifying fees should not be a consideration in whether or not they are reported.

The GASB implementation guides for Statements 25 and 67 further provide that “The purpose of this requirement is to help users of the pension plan’s financial statements assess both gross and net investment income.” A comprehensive reporting of carried interest and other fund costs are necessary to determine the gross investment income.

Finally, it should be noted that both GASB Statements 25 and 67 direct the reporting of “significant investment-related costs.”

⁽¹²⁾ Not only do transparency practices vary among pension funds and investment boards in what information is provided, the ease of accessing the information can also vary greatly. For example, some funds may provide detailed quarterly performance reports in an easy to locate section of their websites. Other funds may produce the reports, but they may be tucked in a 500 page board report. The table was developed to show information could be readily identified, therefore, this should not be viewed as an all-inclusive analysis of transparency practices.

Figure 26: Transparency Practices among Peers

CATEGORY	SERS	PSERS	Examples of Funds/Boards Providing
Comprehensive Package of Board Meeting Materials	Not Provided	Not Provided	Alaska Permanent Fund Alaska Retirement Arizona SRS CalPERS CalSTRS Florida SBA Montana Board of Investment Nebraska Inv. Council New Mexico State Inv. Council North Dakota State Inv. Council North Carolina Teachers & State Oregon PERS Rhode Island South Carolina South Dakota Texas ERS Texas Teachers Wisconsin State Inv. Board
Live Stream, video, audio, and/or transcripts of Board Meetings	Not Provided	Not Provided	CaPERS CalSTRS Florida SBA Illinois Municipal Massachusetts Pension Reserve Montana New Mexico State New Mexico Public Employees Oregon PERS South Carolina Tennessee Consolidated Texas ERS Texas Teachers
Performance reported per manager	Not provided, returns by asset class posted quarterly.	Not provided, returns by asset class posted quarterly. Alternative Investments reported separately per manager, see below	Alaska Permanent Fund Alaska Retirement Arizona SRS Louisiana School Employees Michigan Public Schools Minnesota State Board of Investment Montana Board of Investment Nebraska Inv. Council New Mexico State Inv. Council New York State Teachers North Dakota State Inv. Council North Carolina Teachers & State Rhode Island Washington PERS
Detailed performance reports of alternative investments, including PME metrics	Reporting of commitments, contributions, and distributions provided annually. Performance and PME metrics not provided	Reporting of commitments, contributions, and distributions provided annually. Asset class performance and per manager PME metrics not provided	Connecticut Los Angeles County Employees Retirement Association, New Mexico Education Retirement Board Nebraska Investment Council New York City Employees
Fee Terms	Not provided	Public markets included in contracts posted on Treasury's e-Contract website	Louisiana New Jersey (new investments) Nebraska Investment Council Rhode Island South Dakota (management only)
Asset Management Fees Per Manager	Fees reported by manager	Fees reported by manager	Connecticut Illinois Municipal Illinois Teachers Louisiana School Employees Maryland Minnesota Public Employees Missouri State Employees Missouri Teachers Nebraska Investment Council Nevada Regular Employees New Mexico State Investment Council New York City Teachers North Dakota State Investment Board North Carolina South Carolina
Carried Interest Reported	Not historically reported, nor tracked internally.	Not historically reported. Reported per asset class in October 2018	Arizona CalPERS CalSTRS South Carolina Missouri Rhode Island Texas County

Source: Analysis of pension fund investment board websites.

The Institutional Limited Partners Association (ILPA)

Investment fee transparency has been particularly absent in alternative investments. For all of the reasons noted above, this is to the detriment of asset owners. Alternative investment managers, referred to as general partners, benefit from this opacity. In fact, it has been noted by SERS and PSERS staff and by several witnesses that the investment managers currently hold more power than asset owners when negotiating terms of many alternative investment partnership agreements. As a result, and in the best interests of the industry, the Institutional Limited Partners Association (ILPA) has developed a reporting template shown in Appendix I to facilitate more transparency between general partners and their limited partners. It is a standardized way for general partners to report all fees and costs associated with investments by their limited partners.

The ILPA reporting template has unique characteristics that provide mutual benefits to investment managers and pension fund management/staff. The ILPA reporting template was developed by a network of limited partners (investors in private equity, such as pension funds) in response to concerns with inconsistent reporting by the general partners (investment managers). A survey of the ILPA membership conducted in 2015 found that “52% of institutions had created custom templates to capture fee and expense information beyond what was being provided in standard GP reporting packages.”^{lv} From the perspective of the general partner, producing numerous variations of customized quarterly reporting for numerous limited partners can be burdensome and inefficient.

When we have examined how fees and expenses are handled by advisers to private equity funds, we have identified what we believe are violations of law or material weaknesses in controls over 50% of the time. - Spreading Sunshine in Private Equity, May 6, 2014, speech by Andrew Bowden, Director, Office of Compliance and Examinations, U.S. Securities and Exchange Commission.

These concerns were heightened by findings from the United States Securities and Exchange Commission (SEC) that general partners had engaged in “violations of law or material weakness in controls over 50% of the time.”^{lvi} In an interview with *The New York Times*, then director for the SEC’s office of compliance inspections elaborated: “These investors may be sophisticated and they may be capable of protecting themselves, but much of what we’re uncovering is undetectable by even the most sophisticated investor.”^{lvii}

The Commission heard from Lorelei Gray, who was instrumental in developing a comprehensive reporting framework while working for the state of South Carolina. South Carolina had been recognized as an early adopter and leader in its transparency of reporting of fees – receiving both positive and negative recognition. By including a more comprehensive accounting of fees in alternative investments, the fund faced criticism for being higher cost than its peers^{lviii}. Other funds have referenced the negative attention of South Carolina as a rationale to continue reporting a minimal level of fees and costs. The consistent use of a standardized reporting framework should put all pension funds on a level playing field. This is part of the benefits of the ILPA reporting template.

Jennifer Choi of the ILPA testified that the approximately 480 organizations that are members of the ILPA (including SERS, PSERS, and Pennsylvania Treasury) represent greater than 50% of private equity assets under management. General partners that have publicly endorsed the template represent 26% of private equity assets under management. Many of these managers invest for SERS and PSERS, including Advent International, Apollo, Blackstone, Bridgepoint, Hellman & Friedman, Oaktree, Permira, and TPG. SERS and PSERS have committed approximately \$6 billion to managers that have endorsed the ILPA template.¹³

The ILPA also estimates that over 300 managers provide the ILPA reporting template to investors requesting its use. It is reasonable to expect that SERS and PSERS have committed funds to several of these managers and

⁽¹³⁾ Calculations based on 6/30/17 consultant reports and ILPA GP template endorsers as of November 6, 2018 listed at <https://ilpa.org/reporting-template/template-endorsers/>.

that they would agree to utilize the reporting template if simply asked.

PSERS should be commended for its acceptance of the ILPA template. In its response to the Commission, it elaborated that “PSERS added a side letter provision to all new funds about a year and a half ago requiring the investment manager to utilize the ILPA reporting template as part of their reporting package to PSERS.”

When asked about its implementation of the ILPA template, SERS responded that “earlier this year, the Board passed a motion to direct SERS’ Investment Office to **request** from general partners/managers of private equity funds to adopt and complete the ILPA fee disclosure template” (emphasis added).

The ILPA has made significant progress on its efforts to promote enhanced uniform practices to improve the quality of reporting and disclosures. The ILPA reporting template can help SERS/PSERS and other investors improve investment fee transparency. General partners have generally embraced the ILPA template, and future investments in alternatives should require this standardized transparent report and the information should be evaluated, aggregated and shared publicly.

Recommendations

Although nothing precludes the Funds from implementing the following recommendations on their own, we recommend that the General Assembly act to require full public disclosure of fee and performance data by the funds through legislation, to institutionalize and make permanent these practices.

Transparency of decision-making processes:

- We recommend that complete board materials be posted on each system’s public websites, including manager presentations with proposed fee terms, no less than one week before each board or investment committee meeting, and that materials remain online for a period of seven years.
- We recommend that each public board and committee meeting be live streamed and video and audio recordings of public board proceedings be published and archived.
- We recommend that all investment marketing (“pitch”) materials, investment agreement terms, including side letters, related to fees, costs, expenses, performance and risk be publicly available, that fee terms not be redacted in contracts posted to e-contracts website, and that both retirement systems utilize a common standard checklist for transparency issues when evaluating managers (see Appendix I for sample).
- We commend the Systems for disclosing investment policy guidelines and asset allocation plans as well as other statements of their processes, and we recommend that they continue.

Transparency of performance reporting:

- We commend the Systems for disclosing total fund performance and performance of certain asset classes relative to benchmarks, and recommend that they continue to do so.
- We recommend that both retirement systems publish net-of-fee and gross-of-fee returns when reporting investment performance, and that the General Assembly consider enacting legislation to require that.
- We recommend that, to facilitate understanding by stakeholders and policymakers, each fund should report total fund performance against a risk-appropriate and commonly understood reference portfolio benchmark as Rhode Island, such as a global 60/40 or 70/30 index, with and without leverage if used, and for one, three, five, seven, ten, fifteen, twenty, and twenty-five year periods, as well as year by year.
- We recommend that both retirement systems publish returns, costs and fees of individual investments relative to a similar risk public markets alternative, on a levered and unlevered basis.

- We recommend that returns of internal investments are reported in the same manner as other investments – by investment, by asset class, by vintage year (if appropriate) and as a portfolio – on a levered and unlevered basis.
- We recommend that performance reports for the two retirement systems also include a rolling 3- and 5-year return comparison in graphic form, and annual returns for the last 5 years, in addition to the returns over 3-, 5-, 10-, 15-, and 20-year periods ending at the current period, in situations where they do not do so already.
- We recommend that both retirement systems publicly post detailed quarterly portfolio performance reports received from general consultants, with per-manager returns versus benchmarks, and alternative investment performance reports received from specialty consultants, including public market equivalent (PME) values for each individual fund/manager based on a board-approved index.
- We recommend the General Assembly repeal statutory provisions within the two retirement codes that permit both retirement systems to shield investment performance, risk and expense information from public disclosure pursuant to a Right-to-Know Request. Specifically, 71 Pa. C.S.A. § 5902 (e) and 24 Pa. C.S.A § 8502 (e).
- We recommend the General Assembly enact legislation that designates all retirement system records related to investment performance, risk and expense information as public records, using Arkansas (broadly identifying “all records” kept by the retirement system as open to the public), Nevada (declaring “books of the retirement system” are public records), Texas (affirmatively listing most all investment records as “not exempt from disclosure”), and, New York (mandating “records of the retirement system” as public) as examples of model legislation.
- At a minimum, we recommend the General Assembly enact legislation that would apply the provisions of the Public School Employees’ Retirement Code (24 Pa. C.S.A § 8502 (e)(5)), which designates valuation and expense information related to alternative investments as public records, to SERS’ alternative investments. Inexplicitly, SERS is presently not subject to this disclosure requirement.

Transparency of fees, costs, and expenses:

- We recommend that both retirement systems require all external managers to use the ILPA template. We commend PSERS for its policy, and urge that it be continued, and recommend that SERS also require, rather than request, this of managers.
- We recommend that both retirement systems publicly disclose all travel or other expenses incurred by staff and paid for by an external investment manager, fund or consultant.
- We recommend that both retirement systems utilize and report information from the ILPA template for each manager for the public reporting of fees, costs, and expenses of its alternative investments, including carried interest. In addition, we recommend that the General Assembly consider enacting legislation to require that information be reported in this manner. For traditional investments, we also recommend that the Systems publish investment management fees, costs, and expenses both by manager and aggregated by asset class, separately identifying base management, performance/carried interest, and other expenses (as reported by CalPERS, Missouri, and South Carolina). In addition, we recommend that the General Assembly consider enacting legislation to require the publication of this information.
- We recommend that policymakers and stakeholders should be prepared and willing to defend the systems against false comparisons that may be made as a result of increased transparency on fees. Increased disclosure comes with a risk of unflattering but also unfair comparisons to less transparent systems. The solution is not to avoid transparency, but for policymakers to avoid “penalizing” Pennsylvania’s funds for doing the right thing.



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

PORTFOLIO IMPLEMENTATION

III. Portfolio Implementation

Portfolio implementation is the process by which a board manages the investment portfolio, both directly as well as through responsibilities delegated to investment staff and consultants.

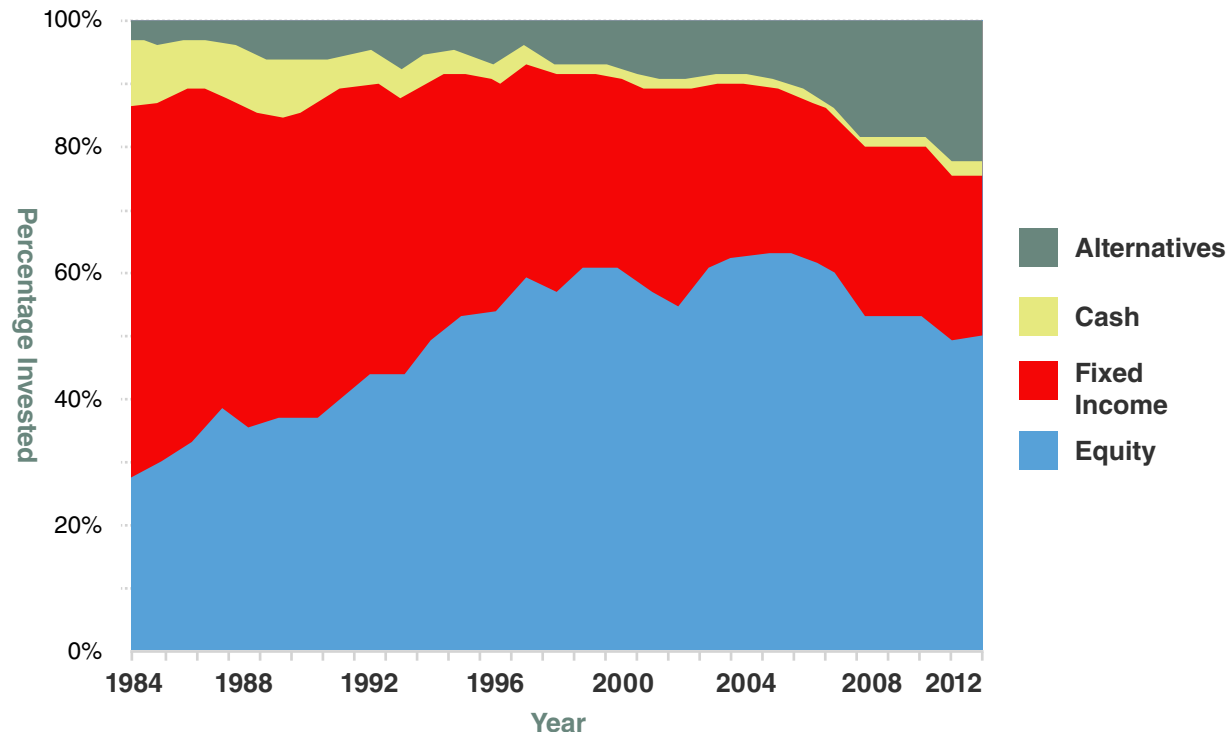
Portfolio Design – Risk Constraints and Portfolio Allocations

Risk Tolerance. The most important role for any board is to establish a risk budget: the level of volatility, loss, and illiquidity that is tolerable in the investment portfolio. Just as an 80-year-old's portfolio needs more liquidity and lower risk than does a young person's with a steady income, each pension system's risk budget will depend on their cash needs. Stress tests, as discussed in a prior chapter, are the most useful analyses for determining appropriate limits. While the employer has an obligation to fund the pension benefits even if investment performance is low, the board has an obligation to consider the risk to the pension beneficiaries of its reliance on funding that has historically been unreliable. Reverse stress tests determine what levels of downside risk, volatility and illiquidity might cause funding levels to cross a threshold percent or cause contributions to increase past a given threshold level.

U.S. public pension portfolios, in general, have opted for portfolios with a greater percentage of return-seeking assets today than in years past as seen in the following chart:

Figure 27: U.S. Public Pension Plan Investments in Risky Assets, 1984-2012

INVESTMENT BY ASSET CLASS



Source: Society of Actuaries, Report of the Blue Ribbon Panel on Public Pension Plan Funding.

A pension board is also responsible for limiting idiosyncratic risk in the portfolio. Idiosyncratic risk is the risk from adverse events at a specific company or investment manager. In contrast to systematic risk exposures (an investment's or portfolio's return exposure to aggregate economic events, such as a decline in a broad equity index), idiosyncratic risk can be diversified in a portfolio. Therefore, a board should limit the amount of any one

idiosyncratic risk, including limits on any one security, company, manager (including internal management), industry, and non-domestic country. As the saying goes, “don’t have all of your eggs in one basket.”

Within these risk limits, the board of a pension fund will then establish an investment allocation aimed at maximizing the portfolio’s expected return as described below. However, the starting point (and a point for performance evaluation) is the simplest, completely liquid portfolio reflective of the level of risk the board has established. An equity index is used for return seeking and a bond index for risk mitigating. A commonly chosen benchmark would be a 70/30 portfolio (70% in S&P 500 Index and 30% in Barclay’s Aggregate Bond Index),¹⁴ but it might also be 60/40 or 75/25 depending on the established risk tolerance.¹⁵ This choice is the board-determined simple portfolio benchmark. Below is a table showing a calculation (described in a footnote) of how SERS’ and PSERS’ assets divide into return-seeking versus risk-mitigating. Note that because PSERS uses leverage, as will be discussed below, their numbers do not sum to 100%.

Figure 28: Return-Seeking v. Risk-Mitigating Assets, SERS and PSERS¹⁵

	RETURN SEEKING	RISK MITIGATING
SERS – December 2017	78.6%	21.4%
PSERS – June 2018	79.7%	32.7%
	89.3% if include high yield as risk seeking	23.1% if include high yield as risk seeking

Sources: RVK; Moneyline.^{1x}

Asset Allocation. As financial markets have evolved, investors have tried to create more efficient portfolios (higher return without more risk) by diversifying across systematic risks beyond domestic equities and bonds. If a systematic risk exposure can be found that earns a high enough risk premium and has a low enough correlation with the rest of the portfolio, then a portfolio’s characteristics will improve with some exposure to it. Within its risk budget, the board determines how to diversify across additional asset classes and systematic risks by establishing a target investment allocation.

There are several considerations when adopting an investment allocation. The first consideration is what constitutes a legitimate sustainable systematic risk justifying a separate portfolio allocation, as this is still an area of current academic study and debate. International, currency, and real estate exposures have data supporting their inclusion in a portfolio.^{1xi} There is less consensus on exposures to commodities, lower grade credits, private equity and private debt markets, market capitalization or style biases. Thousands of indices have been created to attempt to generate returns from specific systematic risk without bearing idiosyncratic risk.

The lack of consensus on appropriate allocation categories is illustrated by how much terminology used by SERS and PSERS to describe asset classes changes. We show below that even within each system, and in the case of SERS even with the same Consultant, the categories change over short periods of time.

⁽¹⁴⁾ There is no exact science for choosing which equity index or which fixed income index. The original premise of modern portfolio theory and mean variance optimization originated with a paper by Nobel Laureate Harry Markowitz in 1952 and was extended into the capital asset pricing theory by William Sharpe and others. The conclusion is that under certain assumptions, holding a share of the market portfolio (a claim on everything produced in the economy) is the efficient portfolio.

⁽¹⁵⁾ Notes on table. SERS: “Risk Seeking” includes Private Equity, Global Public Equity, Multi-Strategy, 50% Real Estate, Legacy Hedge Funds. “Risk mitigating” includes 50% Real Estate, Fixed Income, Cash. It is unclear how safe real estate and fixed income assets are. PSERS: Use of leverage and the risk parity category makes this very difficult to calculate precisely for PSERS. Using allocations as reported in the Moneyline Report June 2018, there is 32.7% in fixed income (9.6% is in credit related, much of which is illiquid), 12.4% net leverage, which leaves the other assets (equity, risk parity, real assets – 24.4%, absolute return) at 79.7%. The risk parity category is itself leveraged, so these numbers are likely underestimating exposure.

Figure 29: SERS Allocation Categories

DEC 2012 – RVK REPORT	DEC 2017 – RVK REPORT
Alternative Investments	Private Equity
Global Public Equity	Global Public Equity
Real Assets	Real Estate
Diversifying Assets	Multi-Strategy
	Legacy Hedge Funds
Fixed Income	Fixed Income
Liquidity Reserves	Cash

Sources: RVK 2013 and 2017. ^{lxii}

Figure 30: PSERS Allocation Categories

DEC 2012 – WILSHIRE REPORT	JUNE 2017 – AON HEWITT REPORT	JUNE 2018 - MONEYLINE
Managed US Equity	Public Equity (US Large Cap, US Small Cap, Emerging Markets, Non-US Large Cap, Non-US Small Cap)	US Public Equity
Managed US Fixed	Alternatives Hedged	Non-US Public Equity
	Fixed Income (Investment Grade, Credit Related - High Yield and Emerging)	Private (Equity) Markets
Int'l Equity	Inflation Protected	US Fixed Income
Global Fixed Income		Non-US Fixed Income
Real Estate	Real Assets (Infrastructure, Commodities, Real Estate)	Real Assets (Real Estate, Commodities, Infrastructure)
Special Investments	Risk Parity	Risk Parity
Other (Commodities, Absolute Return, MLP, Risk Parity, other)	Absolute Return	Absolute Return
Unallocated STIF	Unallocated Cash & Cash Equivalents	Net Leverage

Sources: Wilshire; Aon Hewitt, Moneyline. ^{lxiii}

In addition to deciding what categories of investments (and risks) to employ, a board has to weigh the complexity of different allocations. While diversification across additional systematic risk factors may be prudent, it also adds complexity and increased reliance on forecasts. After a certain threshold, the benefits from diversification are outweighed by the costs of this additional complexity. In particular, as will be discussed below, complexity associated with illiquidity must be taken on cautiously since diversification benefits decrease with illiquidity while the costs of complexity increase.

Figure 31: Index vs. State Returns¹⁶

EXHIBIT 4: STATE PENSION RETURN DISTRIBUTIONS FOR FISCAL YEARS 2001 TO 2017, AND 17-YEAR ANNUALIZED RETURNS

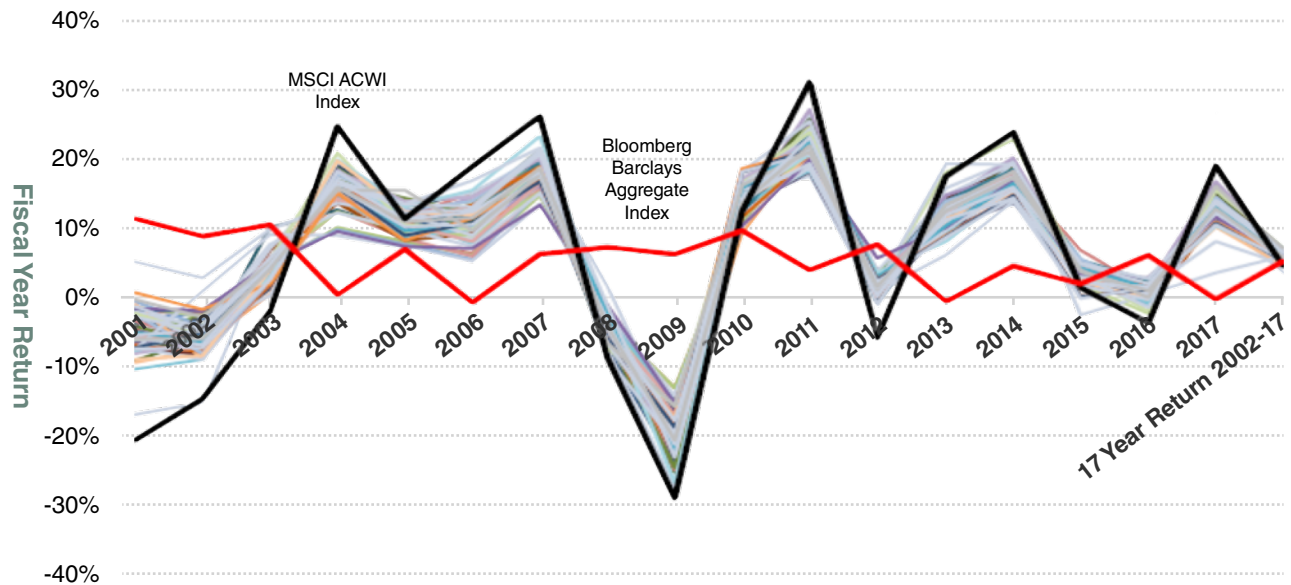


Exhibit 4 plots fiscal year-to-year returns for each of the 66 state pensions, ending with 17-year annualized return. Each line represents one state pension. Also shown are fiscal year returns for global stocks (MSCI ACWI Index) and U.S. bonds (Bloomberg Barclays Aggregate Bond Index).

Source: Cliffwater, 2018.^{lxiv}

As the chart above shows, it is unclear how much pension funds have truly benefitted from adding complexity. What is clear, however, is that the skill needed to manage and monitor the portfolio properly increases (for additional information on this topic see the chapter on Cost Saving Options). As the economist and Nobel Laureate Lars Hansen explains:

One argument I've heard made is that since this is a complicated problem, this requires a complicated solution. But I would argue the opposite. Because it's such a complicated problem and because there are so many things we don't understand, the best approach is to do it with simplicity and transparency and worry about fine-tuning things once our knowledge base expands.^{lxv}

A third consideration is that models used to select an allocation require assumptions about the distribution of future returns to different types of assets – at a minimum, expected returns, correlations, and covariances. But in making decisions based on models of future expected returns, buyer beware. Model outputs are only as good as the model inputs and assumptions. As an example, it is common to use a mean variance optimization model in developing asset allocation models, as the investment consultant to SERS does.¹⁷ Consultants regularly note how sensitive the outputs of mean variance optimization are to very small changes in assumptions. RVK wrote in a recent presentation to the SERS Board:

⁽¹⁶⁾ Legend: Red line is bond index, black line is stock index, lines in between are individual state returns.

⁽¹⁷⁾ We use the terms asset allocation and risk allocation interchangeably even though there are important differences. Asset allocation means allocation to an asset class such as domestic equities. Risk allocation means how much risk the entire portfolio has relative to systematic risk exposures, such as movements in domestic equities, often measured as beta. This distinction is important but not meaningful for the discussion here.

“MVO (Mean Variance Optimization) Shortcomings...

- *Models are sometimes highly sensitive to small changes to input values (“robustness”).*
- *Unconstrained output yields highly concentrated portfolios rather than the expected diversification.”^{lxvi}*

As a result of these shortcomings, the mean variance optimization model must be constrained because the model combined with the assumptions used would suggest allocations that consultants would not recommend. In other words, consultants believe that there are flaws with the model, with the assumptions, or with both.

The implication is that there is significant uncertainty in a portfolio’s expected returns and in which portfolio allocation is optimal, even though this may be obscured in the analysis. There is generally no statistical significance to small model-based basis point improvements in expected return between portfolio allocations. In general, a board should not choose an allocation with too much reliance on a particular model or set of assumptions.

*Risk parity.*¹⁸ “Risk Parity” is an asset allocation model promoted by the hedge fund Bridgewater Associates and others. Recognizing how hard it is to forecast future returns and correlations, some risk parity advocates suggest balancing a portfolio’s risk exposure to 4 potential scenarios driven by whether economic growth exceeds or falls short of expectations and whether inflation exceeds or falls short of expectations. More generally, a risk parity approach to asset allocation uses leverage to approximately equalize a portfolio’s “risk exposure” to different asset types and macro-economic scenarios without lowering expected returns. Assets, such as bonds and commodities, that have expected risk and returns that are lower than equities can be levered in order to achieve “parity.” For example, without a constraint on the use of direct or indirect borrowing (leverage), and with favorable assumptions about the expected future return and correlation of stocks and bonds, a portfolio with 65% stocks, 35% bonds, plus another 20% of a leveraged position in bonds (65%/55%), may be forecasted to outperform a 70%/30% allocation. Of course, as leverage is added into the portfolio allocation, errors in forecasts of future returns and correlations have a more meaningful impact.

PSERS’ portfolio allocation reflects a risk parity model. As of June 2018, PSERS reported 16.8% portfolio level financing.^{lxvii} At the same time, PSERS also has a separate allocation to a Risk Parity category. This makes interpreting or comparing their exposures very difficult as the 10% allocation (as of June 2018) to the “Risk Parity” category has within it leveraged exposure to a mixture of equity, fixed income, commodities, inflation-protected securities, and other traditionally defined asset classes. By using a separate “risk parity” category, PSERS total exposures to traditional asset classes and portfolio risks cannot be calculated.

A NOTE ON LEVERAGE AT PSERS

The use of leverage at PSERS, while consistent with a risk parity model, adds complexity to risk reporting. When leverage is used, allocations need to reflect total exposure – cash exposures plus notional exposures – and risk metrics need to account for the levered exposure. Calculations need to be clear and consistent and well defined. Direct borrowing and indirect financing through derivative securities must be calculated and disclosed.

Current reports produced by PSERS are difficult to understand regarding the use and level of leverage, as well as what total exposures or risks relative to traditional asset classes are. It is unclear which types of leverage are and are not included in the reported financing. For example, consider the PSERS Commodity Beta investment which was shown on the Moneyline Report for June 2018 at \$1.748 billion. The footnote labels this a notional exposure with \$584 million of cash and \$301 million of the PIMCO Commodity Alpha Fund as collateral. Under financing, there is a line for PSERS Commodity Beta for \$863 million. The PIMCO Commodity Alpha Fund is not listed elsewhere, although there is a line for “PIMCO PARS/GCOF/MAV” under absolute return for \$793 million. It is unclear if the \$584 million of cash is counted in the line for cash management or in the allocated cash. When a borrower takes out a mortgage on a house, the size of the mortgage does not decline just because the house is collateral or if the lender requires the borrower to maintain a checking account at their bank. This would not seem to be different. A derivative with a notional exposure of \$1.748 billion is synthetically the same as a loan (financing) for \$1.748 billion and a purchase of \$1.748 of the commodity index that the derivative is based on. That would suggest a financing of \$1.748 billion should be recorded. Yet, the financing line is less than half of that at \$863 million which is the difference between the notional value and the value of the collateral. From these materials, it is difficult to know if PSERS’ limits on leverage have been exceeded or not. The reported leverage will change by as much as 1.6% of the value of PSERS’ assets by how one calculates the leverage of this one line item.

There are further complications from leverage related to performance evaluation (discussed in a different chapter) and for the management of liquidity (discussed below).

⁽¹⁸⁾ Some suggest that risk parity models require less assumptions about expected returns. However, a model, for example, where asset class sharpe ratios are equal and future volatilities are the same as historical is assuming such about future return distributions.

A fourth consideration for the investment allocation decision is idiosyncratic risk. Seeking “alpha” is by definition deviating from the benchmark – accepting idiosyncratic risk – hoping to produce excess returns. A key observation that led to the development of modern portfolio theory was that idiosyncratic risk is diversifiable and therefore should not be systematically rewarded. Therefore, allocation models should not assume any returns from idiosyncratic risk, including returns to active management styles, as doing so conflates illiquidity, manager skill, and manager selection skill with the returns and risk from systematic risk exposures.

Whatever approach is taken to diversifying across more systematic risk exposures and creating a more refined investment allocation, the result is for the board to establish a second policy benchmark portfolio with the same risk level as the simple portfolio benchmark, but with a more diversified allocation to market indices. The performance of this diversified benchmark portfolio is compared over time to the performance of the simple portfolio benchmark to evaluate whether the asset allocation models and assumptions used have performed as expected or whether there needs to be a re-evaluation.

The choice of the diversified policy benchmark described above constitutes the allocation decision. There has been significant academic research that shows that over 90% of the returns of a portfolio can be explained by the allocation. As SERS’ consultant RVK writes:

Asset Allocation Explains:

100% of Return Amount Over Time

- *Studies consistently find that funds making timing and selection bets against their long-term policy mix are unsuccessful in adding significant value by engaging in timing and/or manager selection.*

90% of Return Variability Over Time

- *Studies consistently conclude that roughly 90% of the movement of a fund’s total return is explained by target policy fluctuation.^{lxviii}*

Respecting this data, many institutional investment managers simply choose to invest in the diversified benchmark portfolio. In fact, David Swensen, the acclaimed chief investment officer for Yale University’s endowment, in his book *Pioneering Portfolio Management*, recommends investing in a diversified benchmark portfolio. Georgia, Idaho, and Nevada and others have essentially utilized this practice to great success. These portfolios are well-diversified, have low external and internal costs, are easily understood, and are highly liquid.

Portfolio Execution

Costs, and Why They Matter.

All other things being equal, the smaller a fund’s expense ratio, the better the results obtained by its stockholders. - William F. Sharpe, Nobel Laureate

Once investors turn from establishing an asset allocation to implementing that asset allocation, they face the issue of costs. An abstract reference portfolio on paper is cost free; a portfolio in the real world will incur investing costs, whether large or small. Since by simple math, any investors’ actual return will be the return of the underlying assets minus the cost to obtain that return, clearly understanding and minimizing costs matters – and can matter considerably – to maximizing returns. This was the central insight behind the creation of this Commission by Act 5, and its mandate to identify savings.

The diversified benchmark portfolio described above is simple to manage, simple to monitor, and simple to understand. It does not require complex compliance systems or risk measurement or monitoring. Even a risk

parity strategy, such as PSERS', can be implemented using public markets indices at low cost. The leverage of the risk parity model makes the strategy a bit more complex for reporting and monitoring, but not significantly so, when it is employed with liquid public markets indices.

Some investment owners, believing that they can “beat” indices, choose to implement the portfolio using other types of investment strategies instead of investing directly in liquid public markets indices as defined by the diversified benchmark portfolio. This is a more expensive implementation. It adds direct and indirect costs and it adds risks. Since the asset allocation decision accounts for so much of the return, doing so, and thereby adding complexity through manager or security selection, should be done cautiously and must factor in the costs of doing so.

There are two types of costs associated with manager and/or security selection. First is the cost of monitoring and managing the risks – systematic and idiosyncratic – that are thereby introduced. An active management strategy may have different systematic risk than the index it replaces in the benchmark. For example, active fixed income managers often invest with more credit risk than the index. An active management strategy also introduces idiosyncratic risk, in two ways. One, from the risk of an adverse event in the (internal or external) manager's operations – either unintentional or intentional (fraud or rogue trader). Two, an active management strategy's securities differ from the index with the goal of outperforming an index. Those risks need to be measured, monitored, and managed. Doing all of this well in today's financial market environment requires sophisticated risk measurement tools and equally sophisticated investment expertise (staff and board) to understand and use them. This is neither simple nor cheap. Wall Street and institutional investment management operations like Blackstone and Apollo have enormous numbers of people and resources dedicated to this task alone. This issue is described in more detail in Chapter VII: Cost-saving Options.

The second cost associated with manager and/or security selection is the direct cost of the investment management. When an external manager is hired to implement an investment strategy, they do not do it for free. Some of the costs are direct fees and easy to measure, such as an asset management fee. Some of the costs are indirect, such as commissions on

CATEGORIES OF FEES AND COSTS

Transparency to the actual fees and costs of every individual investment is critical to good decision making and performance evaluation. Terms of contracts that dictate what fees and costs can and will be charged to the pension fund are enormously varied and they directly impact the risk of an investment by altering the incentives of an investment manager. Outlined here are general categories of fees and costs. It is important to note that tradeoffs between different types of fees are complex. Reducing base management fees in exchange for increases in performance-based fees will only deliver the full savings associated with the reduction of the base management fees when performance is so poor that no performance-based fees are earned.

Base management fees. Also known as asset management fees, these fees are charged as a percentage of assets under management. There is a financial incentive for an investment manager to gather assets to increase their total fee income. Offsetting the risk associated with this behavior is the understanding that longer term, if performance is poor, the investment manager will lose assets and thus fees.

Performance-based fees. Performance-based fees, also called incentive fees or carried interest, are usually a share of profits that accrue to the investment manager, often – although not always – above a threshold return to the asset owner. Important terms include whether the threshold return is a hurdle or a preferred return, what the threshold return is, what the catch up is, and what percentage of the returns over the hurdle or threshold the general partner earns. A common oversimplification is that these fees serve to align interests between asset managers and asset owners. The truth is significantly more nuanced. While it is true that the asset manager earns more in performance-based fees when performance is higher, the asset manager does not generally suffer losses when returns are negative. This creates an asymmetry between investor and manager: the manager wins when the investor wins . . . but does not lose when the investor loses. Moreover, there are very few contracts where the performance is adjusted for the use of leverage or other risk-increasing techniques, including the use of subscription lines of credit.

Other fees and costs. Transparency into other fees and costs are also critical to ensuring that the asset owner understands the incentives of the investment manager. There are numerous ways in which investment managers earn money at the expense of the asset owner. A few examples include commissions, soft dollar commissions, partnership expenses, portfolio company monitoring expenses, directors' fees, advisory fees, and travel expenses. Transparency is critical for controlling these costs and ensuring proper alignment of interests. As an example, historically, soft dollar transactions were not tracked or monitored,^{xxx} but transparency and regulations uncovered and then controlled abuse. Some costs are justifiable and appropriate, and others are not. Without transparency, it is impossible to form an accurate view on how the pension's assets are being treated.

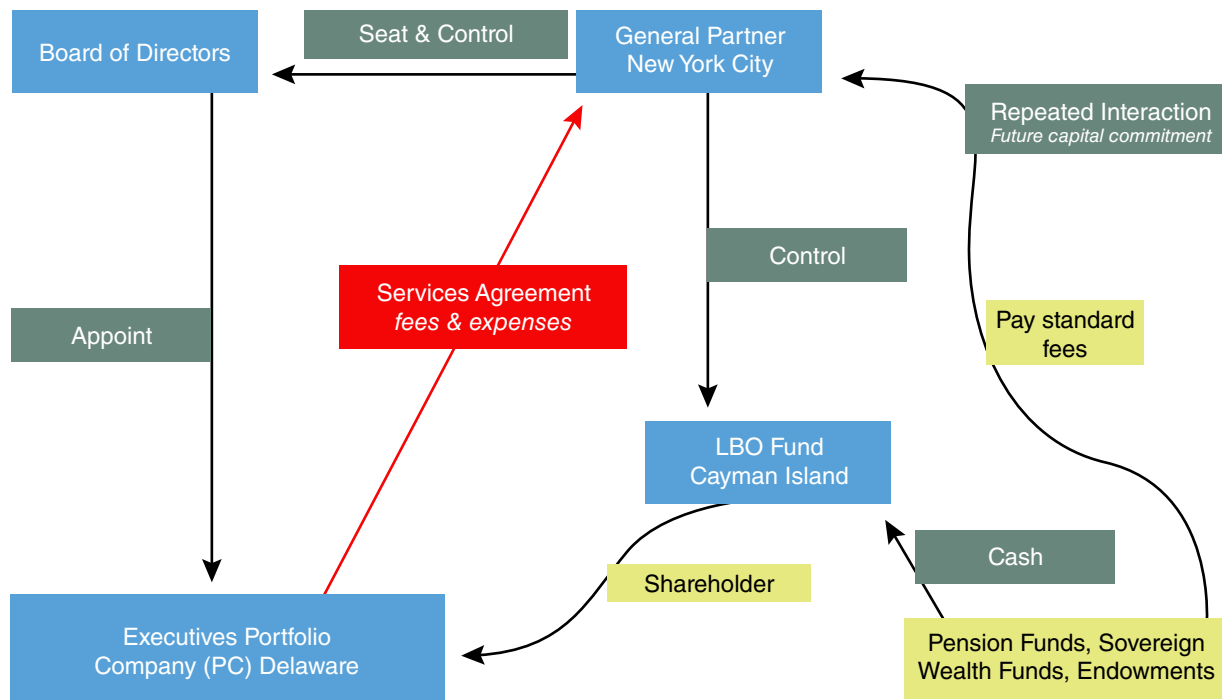
trades, purchases, or sales. Some of the costs are a function of the realized performance of the investment strategy. While there is debate about what legally constitutes a “fee”, the Commission’s purpose has been to consider the costs associated with achieving returns, so all costs paid or assumed related to the service of an investment have been considered regardless of nomenclature. Internal management may not always be as low cost as indexing. Internal investment management has all of the costs associated with risk and compliance management as described above, plus the costs of internal staff, office space and the like, the costs of additional risk and analytic systems, and the costs associated with increased board supervision needed.

As a board evaluates different types of portfolio implementation, these costs must be considered. Why should fees and costs matter if we are happy with what net-of-fee returns have been? There are several reasons. First, higher fees require a higher level of confidence in the manager’s skill. Second, fees and costs influence the alignment of interests. Finally, the board and staff make decisions about the future and not about the past. Historical performance is only useful to the extent that it informs expectations about future returns. Future net-of-fee returns are not known, but fees and how they relate to gross-of-fee returns and the risks that will be taken to generate them can be understood.

Risk. To achieve the same net-of-fee return,²⁰ when fees and costs are higher, the gross-of-fee return needs to be higher. If, as is reasonable to assume, these higher gross-of-fee returns are associated with higher idiosyncratic risk, then the higher fees also imply higher risk for the same amount of net-of-fee return. In other words, the only way to justify a higher fee manager on a risk adjusted basis is to have more confidence in the consistent success of the strategy.

Alignment of Interests. Fees and other costs of active investment management have the potential to introduce conflicts of interest. For example, conflicts associated with bundled brokerage are discussed in Chapter VIII: Cost-savings Analysis. Investment managers who earn fees as a percentage of assets managed have incentives to gather assets which may not be aligned with optimizing performance. Performance fees do not share downside risk. Few benchmarks, hurdle rates, or performance fees are truly risk-matched to the strategy. The following image provides an illustration of areas for potential conflicts of interest in private equity.

Figure 32: Potential for conflicts of interest in Private Equity



Source: Ludovic Phalippou^{lxx}

⁽²⁰⁾ This refers to returns in excess of what can be earned by a similar risk liquid markets index portfolio.

Fee Negotiations. Even when an active management strategy is deemed to be worth the risk it entails, maximizing returns (relative to risk) requires skillful and knowledgeable negotiation of fee structures. Fee structures vary enormously, particularly in private markets investments. As Steve Nesbitt, Chief Executive Officer of Cliffwater, LLC testified to the Commission at the October 2018 hearing:

Fee components and levels are spelled out in a private equity partnership agreement. These are negotiated between managers and investors before the partnership is activated. So again, there is an active negotiation of fees, it happens when the partnership is originated. Large state pensions have historically played an active role in negotiating private equity partnership fees and terms and are not simply price-takers [emphasis added].^{lxxi}

In choosing a fee structure, the total costs of an investment strategy under different performance scenarios must be evaluated, as well as how the terms impact incentives and/or create conflicts of interest. For example, lowering an asset management fee rate in exchange for a higher performance fee may or may not be wise. It will depend on the expected return of the strategy, the hurdle rate and catch up terms, the level of performance fees and asset management fees, amongst other considerations. To illustrate, consider a 10bps reduction in an asset management fee in exchange for a 10% performance fee (with no hurdle rate). When gross returns are just 1% or more, the savings on the investment management fee is swamped by the increased cost from the performance fee. This example also shows that even “agreements with zero base management fees, and the investment manager only gets his share of the profits generated”^{lxxii} may or may not be good as a 10bps asset management fee with no carry is preferable to zero asset management fee and 10% carry for any manager worthy of being hired.

Overview of Investment Costs at SERS and PSERS

Reported costs for the \$29.3 billion SERS portfolio in calendar year 2017 mainly consisted of \$135 million of investment expenses and \$26 million of administrative expenses, as detailed below. Reported costs for the \$52.4 billion PSERS portfolio in fiscal year 2016-2017 consisted of \$475 million of investment expenses and \$45 million of administrative expenses. When including an estimated \$577 million of carried interest for fiscal year 2016-17,²¹ estimated total investment expenses for PSERS – or the amount ultimately retained by investment managers – exceed \$1.03 billion – an amount greater than the \$1.01 billion in all employee contributions for the same period.

PSERS FEE RENEGOTIATION EXAMPLE

In its response to a Board resolution on management fees, PSERS asserts it will save costs by decreasing “the guaranteed fees, or base fees, in exchange for a profit-sharing arrangement on returns above a negotiated benchmark.”^{lxxiii} While details of the fee terms were generally not disclosed, there was one example given for a commodity manager: (page 19).

We also renegotiated the alpha investment manager’s contract to reduce the base management fee from 95 bps to 65 bps. In exchange, we increased the profit share from 22.25% of profits above the base management fee to the higher of 29% of the profits or 65 bps (the base management fee)^{lxxiv}

Using this information, the breakeven between the fee structures is calculated to occur at a gross return of 10.94%. Assuming the alpha manager’s expected gross return is less than 10.94%, this would be a true cost-savings. However, the cost-savings are not likely to be the entire 30 bps.. The manager must generate more than a 10.2% gross return to produce a net return equal to the actuarial expected rate of return for the portfolio (7.25%). At that 10.2% gross return, the fee savings from this fee change would actually be 5bps, not 30bps. In general, any estimated savings that ignore the increased costs associated with performance fees, likely significantly overstate cost-savings.

⁽²¹⁾ Carried interest reported by calendar year; therefore, an average was calculated.

Figure 33: SERS Expense Overview, 2017

PENSION ADMINISTRATIVE & INVESTMENT EXPENSES	
	TOTAL REPORTED EXPENSES
Private Equity	\$63,144
Global Public Equity	21,552
Real Assets	20,392
Multi-Strategy	9,433
Fixed Income	9,176
Hedge Funds	2,844
TOTAL MANAGER INVESTMENT EXPENSES	\$126,541
Investment Consultants	3,597
Investment Professional Personnel	2,864
Custodian	1,302
Legal	369
Subscriptions and Memberships	296
Operational	110
TOTAL INVESTMENT EXPENSES	\$135,079
Administrative Expenses	26,122
TOTAL ADMINISTRATIVE & INVESTMENT EXPENSES	\$161,201
Note: Refunds of \$15,820 not included All amounts in thousands	

ASSET ALLOCATION & APPROX. EXPENSE RATIO		
	VALUE	EXPENSE RATIO
Private Equity	\$4,044,500	1.55%
Global Public Equity	15,505,300	0.14%
Real Assets	2,207,400	0.92%
Multi-Strategy	2,121,400	0.44%
Fixed Income	4,238,200	0.22%
Hedge Funds	191,000	1.49%
Cash	948,400	
TOTAL	\$29,289,200	

Source: SERS 2017 CAFR

Figure 34: PSERS Expense Overview FY 2016-2017

PENSION ADMINISTRATIVE & INVESTMENT EXPENSES				CARRIED INTEREST		ASSET ALLOCATION & APPROX. EXPENSE RATIO		
	BASE	PERFORMANCE	TOTAL	16-17 AVERAGE	TOTAL W/ CARRIED		VALUE	EXPENSE RATIO
Domestic Equity	\$1,494	\$1,490	\$2,984		\$2,984	Domestic Equity	6,910,141	0.04%
International Equity	19,771	5,392	25,163		25,163	International Equity	4,243,439	0.59%
Fixed Income	87,464	21,061	108,525	81,000	189,525	Fixed Income	18,660,470	1.02%
Real Estate	50,609		50,609	160,000	210,609	Real Estate	6,146,728	3.43%
Alternative Investments	102,714		102,714	336,000	438,714	Alternative Investments	7,909,926	5.55%
Absolute Return	78,202	50,784	128,986		128,986	Absolute Return	5,082,149	2.54%
Commodities	4,132		4,132		4,132	Commodities	4,052,402	0.10%
Master Limited Partnership	8,295	238	8,533		8,533	Master Limited Partnership	2,369,627	0.36%
Risk Parity	19,632	3,466	23,098		23,098	Risk Parity	1,055,092	2.19%
TOTAL EXTERNAL MANAGEMENT			454,744	577,000	1,031,744	Infrastructure	5,038,035	
TOTAL INTERNAL MANAGEMENT			12,787			Financing	(9,070,910)	
Custodian Fees			2,476			TOTAL	52,397,099	
Consultant and Legal Fees			4,484					
Total Investment Expenses			474,491					
Pension Administration Expenses			45,127					
Total Pension Administrative & Investment Expenses			\$519,618					
Note: Post-employment healthcare of \$39,310 not included All amounts in thousands								

Source: PSERS 2016-2017 CAFR, PSERS Carried Interest Presentation, October 2018.

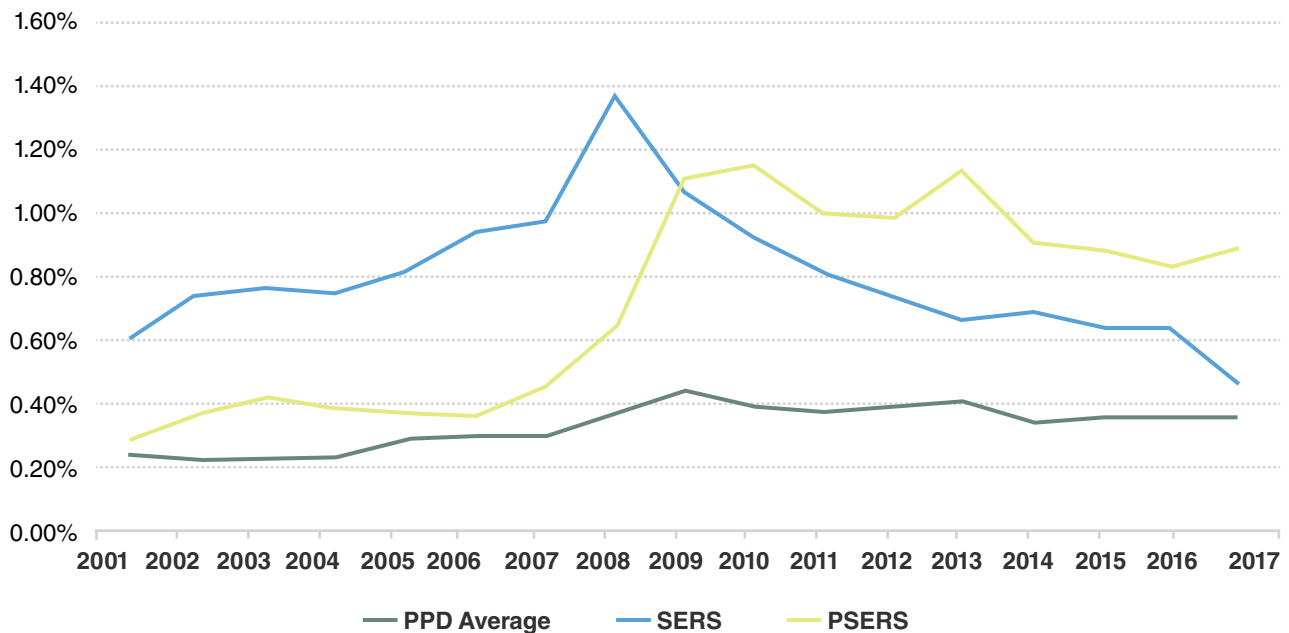
Investment Expenses

Concerns about the increasing expenses for managing public pension plan investments were elevated to Pennsylvania’s elected leaders in an April 2017 report that showed PSERS had the 6th highest investment expenses in the nation and SERS had the 9th highest out of the 73 largest plans (based on 2015 data).^{lxxv} A year later, PSERS was reported at 8th highest and SERS at the 16th highest (based on 2016 data).^{lxxvi} While it is difficult to precisely compare reported expenses among differing public funds, the simple underlying fact remains: SERS and PSERS have higher investment expense levels than most comparable funds, and the difference is especially stark at PSERS. As JP Aubrey of Boston College, during his presentation in front of the Commission in July, stated: “Our estimates for Pennsylvania were closer to 70 to 80 basis points, so they were at the very high, very high end of the average fee paid over the whole period.”^{lxxvii}

The following chart shows how the investment expense ratios for SERS and PSERS have changed over time, compared to the average expense ratio of all plans on the Boston College Public Plan Database. Notably, **SERS has made significant and commendable progress in reducing investment expenses.**

Investment expenses at SERS decreased over 50% from \$310 million in 2008 to \$135 million in 2017. At first glance, the savings could be attributed to a nearly 50% reduction in the allocation to alternative investments – saving nearly \$60 million in investment expenses alone. What is both notable and commendable is that public equity investment expenses decreased 75% while the allocation to public equity more than doubled. The total dollars saved in public equity markets totaled \$67 million and exceeded those saved in alternative investments. This was accomplished through the increased indexing of public equity investments. Please see Chapter VIII: Cost-saving Analysis for additional information on how these investments performed.

Figure 35: Estimated Investment Expense Ratio



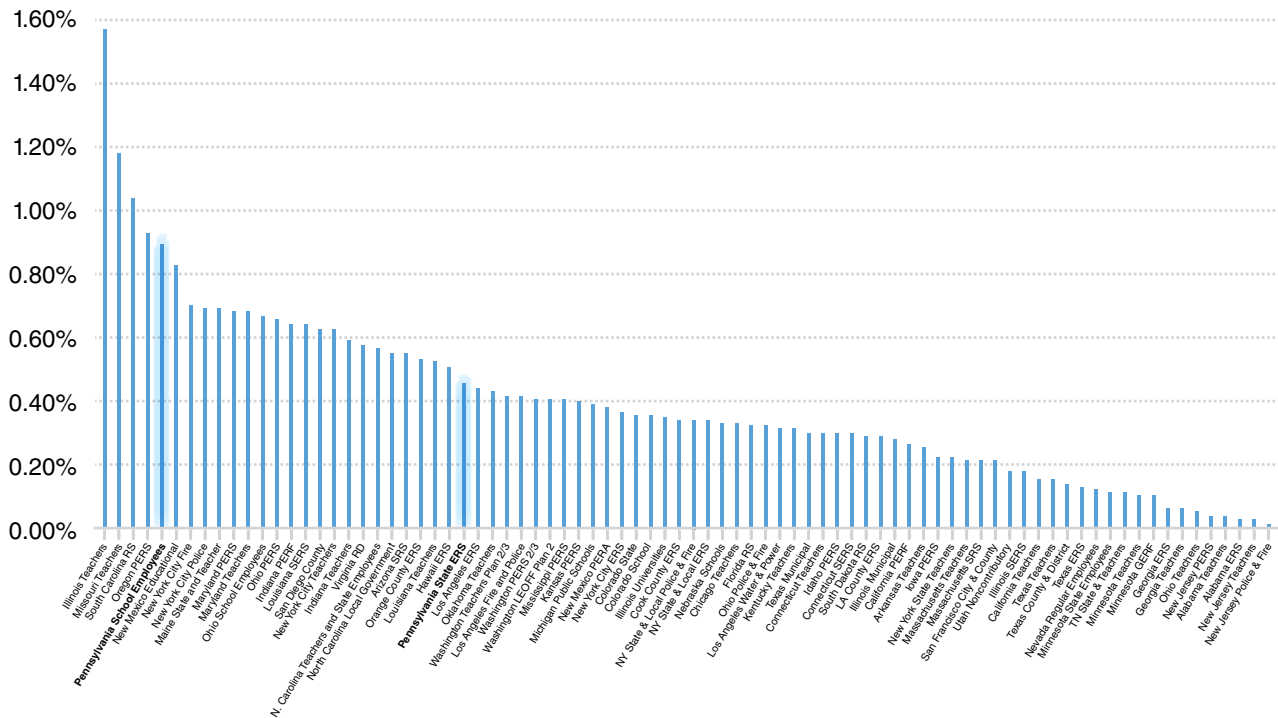
Source: Analysis of Boston College Public Plans Data, 2001-2017.

Costs Compared to Peers

An analysis of peer public pension plans with assets greater than \$10 billion from the Boston College Public Plans database supports the findings of the April 2017 report and subsequent update (which used 2015 and 2016 data, respectively). Additionally, as of the 2017 fiscal year SERS ranked 27th most expensive out of a peer group of 82 funds in investment expenses expressed as a ratio of total investment expenses to net market

assets. PSERS ranked 5th most expensive – a concerning placement among peers that has remained relatively consistent over the past three years and between the different peer groups.^{lxxviii}

Figure 36: Estimated Investment Expense Ratio, Plans above \$10 billion in assets.



Source: Analysis of Boston College Public Plans Data, 2017 data.

Inconsistency in Reporting of Investment Expenses

Certain funds cite inconsistencies in the reporting of investment expenses as an explanation of their reported high cost among peers (please see Chapter II: Transparency). In a November 2018 guest piece for investment industry website top1000funds.com, PSERS staff wrote: “PennPSERS is one of the most transparent pension funds in the US regarding disclosure of management fees. For example, certain pension funds report little to nothing in management fees for alternative investments because they are considered part of the cost of the investment and are netted against performance rather than shown separately.”^{lxxix} However, if PSERS were to report zero management expenses for fixed income, alternative investments, and real estate, total investment expenses would still total \$234 million for fiscal year 2016-17 and PSERS’ rank would change from 5th most expensive to 27th most expensive, slightly less expensive than SERS at 25th. In other words, PSERS could hypothetically reduce total investment expenses 50% and still remain amongst the top third most expensive plans. The transparency of PSERS’ management expenses for fixed income (High Yield), alternative investments, and real estate is not the sole cause of its appearing as high cost.

Please see the Chapter VIII: Cost-saving Analysis of this report for a deeper and targeted analysis of investment management costs for managers and asset classes at SERS and PSERS.

Administrative Expenses

Administrative expenses include the personnel and operating costs of running the pension system, such as office space, legal fees, postage, phone systems, and technology. On an absolute dollar basis, SERS and PSERS appear to have high administrative expenses. Of 73 plans on the Public Plans Database with assets greater than \$10 billion where data were available, SERS’ \$26 million ranks it 16th most expensive and PSERS’ \$45 million

of administrative expenses ranks it as the 7th most expensive. When based on cost per member – a commonly-used, yet not all-inclusive way to normalize costs – SERS' per member costs of \$109.18 ranks as 27th most expensive and PSERS' per-member cost of \$88.40 ranks as 36th most expensive. Again, while the actual ranking may be reasonably disputed, the underlying premise remains valid – that SERS' and PSERS' administrative expenses are higher than most comparable plans.

As is the case with investment expenses, there is potential that some administrative costs are reported differently between plans. The Commission's primary focus was on investment performance and costs; the administrative costs of SERS and PSERS as it relates to peers on an absolute basis suggests that further analysis is warranted. Please see the Chapter IX: Consolidation of Investment Operations for specific analysis and recommendations for SERS and PSERS to reduce investment and administrative expenses.

Managing Liquidity

As a board assesses different portfolio implementations, in addition to costs, liquidity must be evaluated, monitored, and managed. While pension funds are long-term assets, liquidity still matters. There are several reasons that liquidity is valuable. First, liquid assets are needed to pay expenses, including benefits. Second, one of the payoffs to diversification is achieved by being able to rebalance a portfolio's allocations back to the desired targets. When stock market returns are poor and values are depressed, for example, other liquid investments can be sold to fund purchases of these now-cheaper assets.

This is not just an academic matter. Institutional investors that have ignored liquidity have suffered. As Steve Nesbitt of Cliffwater testified to the Commission:

If I may briefly go back to the subject of asset allocation and speak to the issue of private equity and liquidity management, which has generally been overlooked in asset allocation. Trustees learn from the Global Financial Crisis that asset allocation targets to private equity and private assets more generally need to take account of cash flow needs of the pension system and the potential for large variances in actual versus target allocations during downturns. Prior to the Global Financial Crisis, many endowments, including large endowments like Princeton and Stanford, had outsized allocations and unfunded commitments to private assets well exceeding 50 percent of their total assets. The crisis forced these and other endowments into potential distress sales of their illiquid assets and unfunded commitments to meet then current spending needs. Fortunately, distressed sales were largely averted as capital markets rebounded and private asset managers delayed calling on committed capital. But the experience was a lesson learned. . . .^{lxxx}

To the best of our knowledge, PSERS' current allocations and unfunded commitments to private assets are over the levels that caused Stanford University and Princeton University trouble. Based on the footnote to the June 30, 2018, Moneyline Report, PSERS has 18.1% in unfunded capital commitments and 43.1% in private investment structures giving a 61.2% exposure.^{lxxxi} The liquidity problem Nesbitt describes is worse for underfunded pension funds such as Pennsylvania's than for endowments. Pension funds' benefit payments do not decrease when pension assets decrease. In fact, as a percentage of the assets, they increase. Moreover, history indicates that contributions from the employer become less certain in financial crisis. As a PSERS official testified to the Commission:

At the bottom, towards the bottom of the market, what we were facing was an uncertain funding future, right? We knew at the time we were being severely underfunded, the ARC. Obviously [...] we've gone through three years in a row, but to this point [...] I guess I'm not going to be comfortable until I see it through a recession, whether the contribution rate will be maintained, right? So, we're at the best of times from an economic standpoint, and we're meeting the ARC. I'm more interested in what's going to happen in the worst of times when the, you know, need for government spending will increase, the tax revenue will fall, and then you're going to have to figure out how to balance that budget. I'm not 100 percent convinced what that's going to look like. ^{lxxxii}

Endowments, by contrast, generally only need to distribute 5% of their assets – an amount that decreases when their assets decrease.

Illiquidity comes from many sources. First, even when the underlying securities are themselves liquid, the pension fund may only have access to the strategy by committing to a legal structure that limits their rights to withdraw assets quickly. Hedge funds are examples of such structures, and often the general partner is legally permitted to restrict withdrawals (impose gates) when too many investors want to redeem at once – an event that happens when liquidity is most valuable.

Second, private investments – for example, private buyout equity, private equity in venture capital, private debt investments, private real estate equity and debt – share a common feature – illiquidity. The investments are typically made through a partnership structure where the pension fund is a limited partner, with limited rights and limited liquidity.

Finally, these structures typically involve commitments of capital that can be requested by the general partner at any time during the investment period. Amounts committed but not yet funded (unfunded capital commitments or unfunded commitments) represent a significant liability that must be included in calculations of required liquidity. While institutional investors attempt to model expected cash flows from private markets investing, the pacing of capital calls and distributions is far from predictable. The recent rise of the use of subscription lines of credit by general partners makes this risk worse. These are loans by a bank to the partnership that are collateralized by the partner commitments. In a financial crisis, banks may withdraw²² those loans, forcing general partners to call capital quickly to fund investments already made. Monitoring the use of these lines of credit is important for understanding liquidity as well as understanding performance as discussed in a separate chapter. Internally managed direct investments or co-investments in debt or equity securities that are not traded on a public market are also illiquid.

While secondary markets for private investments and limited partnership interests have been developing, a pension fund will typically only be able to sell their illiquid investments at very substantial discounts from current valuations, particularly when global liquidity is most valuable.

The use of leverage also affects required liquidity. First, leverage may introduce cash flow needs. When a pension invests in a total return swap on the S&P 500, for example, while there is little or no money allocated at the outset, the fund is obligated to produce cash to fund losses as they occur. Futures contracts are similar, with mark-to-market happening daily. Second, all else equal, leverage causes the volatility of the liquid assets to increase. Can that volatility be tolerated when the liquid assets are needed to fund cash flows and to rebalance the portfolio?

PSERS' CIO testified to the Commission about PSERS' liquidity problems during the Great Financial Crisis of 2008:

⁽²²⁾ Some general partners negotiate term subscription lines of credit, where the bank does not have the right to call the loan. The size of this issue is not known.

When you look back, you know, through our history, coming into the Great Recession, we probably looked similar to a lot of other pension plans, very heavy in equities, say about 70 percent, 30 percent in fixed income. When we entered the crisis, assets fell significantly. You know, we probably topped assets around \$70 billion and we fell down to about \$40 billion. And that was just an indication of the risk profile that the fund was taking. We had 70 percent in equities. Equities were cut in half...

Our cash flow went to about negative eight percent of assets... So if the fund grew zero in that next year, we would have eight percent less in assets. And if you went through a period, a long protracted period of sort of no returns, or God forbid, you had another drawdown after that, we ran into issues where solvency could become an issue.

So we stepped back and we said that we really couldn't accept that 70/30 type risk profile anymore. It was way too risky.^{lxxxiii}

As noted above, PSERS risk reports are difficult to interpret, as it is difficult to know whether the risk from leverage and risk parity is fully reflected. Judging solely on the basis of the ratio of return-seeking to risk-protecting liquid assets, and without having access to all the necessary data to evaluate, stakeholders should consider whether the risk profile of PSERS' liquid portfolio today may be, in fact, riskier than before the 2008 financial crisis:

Figure 37: PSERS Liquidity

PRIVATE/ILLIQUID ASSETS		61.2%
	Private Equity	14.1%
	High Yield/LP Structure	9.0%
	Real Estate	9.7%
	Absolute Return	10.3%
	Unfunded Commitments	18.1%
LIQUID ASSETS EXPOSURE		69.3%
	Public Equity	21.0%
	Investment Grade Fixed Income	8.6%
	Emerging Markets Fixed Income	0.6%
	Inflation-Linked Fixed Income	14.5%
	Commodities and Infrastructure (some is illiquid)	14.7%
	Risk Parity	9.9%
NET LEVERAGE		(12.4%)
Liquid Assets	Not including Unfunded Commitments	56.9%
Liquid Assets	Deducting Unfunded Commitments	38.8%

Source: Analysis based on data from Moneyline.^{lxxxiv}

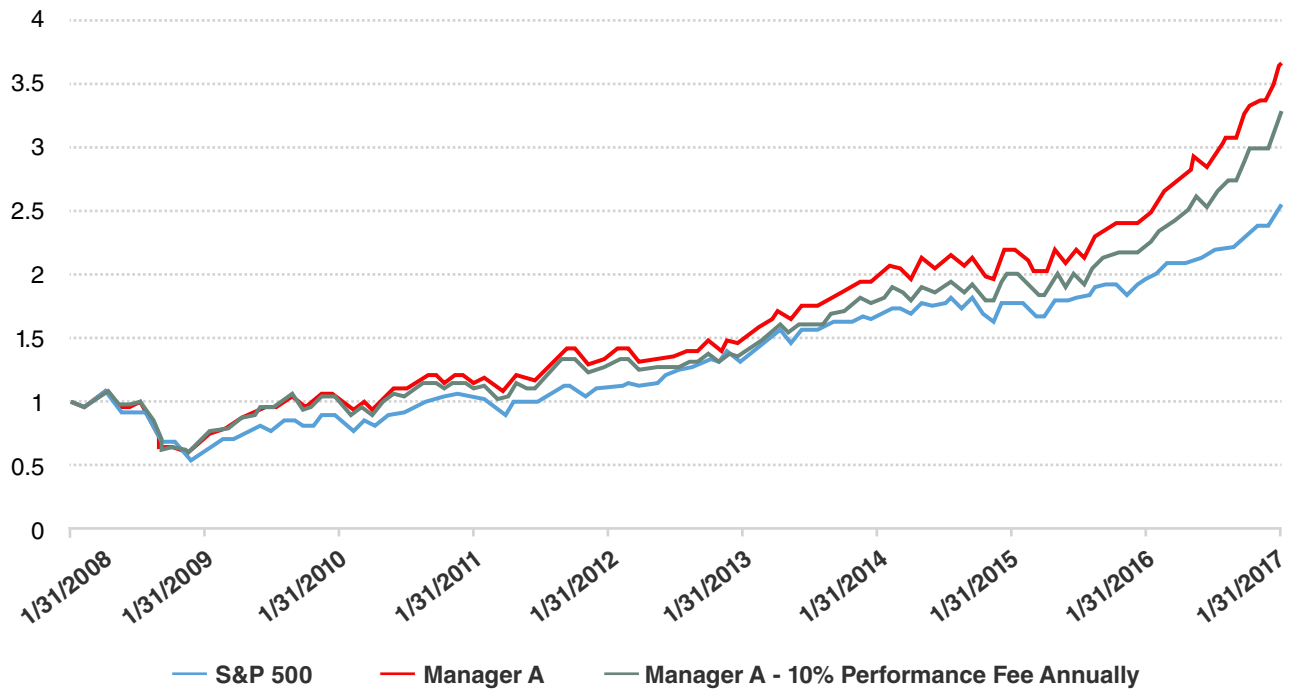
It's only possible to pay benefits and operating costs, fund commitments, pay financing, fund losses on financed positions, and rebalance a portfolio with liquid assets. Therefore, the riskiness of the liquid assets is an important number to monitor. As such, public equities plus the public equity exposure of risk parity, last reported at the full 9.9%, would be 30.9%.^{lxxxv} As a ratio of just the net liquid assets, PSERS has between 54% and 79.6% in equities, depending on how the unfunded commitments are treated. The size of the negative cash flow in a crisis (the benefit payments described by PSERS CIO in testimony) is closer to 10% as a percentage of these liquid assets. If accurate, such a combination of illiquidity and leverage is concerning and warrants attention.

Manager Selection. If active management is used, it should only be employed if there is great confidence that it is “worth it”. There is always the option to invest in low fee, highly liquid market indices. As Craig Lazzara, Managing Director and Global Head of Index Investment Strategy at Standard & Poors Dow Jones Indices testified to the Commission in September 2018, there are low cost indices for many styles of investing to allow a pension fund to have the risk profile that they desire.^{lxxxvi} It is not just the S&P 500. An active management strategy must be evaluated relative to its alternatives, taking into account costs and liquidity and additional risk.

PSERS writes that their “first job is to hire the best institutional managers we can find.”^{lxxxvii} Identifying managers is not the “first” task of implementing a portfolio according to best practice. Investment staff should never hire an investment manager unless there is great confidence that they are worth their fees – that they will earn returns net of all costs that exceed those available from risk equivalent public markets index exposures. Without being explicit about the systematic risk exposures of the manager’s investment strategy, and the other risks and costs associated with managing it, it is impossible to judge how worthy the manager is. The view that in investment management, “you get what you pay for,” is unsupported and risky, and could easily lead to high fees and low performance.^{lxxxviii} Higher fees do not guarantee higher performance and evidence and logic indicates it is more often the reverse. In fact, as is shown in Chapter VIII: Cost-savings Analysis of this report, in one category, PSERS’ least expensive manager is its best performing.

A manager and the associated investment strategy must be evaluated on (1) what portion of the diversified portfolio benchmark is replaced, (2) what additional risk the strategy introduces, (3) the expected excess return net-of-fees that is earned relative to a public markets index exposure to the same systematic risks, and (4) the costs associated with those excess returns. There are many investment strategies, available at high fees, that appear to “outperform” simply because they take on different risk. Investors who wish to take on different risk profiles should do so explicitly, and the default option should always be to do so at low cost.

Figure 38: Manager Selection



Source: Analysis using data from S&P Dow Jones Indices and Bloomberg.

The previous chart is the wealth index generated by Manager A. The orange line is the gross-of-fee wealth index and the grey line is after deducting the 10% annual performance fee. Manager A outperformed the S&P 500 by 3.8% per year for the last 10 years gross-of-fees and by a still “respectable” 2.4% per year net-of-fees. Without further analysis, Manager A might be considered “clearly worth their fees” except Manager A is simply the index returns of the S&P 500 IT Sector so paying any fees for those returns, if manager A was investing in the IT sector, would in fact be poor execution. Choosing active management requires several assumptions. (1) That alpha exists: that it is possible to create true persistent returns above those of an investable index, adjusted for systematic risks and illiquidity – true “alpha.” (2) That the pension fund has processes to capture that alpha without taking on too much additional risk – either through internal management or through selecting external managers who can do it and negotiating a fee structure with them such that enough of the alpha is earned by the pension, compared to the risk taken. (3) That the board has sufficient skills, risk controls and compliance procedures to manage the increased complexity and risk that this activity entails.

David Swensen, the Chief Investment Officer of Yale University’s endowment, has written and spoken on many occasions about the challenges of doing this well.

At the active end of the spectrum, you’ve got institutions like Yale and Harvard and Princeton and Stanford and others, who’ve really built high-quality investment teams that have a shot at making consistently good active management decisions. But there’s a vanishingly small number of such investors. Those on the passive end of the spectrum have figured out that they don’t know enough to be active. The passive group is not nearly as big as it should be. Almost everybody should be there.^{lxxxix}

As discussed in the next chapter, data and logic show that active management generally underperforms indexing in public markets. It warrants repeating here, that foregoing active management is not the same as investing in the simple portfolio benchmark that is merely a stock index and a bond index. Some sophisticated asset allocation approaches, even including versions of risk parity, can be implemented with low cost, highly liquid, diversified investable indices.^{xo}

Private Markets. While there is momentum towards indexing for large capitalization equities, there is still resistance to apply the logic and data to markets that are considered less efficient, particularly private markets. While a complete review of private markets investing could not be completed by this Commission, we note here that private asset investing involves the highest levels of costs – both the direct costs from the investment manager and the costs to properly understand and manage the risks associated with them.²³ Moreover, they are illiquid for long periods of time, so decisions made today often cannot be undone – or even fully evaluated – for 10-15 years. As discussed in the performance evaluation chapter, proper rigorous analysis of private investment performance is extraordinarily difficult but at the same time critical to success.

This is particularly true in Pennsylvania, whose two state-run plans have higher than average allocations to alternatives, according to a recent analysis of statewide pension plans. In 2016, PSERS had the highest allocation to alternatives in the nation at 56% and SERS ranked #22 at 32% – both above the national average of 26%.^{xci} In the discussion that follows, we outline important concerns that warrant further study and analysis before the pension funds continue adding commitments to these types of investments.

Private investment opportunities exist in all types of markets: equity, debt, real estate, commodity, infrastructure, etc. The common feature of most of these investments is the limited partnership structure,

⁽²³⁾ Some suggest that the only method to achieve the desired actuarial rate of return is to invest in private markets securities. Leaving aside whether the actuarial rate of return should drive investment decisions, there are other means for increasing the expected return of a portfolio. As discussed in the section about risk parity, leverage can be used, even with liquid securities, to increase the level of expected rates of return. SERS and PSERS have very similar expected rates of return, as reported by their consultants, but very dissimilar asset allocations. Moreover, as discussed in this section, it is unclear whether prospective private markets net-of-fee returns are going to be attractive relative to public markets, particularly risk-adjusted.

whereby the pension fund (the limited partner) commits capital to a partnership that the general partner controls and on which the general partner collects asset-based and performance-based fees, amongst other compensation. Investments are illiquid for multi-year periods. In addition, the general partner has the right to call the capital that has been committed at any time and distributes the capital as investments are realized, introducing significant cash flow uncertainty.

Within private equity, much like public equity, there are many different categories with different risk profiles. Private equity includes investments in startups and early stage companies through venture and growth capital, and buyouts of more mature and/or larger capitalization companies. Some private equity managers have a specific industry or geographic focus to their investments. These risk profiles must be understood and evaluated. Hamilton Lane produces a “Periodic Table of Returns” which show how style drives return differences within a vintage year.^{xcii} To compare (without risk adjusting) returns of a private equity manager that has invested in, for example, technology and software companies over the last 10 years to the average private equity manager will almost always cause that particular private equity manager to appear attractive.

An allocation bucket for any type of private markets has inherent dangers. With an allocation bucket, investment staff are implicitly directed to source and invest with the “best” private managers currently raising a fund in order to maintain the allocation, rather than only investing in a private investment vehicle when there is compelling evidence that its manager will, cost and liquidity risk adjusted, outperform appropriately chosen public market index exposures. As PSERS writes in its response to the management fee resolution:

Non-traditional asset classes are those that only offer active management to implement, such as private equity and absolute return. The decisions to invest in these asset classes are made by the Board when the asset allocation is set. PSERS Investment Professionals then find appropriate investment manager(s) to implement this portion of the asset allocation.^{xciii}

Private markets investing is reminiscent of some aspects of active public markets investing in the 1960s – a lack of well understood, risk-adjusted performance measurement, a lack of disclosures on fees and costs, a lack of a commonly accepted low-cost liquid alternative, and incentives for fee earning investment managers and consultants to produce data professing “alpha.” Given this, it is not surprising that there is conflicting evidence on what level of alpha exists in private markets.

The legal structure itself does not magically endow investments inside it with risk premia. A public company that is taken private does not magically have more value. The legal structure does create more risk for the limited partner – illiquidity, lack of transparency and control – but it does not guarantee or create excess returns.

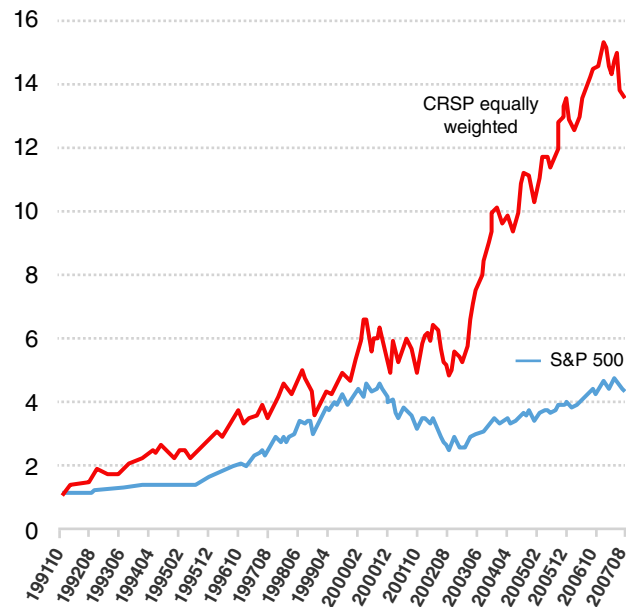
As Professor of Finance at Said Business School, Oxford University, Tim Jenkinson testified to the Commission in September, private equity is “really just an alternative way to get equity returns and should be judged against equity returns.”^{xciv} The question is whether there is some unique information or operating advantage that should enable the average private company to outperform the average public company. Jenkinson testified on the increased proportion of equity assets that are in private markets.^{xcv} It is unclear what this means for investors. An owner of a company (consider Uber) chooses whether to raise needed/desired capital from public markets or from private markets. Among other factors, if private markets will value the company as highly or higher than public markets, then owners may choose to raise money privately. Therefore, it is unclear if the increased size of private markets reflects value for investors, or if it in fact reflects the opposite.

Research by Ludovic Phalippou suggests that, historically, outperformance of the average private company has largely accrued to the investment manager or operator and not to the asset owner. The average net returns of

private equity have essentially matched the return of the average stock.

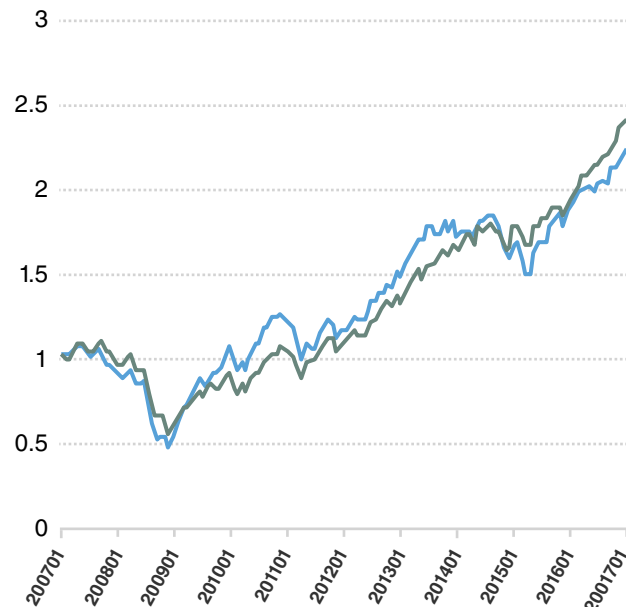
Figure 39: Average PE Returns Now Match Average Stock

THE S&P 500 INDEX VERSUS THE AVERAGE US STOCK, 1991-2007, ANNUALIZED SPREAD IN PERFORMANCES: 3%



LBO funds outperform S&P 500 by 3%

AND THEN, THESE TWO INDICES FROM 2007 TO 2017



LBO funds performance equal to that of S&P 500

Source: Ludovic Phalippou, September 2018.^{xvii}

Prospectively, it is even less clear whether private equity returns net-of-fees will deliver the returns investors are forecasting. Hedge funds in the 80s and 90s were able to take advantage of the lack of capital that would permit the use of leverage and short securities. As a result of this lack of capital, there were arbitrage strategies that offered high returns for the level of risk taken. Returns to hedge funds during those decades were very attractive. As a result, institutional investors relaxed their constraints and started to invest in these strategies. With the added capital, the expected return per unit of risk declined. Returns to the average arbitrage strategies have been risk appropriate, at best, since then. It is possible that a similar trend is occurring in private equity – institutional investment in private equity has increased over the last 30 years, and there is a much smaller difference today between private markets purchase price multiples of earnings compared to those in public markets. As Jenkinson testified to the Commission:

... anybody looking at those charts will see that that premium has been falling over time and has been getting, you know, closer to one. So, it's, you know – there's no doubt that I think that as competition and growth in the sector has happened, people have been attracted to this sector. The returns have come down. And that's what we expect. That's what you expect in any asset class. That's what we've seen in hedge fund, some real estate funds, and others. The competition and growth tends to limit returns.^{xviii}

He continued later, “There’s no doubt the private equity premium has been falling over the years.”^{xviii} Thus the future median return in private equity gross-of-fees may be much closer to public markets. As a result, net-of-fees returns could be extremely disappointing given the level of fees charged, and certainly not worthy of all of the additional monitoring costs and illiquidity.

Much like the proponents of active management in public markets, proponents of private equity point to the large dispersion of returns realized as evidence that it should be easy to outperform the median. However, the large dispersion is likely more reflective of the differences in the risk profiles of the investment strategies considered in the bucket – including different levels of manager-employed leverage – and the difficulties of comparing and evaluating private investment returns as will be discussed in the Performance Evaluation chapter. Consistent with the above, McKinsey has found that there is almost no persistence of top quartile funds.^{xcix} Moreover, portfolios such as the ones constructed at SERS and PSERS are diversified across so many managers and therefore underlying portfolio companies that they may simply own systematic risk, paying high costs and bearing illiquidity for it.

Co-investing. Co-investments are a special type of private markets investing whereby the pension fund invests in a single security alongside an external investment manager. These investments are often made at lower or no asset management fees and at lower or no performance-based fees. Fees on co-investments are not pooled or netted – when charged, performance fees on successful co-investments are not offset by the poor returns on unsuccessful co-investments.

Again, it is unclear from the data whether co-investments, even considering the lower fees, outperform the net-of-fees returns from the manager’s pooled vehicles. There is no fee low enough to offset bad investment returns. And, in this context, a bad investment is simply one that does not earn a return commensurate with what can be earned from a (risk-equivalent) public market index.

In addition, co-investing requires internal investment staff to conduct rigorous evaluation of and to be able to manage an individual investment and for their board to be resourced to supervise it. Co-investing typically involves exposure to a specific investment that is larger (as a percentage of the pension fund’s assets) than exposures to other individual investments (greater idiosyncratic risk) and can involve “hands on” expertise, particularly if the investment underperforms and the general partner needs to be removed for any reason.

Figure 40: Performance of PSERS’ Internally Managed Private Debt Co-Investment, Calendar Year Performance

	2014	2015	2016
PSERS – Internally Managed Private Debt Co-Investment	15.79	-33.14	-32.79
Benchmark: Blmbg US Corp HY	2.45	-4.47	17.13
Difference – “Value Added”	13.34	-28.67	-49.92

Source: Aon Hewitt, June 2017. (2017 not provided.)^c

Figure 40 shows the performance of PSERS’ internally managed private debt co-investment. PSERS has highlighted that this is not a diversified portfolio, that this was the beginning of a new program, and that other co-investing strategies at PSERS have performed well. However, it underscores the need for fiduciaries to understand the magnitude of financial loss possible with these strategies at the time of investment. Co-investments, even at no-fees, are still risky investments. As David Swensen, Chief Investment Officer of Yale University Endowment said:

You know, I’m not a big fan of co-investments. Josh Lerner did a study – Josh is at Harvard Business School – looked at six very large programs that had been in existence for a long period of time. And the conclusion that he came to was that the co-investments, in spite of the fact that they had lower fees, underperformed the funds in which the investments were located.^{ci}

It is recommended that a new body such as this commission, with appropriate expertise, resources and time, further study data on these and other issues around private market investing more broadly, and that private markets investments be limited until there is better evidence both that private markets investing provides a risk-adjusted return above public markets and that SERS and PSERS have processes that are rigorous enough to ensure selection of above median managers, on a risk-adjusted basis.

Internal Investing. A board can delegate authority to internal investment staff to manage investments directly rather than through an index fund or an external active investment manager. Authority can be granted for public markets index investing, public markets active investing, or direct investments in private investments including the co-investments described above.

Internal investment management represents its own set of risks. Just like any other investment manager, there is risk of an adverse event within management's processes. No amount of risk control completely eliminates the possibility that something significant will go wrong. As a result, the oversight burden on the board for risk monitoring and management increases since internal staff cannot effectively monitor themselves.

While internal investing is usually lower direct cost than external management, often dramatically, it is important to recognize that some external managers have resources, networks, and expertise for sourcing, due diligence, selecting, operating and managing portfolio investments that far exceed that of the internal staff. As with any other investment strategy, and as PSERS and others have noted, lower costs are not a justification for selecting a portfolio implementation. Any implementation style must always be evaluated relative to other options, including indexing.

A special type of internal investment management is tactical asset allocation. Tactical asset allocation is temporary changes in the systematic risk exposures of the pension portfolio based on a view of current expected returns and risks. It is notoriously difficult to predict returns, and consistent with that there is strong evidence that tactical asset allocation adds risk without adding return. Examples of tactical asset allocation includes the purchase or sale of options, foreign exchange exposures, and other derivative contracts that impact the systematic risk exposures. Tactical asset allocation can also be achieved by intentionally allowing investment allocations to deviate from targets. The board should understand what tactical asset allocation decisions the investment staff makes, track how these decisions have performed, and establish clear limits to deviations from the strategic asset allocation.

Risk Monitoring, Reporting, and Compliance. An Investment Policy Statement (IPS) documents for the public and for the investment staff what the board-approved portfolio risk budget is: the volatility target, the limit on illiquidity, and downside risk limit. The IPS shows, directly or by reference, the approved allocations to liquid markets indices as well as the simple portfolio benchmark. If allocations are established as "economic exposure," then the calculations for those economic exposures must be clearly defined. What is the economic exposure of a small cap value fund compared to the S&P 500? What is the economic exposure of a small cap value fund hedged with a short position in the S&P 500? These questions also illustrate the need for there to be limits on gross long and gross short positions or exposures, particularly when leverage and/or shorting is permitted. The IPS also codifies limits on other idiosyncratic risks in the portfolio such as limits on a particular manager, industry, or company. These benchmarks and risk limits function as the basis for future performance evaluations and for risk controls and compliance checks.

Relative to the diversified benchmark portfolio, a board that authorizes any type of active management (including selecting external active managers) takes on a greater burden of risk management. The board must monitor compliance with their established risk parameters. They need to understand and control liquidity and leverage and the interaction of the two with cash flow needs. Authorizing staff to directly invest in securities increases the responsibility of the board for expert oversight. They need risk systems and reports to quickly identify and respond to problems and to monitor whether the risk borne internally stays within the limits set.

As discussed below, the audit committee of the board is responsible for verifying processes and reports.

The use of performance evaluation will be discussed in its own chapter, but decisions that cannot be changed for an extended period of time, such as making private markets investments, should receive careful consideration and be taken with considerable caution. Investment staff cannot be held accountable for decisions made by prior investment teams, but they and the board must be held accountable for the processes and decisions they do make and how those decisions will impact future investment teams.

AUDIT COMMITTEES

The duties and responsibilities of Audit Committees, public, nonprofit and governmental, in both fiscal and in other compliance matters, have become broader in scope in the last decade.

In the PSERS' bylaws, PSERS has the duties and responsibilities of the Audit/Compliance Committee written into the Committee's description. SERS has an Audit Committee Charter. Below are some, not all, of best practices outlined by the Association of Public Pension Fund Auditors, Inc. and the Government Finance Officers Association. Many of the "best practices" below are in the PSERS' duties and responsibilities of their Audit/Compliance Committee. The SERS' charter also includes many of the "best practices" listed below.

The following notes are from the Model Audit Committee Charter endorsed by the Association of Public Pension Fund Auditors, Inc.:

The Committee has the authority to direct the Chief Audit Executive (CAE), external auditors, or consultants to conduct an audit, review, and/or investigation into any matters within the Committee's scope of responsibility. It is empowered to:

- *Seek any information it requires from employees – all of whom are directed by the Board to cooperate with the Committee's requests – external auditors, consultants, and external parties.*
- *Appoint, compensate, and oversee the work of all public accounting firms employed by the organization.*
- *Resolve any disagreements between management and the external auditors regarding financial reporting.*
- *Retain independent counsel, accountants, or others to advise or assist the Committee in the performance of its responsibilities.*
- *Approve the consultants, or others retained by the organization to assist in the conduct of an audit, review, and/or a special investigation.*
- *Meet with management, external and internal auditors, or outside counsel as necessary.*
- *Obtain information and/or training to enhance the Committee's understanding of the organization's financial reports and the related financial reporting processes.*
- *Review significant accounting and reporting issues, including complex or unusual transactions, and recent professional and regulatory pronouncements, and understand their impact on the financial statements.*
- *Hire outside experts and consultants in risk management as necessary.*
- *Approve the appointment, retention, or discharge of the external auditors. Obtain input from the CAE, management, and other parties as appropriate.*
- *On a regular basis, meet separately with the external auditors to discuss any matters that the Committee or auditors believe should be discussed privately. {Note: Subject to open meeting laws.}*
- *Review the effectiveness of the organization's system for monitoring compliance with laws, regulations, contracts, and policies and the results of management's investigation and follow-up (including disciplinary action) of any instances of noncompliance.*

Institute and oversee special investigations, as needed.

- *Ensure the creation and maintenance of an appropriate whistleblower mechanism for reporting any fraud, noncompliance, and/or inappropriate activities.*
- *Provide an open avenue of communication between the internal auditors, external auditors, management, and the Board.*

The following notes are from the Government Finance Officers Association Audit Committee Best Practices:

- *The audit committee should be formally established by charter, enabling resolution or other appropriate legal means and made directly responsible for the appointment, compensation, retention, and oversight of the work of any independent accountants engaged for the purpose of preparing or issuing an independent audit report or performing other independent audit, review, or attest services. Likewise, the audit committee should be established in such a manner that all accountants thus engaged report directly to the audit committee. The written documentation establishing the audit committee should prescribe the scope of the committee's responsibilities, as well as its structure, processes, and membership requirements. The audit committee should itself periodically review such documentation, no less than once every five years, to assess its continued adequacy.*

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AUDIT COMMITTEES (CONTINUED FROM PREVIOUS PAGE)

- Ideally, all members of the audit committee should possess or obtain a basic understanding of governmental financial reporting and auditing. The audit committee also should have access to the services of at least one financial expert, either a committee member or an outside party engaged by the committee for this purpose.
- All members of the audit committee should be members of the governing body.
- Members of the audit committee should be educated regarding both the role of the audit committee and their personal responsibility as members, including their duty to exercise an appropriate degree of professional skepticism.^{cii}

The role and responsibilities of the Audit/Compliance Committee at PSERS and the Audit Committee at SERS (the Committees) must be independent, have an understanding of their roles and the scope of their responsibilities. Audit Committees, in addition to their financial and fiduciary responsibilities, also monitor risk, financial and otherwise, and ensure the creation and maintenance of an appropriate whistleblower mechanism for reporting any fraud noncompliance, and/or inappropriate activities. A conflict of interest policy, document retention and destruction, cyber and other security matters, disaster and recovery planning, the Board's adherence to its by-laws and internal control oversight are some of the responsibilities of a robust Audit Committee.

The Committees, consulting with management, including Internal Auditing, are solely responsible for hiring the external auditors. The external auditors – albeit, they should have a good working relationship with the system's management and staff – report solely to the Committees.

The Committees report findings to the Board; they do not report to the Board. The Committees should have independent authority. There may be times when the Committees need to direct the Board on matters of risk, compliance, by law adherence or other matters. The Committees should have “an appropriate degree of professional skepticism.”

The Committees “also should have access to the services of at least one financial expert, either a committee member or an outside party engaged by the committee for this purpose.”

The best practices listed above in the *Model Audit Committee Charter and the Government Finance Officers Association* is an abbreviated version. The Boards of PSERS and SERS and the Audit/Compliance Committee at PSERS and the Audit Committee of SERS should review these and other documents to add an independent layer of protection for the members and annuitants of the Systems.

Recommendations

- We recommend that the Boards of SERS and PSERS review their Investment Policy Statements and ensure that:
 - o There is a risk budget that specifies the tolerable volatility, downside risk, and illiquidity and the associated simple benchmark portfolio
 - o There is a diversified policy benchmark that is composed of investable index funds
 - o Systematic risk calculations are defined and targets established
 - o Idiosyncratic risk limits are defined
 - o There is a specified rebalancing policy.
- We recommend that the level of illiquidity in combination with leverage at PSERS be reviewed and addressed immediately.
- We recommend that the level of illiquidity at SERS be comprehensively reviewed and reevaluated.
- We recommend that both funds report the levels of return-seeking and risk-mitigating assets, as well as those levels for just liquid assets.
- We recommend that new risk reports be developed so that the amount of liquidity and leverage is transparent, and the allocations and systematic risks of the portfolio on a look-through basis is clear. Risk reports should identify how risk is allocated across the portfolio, specify the risks (by investment

or asset class) that are not captured in the standard deviation metric, and provide appropriate ways to measure or monitor those risks. Identifying sources of risk mitigation within the portfolio is also relevant, while quantifying how much of the risk is hedged.

- We recommend that internal investment management be limited to index investments until risk controls and compliance procedures can be verified or established that are consistent with more complex strategies. At a minimum, we recommend no expansion of internal strategies beyond indexing until this step is taken.
- We recommend both funds limit new commitments in private markets until risk controls, liquidity management and evaluations are fixed.
- We recommend that the fiduciary Boards should oversee and explicitly authorize any tactical asset allocation decisions the investment staff makes, track how these decisions have performed, and establish clear limits to deviations from the strategic asset allocation.
- We recommend that a new body such as this Commission, with appropriate expertise, resources and time, further study issues around private market investing more broadly, and that private markets investments be limited until there is better evidence both that private markets investing provides a risk-adjusted return above public markets and that SERS and PSERS have processes that are rigorous enough to ensure selection of above median managers, on a risk-adjusted basis.
- We recommend that SERS and PSERS collaborate on a detailed CEM administrative and investment cost benchmarking analysis, and make the detailed report(s) available to the public (not only the Executive Summary).
- We recommend that the Boards see an annual report on manager contracts, which identifies changing terms.
- We recommend that costs be linked to performance in a report similar to the Novarca study that identifies whether managers outperform and how much of the value they capture.
- We recommend that the General Assembly investigate the feasibility of establishing a common investment performance reporting period for both retirement systems that complements existing employer budgeting periods.



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

ACTIVE AND INDEXING

IV. Active and Indexing

Active and Index Investing

“When trillions of dollars are managed by Wall Streeters charging high fees, it will usually be the managers who reap outsized profits, not the clients. Both large and small investors should stick with low-cost index funds.” - Warren Buffett, Letter to Shareholders, 2016

“I am going to . . . go over a decision you’ve already made and just encourage you to keep on going until you’ve got it completed. And that is the movement to indexing and away from active management.”
^{ciii} - Charley Ellis, PPMAIRC Testimony, October 25, 2018

The Origins of Index Investing

This chapter discusses active management and index (sometimes referred to as “passive”)²⁴ investing in the context of public securities markets. By definition, most private market investments do not have a precise index equivalent, although this is a subject of both debate and innovation. Private markets are discussed in the “Portfolio Implementation” and “Performance Evaluation” chapters of this report.

An active investment strategy, or active management, refers to selecting and managing a portfolio’s securities – actively – with the aim of producing returns that outperform those of a given market index. Index investing, or indexing, by contrast, involves investing in a set of securities to replicate as closely as possible the entire market for such securities, typically as reflected in a published market index. In this chapter, “indexing” refers to this strategy, which can be executed in several ways, whether through purchase of an index fund, creation of a separately managed account that tracks an index, purchase of an exchange-traded fund (ETF), or similar means.

Active management had its heyday in the 1950s and 1960s, when a more limited number of professional fund managers were largely competing against amateur investors, and there were not yet regulations insuring fair disclosure²⁵ of information. Moreover, at that time, indexing was not well understood as a strategy or as a performance evaluation tool because the seminal work of Markowitz, Sharpe^{iv} and others on modern portfolio theory was just being developed and disseminated. Active asset management fees were considerable, but were generally not questioned, in part because of poor transparency to costs and the lack of good tools to evaluate performance.^{cv}

⁽²⁴⁾ This terminology is controversial because while indexing is passive in that it follows the same rules as those used to construct the index, some argue that the construction of any index, or decision to invest in it, inherently have some “active” components. The important point is that indexing follows a set of rules to invest in an asset or sub-asset class as a whole that are independent of market conditions or value judgments of a manager.

⁽²⁵⁾ Regulation Fair Disclosure, also known as Reg FD, was promulgated by the SEC in August 2000. The regulation is codified as 17 C.F.R. 243. The regulation aims to level the playing field between investors and prohibits public companies from disclosing previously nonpublic, material information to certain parties unless the information is distributed to the public first or simultaneously. Reg FD eliminated one information “edge” that certain institutional investors had utilized.

“ALPHA”

Investors often refer to the “alpha” of an active management strategy. Positive alpha is considered to be good and negative alpha to be bad. Unfortunately, modern use of the term “alpha” has distorted its original intent. Alpha is often taken to mean the simple difference between the returns of a given active investment strategy and some market index, but the term originated in a much more rigorous regression analysis that accounted for the relative risk of the two strategies. Specifically, a regression of the strategy’s returns (over a risk-free rate) on those of an appropriate market index can be described by the equation $r_{\text{strategy}} = \alpha + \beta r_{\text{index}} + \varepsilon$ and the estimated intercept, α , is the “alpha.” Even more rigorously, the regression can be completed with multiple indices representing different systematic risks to account for more complex strategies. For example, a strategy that invests in corporate bonds hedged with Treasury futures should be regressed against both Treasury futures returns and the appropriate credit quality corporate bond index. When a strategy is measured against such a risk-weighted basket of systematic exposures, the alpha can then be viewed as skill. Unfortunately, the mathematics and statistics of the concept has been largely lost and without an appropriate choice and weighting of market indices, the benchmark, so-called “alpha,” often does not actually reflect true value added. See the chart in Chapter III: Portfolio Implementation on Manager A.

Even though Dow had published market indices since as early as the late 1800s, and the S&P started publishing an index in 1923,^{cv} these indices had not been investable. As Burton Malkiel wrote in *A Random Walk Down Wall Street* in 1973:

What we need is a no-load, minimum management-fee mutual fund that simply buys the hundreds of stocks making up the broad stock-market averages and does no trading from security to security in an attempt to catch the winners. Whenever below-average performance on the part of any mutual fund is noticed, fund spokesmen are quick to point out “You can’t buy the averages.” It’s time the public could.^{cvii}

This described the investing application of modern portfolio theory, capital asset pricing theory and the efficient market hypothesis. That academic work established the intellectual and investing significance of market indices. A key observation made was that idiosyncratic or stock specific risk could be diversified away and therefore should not be rewarded with a risk premium. Systematic or market risk, by contrast, was and should be rewarded. In other words, a share of the Exxon Mobil Corporation stock will fluctuate with what happens at Exxon in particular. However, a diversified basket of energy stocks will fluctuate with energy prices and economic growth; however, they will not be affected much by what happens at any one company – bad news for one company is offset by good news at another.

Modern portfolio theory implied, and studies have borne out, that the bulk of investors’ returns would come from asset allocation rather than security selection: that is, from market (systematic) returns, rather than from individual security excess returns (the idiosyncratic risk). Early studies of determinants of portfolio performance found that over 90 percent of performance was due to investment policy (including asset allocation) as opposed to investment strategy (including securities selection).^{cviii} While different scholars may differ on the precise attributions to the allocation effect, there is wide agreement that it accounts for the vast majority of a given portfolio’s return. SERS’ consultant, RVK, for example, writes that asset allocation explains 100 percent of the return amount over time, and 90 percent of the return variability over time.^{cix}

In 1971, the first index funds began to emerge.^{cx} By 1976, John C. Bogle opened what is now the Vanguard 500 Index mutual fund, and indexing as we know it today was launched. Investors finally had access to an investment which earned the return for market risk without high fees. Investors could now buy the average. There was an alternative to the high fee active management strategies proffered. Importantly, these investment vehicles also represented an important performance evaluation tool.

Today, there are investable market indices for all types of systematic risk exposures, financial markets and segments. The S&P 500, for example, includes stock from the 500 leading companies in the U.S, which are weighted according to market capitalization. As such, it tracks the performance of the largest U.S. company stocks. The Russell 2000, on the other hand, includes stock from 2,000 small-capitalization companies. There are indices for various foreign stock markets, Treasury bonds, corporate bonds of a particular credit quality, or even specific industries such as technology. By the end of 2017, about \$6.7 trillion was invested in index funds, and around \$3 billion a day was flowing into index funds.^{cxix}

John Bogle's advocacy of index funds received much criticism and doubt.^{cxii} Nobel Laureate Daniel Kahneman, who studies behavioral economics, would attribute the criticism to people's biases about data, particularly when they threaten their livelihood: "When people believe a conclusion is true, they are also very likely to believe arguments that appear to support it, **even when these arguments are unsound.**"^{cxiii} Investing in indexing strategies has boomed despite criticisms, because both theory and experience support it.

Performance of Indexing

After fees, it is not just the average active manager that fails to beat index returns, the majority of them fail. Nobel prize-winning economist William Sharpe gave the following simple mathematical proof for the superior value of indexing:

(1) before costs, the return on the average actively managed dollar will equal the return on the average passively managed dollar and

(2) after costs, the return on the average actively managed dollar will be less than the return on the average passively managed dollar.^{cxiv}

In other words, if the total return of a market is x%, and the market is divided into active strategies and index strategies, then since index strategies return x%, mathematically the average active strategy before fees must also return x%. After fees, they must return less.

S&P Managing Director of Index Investment Strategy Craig Lazzara told the Commission in his September testimony with Aye Soe: "There is no natural source of alpha."^{cxv} That is, in order to outperform a market index, someone else must underperform. Adding in fees, not only will the average active manager underperform, but the majority will.

This is the theoretical case for why indexing is a better choice. But there is now considerable data and real-world experience, and it supports the theory: Most active managers indeed underperform their equivalent index fund across all markets and investing styles.

The Standard and Poor Indices Versus Active, or SPIVA[®], is the single most comprehensive body of research²⁶ that "compares actively managed funds against their appropriate benchmarks on a semiannual basis."^{cxvi} It is now in its 18th year. The consistent evidence from SPIVA[®] is that most active managers underperform their index most of the time. This result is not dependent on the efficiency of a market or the size of the fees. Plain and simple, index investing outperforms.

SPIVA[®] is based on data that has eliminated data quality issues previously identified by experts (see below). It addresses issues related to measurement techniques, universe composition, and fund survivorship. It eliminates "survivorship bias," by including the entire opportunity set and not just funds that have survived. It draws comparisons to appropriate benchmarks, taking into account size or style classification. SPIVA[®] uses asset-weighted averages to draw accurate results, because a \$10 million fund should not count the same as a \$10 billion fund. In addition, it avoids double-counting by using only share classes with the greater assets. SPIVA[®] also analyzes performance gross-of-fees and net-of-fees. The size, scope, and rigorous construction of the SPIVA[®] study make it the gold standard in evaluating active and passive performance.

⁽²⁶⁾ While SPIVA[®] is associated with S&P which is a provider of indices, all other research that was reviewed or presented either corroborated the findings discussed herein or was subject to biases that are discussed herein and make the results suspect.

At the September Commission hearing, Aye Soe, head of Research Design at Standard and Poor's Dow Jones Indices, shared the results of analysis of 17 years' worth of SPIVA® data, a period that covered several market cycles, both bull and bear markets.

- The equity annual league table below shows that across all domestic equity funds, regardless of style or capitalization size, most active funds failed to beat their benchmark in most years.

Figure 41: Equity Annual League Table

EQUITY ANNUAL LEAGUE TABLE

FUND CATEGORY	BENCH-MARK INDEX	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
All Domestic Funds	S&P 1500	54.87	58.34	48.01	51.43	42.26	68.02	48.90	64.91	40.68	48.28	84.65	64.91	43.26	86.89	74.03	60.49	63.43
All Large-Cap Funds	S&P 500	65.16	67.73	75.44	68.79	48.81	68.38	44.63	55.95	48.40	65.88	82.24	62.66	54.56	86.73	65.39	66.00	63.08
All Mid-Cap Funds	S&P MidCap 400	67.64	74.43	51.70	64.56	73.63	44.77	45.77	75.73	55.69	73.29	68.59	79.85	37.11	66.05	57.18	89.37	44.41
All Small-Cap Funds	S&P SmallCap 600	53.97	67.54	34.63	83.84	60.95	62.53	45.98	83.30	30.69	53.95	85.81	66.28	67.77	71.96	71.79	85.54	47.70
All Multi-Cap Growth Funds	S&P 1500	54.73	54.02	49.21	49.38	37.14	68.77	45.97	70.14	39.30	60.39	83.88	65.22	46.84	81.62	70.10	74.88	56.46
Large-Cap Core Funds	S&P 500 Growth	94.80	83.13	48.36	44.08	37.96	93.93	27.14	90.67	36.81	50.98	95.90	45.62	41.08	95.61	47.55	89.79	32.92
Mid-Cap Growth Funds	S&P 500	77.03	66.55	85.29	82.91	56.16	81.09	43.50	52.26	50.55	76.61	83.21	66.59	57.65	80.38	73.75	74.56	68.98
Mid-Cap Core Funds	S&P 500 Value	30.77	34.63	85.98	86.47	54.11	80.28	45.79	24.45	45.71	70.55	54.28	85.05	64.86	77.78	61.52	77.99	46.88
Mid-Cap Value Funds	S&P MidCap 400 Growth	87.96	86.24	35.75	64.16	79.67	27.96	41.97	90.95	54.01	84.11	76.53	86.81	34.48	55.37	79.68	94.58	18.05
Mid-Cap Growth Funds	S&P MidCap 400	80.00	70.42	54.74	57.27	66.34	32.04	60.78	60.18	70.75	86.54	65.66	78.57	42.96	58.65	68.18	90.65	61.67
Mid-Cap Value Funds	S&P MidCap 400 Value	47.42	63.64	68.42	53.09	69.14	36.90	57.83	68.00	47.33	57.14	67.61	73.47	40.85	71.43	34.38	96.77	43.14
Small-Cap Growth Funds	S&P SmallCap 600 Growth	76.64	97.14	26.88	94.71	78.06	50.75	40.80	94.84	31.34	62.25	94.12	62.91	55.25	63.98	87.50	95.96	15.08
Small-Cap Core Funds	S&P SmallCap 600	57.78	67.27	34.88	79.47	58.33	56.34	55.51	82.07	33.22	58.63	86.01	68.68	77.74	66.92	77.46	89.47	58.59
Small-Cap Value Funds	S&P SmallCap 600 Value	39.07	29.93	48.08	71.76	45.24	71.26	39.36	72.07	25.17	41.98	81.82	61.54	78.81	94.07	45.04	88.89	74.07

Source: S&P Dow Jones Indices LLC. Data as of Dec. 29, 2017. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

Source: S&P Dow Jones Indices.

- Over a 15-year horizon, more than 80% of active management funds underperform in every equity category.

Figure 42: Percentage of U.S. Equity Funds Outperformed by Benchmarks

PERCENTAGE OF U.S. EQUITY FUNDS OUTPERFORMED BY BENCHMARKS

FUND CATEGORY	COMPARISON INDEX	1-YEAR (%)	3-YEAR (%)	5-YEAR (%)	10-YEAR (%)	15-YEAR (%)
All Domestic Funds	S&P Composite 1500	63.43	83.40	86.72	86.65	83.74
All Large-Cap Funds	S&P 500	63.08	80.56	84.23	89.51	92.33
All Mid-Cap Funds	S&P MidCap 400	44.41	86.34	85.06	96.48	94.81
All Small-Cap Funds	S&P SmallCap 600	47.70	88.83	91.17	95.71	95.73
All Multi-Cap Funds	S&P Composite 1500	56.46	83.64	84.91	90.70	87.67
Large-Cap Growth Funds	S&P 500 Growth	32.92	67.58	80.92	93.65	93.49
Large-Cap Core Funds	S&P 500	68.98	88.45	90.99	94.95	94.67
Large-Cap Value Funds	S&P 500 Value	46.88	80.37	85.07	70.44	85.71
Mid-Cap Growth Funds	S&P MidCap 400 Growth	18.05	91.46	81.13	97.69	95.32
Mid-Cap Core Funds	S&P MidCap 400	61.67	88.24	87.90	96.15	96.51
Mid-Cap Value Funds	S&P MidCap 400 Value	43.14	75.41	81.54	88.04	88.89
Small-Cap Growth Funds	S&P SmallCap 600 Growth	15.08	86.53	86.67	95.56	98.73
Small-Cap Core Funds	S&P SmallCap 600	58.59	93.78	95.59	96.23	96.55
Small-Cap Value Funds	S&P SmallCap 600 Value	74.07	82.14	95.45	92.78	89.47
Multi-Cap Growth Funds	S&P SmallCap 1500 Growth	46.32	33.24	85.11	94.77	86.21
Multi-Cap Core Funds	S&P Composite 1500	68.78	92.78	90.13	90.14	90.82
Multi-Cap Value Funds	S&P Composite 1500 Value	49.57	76.47	76.24	84.21	85.96
Real Estate Funds	S&P United States REIT	36.80	59.76	73.68	84.54	81.13

Source: S&P Dow Jones Indices UC. Data as of Dec 29, 2017. Returns shown are annualized. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

Source: S&P Dow Jones Indices.

- The fixed income annual league table shows the same result for fixed income funds. In almost every year, across every style, most active managers underperform their benchmark.

Figure 43: Fixed Income Annual League Table

FIXED INCOME ANNUAL LEAGUE TABLE**Exhibit 2: Fixed Income Annual League Table**

FUND CATEG-ORY	COMPAR-ISON INDEX	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Government Long Funds	Barclays US Government Long	28.95	98.44	85.45	98.25	96.49	20.00	89.36	95.74	8.33	95.29	96.55	71.43	10.94	96.83	20.34	87.93	96.43
Government Intermediate Funds	Barclays US Government Intermediate	91.40	66.67	77.03	62.86	65.08	57.63	92.59	90.00	9.09	73.81	60.53	33.33	76.67	44.44	88.89	74.07	57.89
Government Short Funds	Barclays US Government/ (1-3 Year)	94.74	72.00	82.98	62.22	65.91	71.43	90.70	86.05	23.81	59.52	60.98	42.50	95.12	60.00	89.97	63.16	47.83
Investment-Grade Long Funds	Barclays US Government/ Credit (1-3 Year)	38.27	99.36	68.18	95.95	99.26	9.24	84.26	95.24	7.38	78.01	99.27	62.02	7.32	98.02	12.15	75.00	96.74
Investment-Grade Intermediate Funds	Barclays US Government/ Credit Intermediate	87.14	85.58	55.35	36.24	37.73	49.07	93.02	89.87	14.09	31.43	49.65	20.70	63.54	33.07	93.25	19.75	31.37
Investment-Grade Short Funds	Barclays US Government/ Credit (1-3 Year)	100.00	87.27	67.21	37.50	53.42	46.91	96.34	98.84	16.67	25.00	56.58	11.11	52.56	50.00	70.87	26.61	22.22
High Yield Funds	Barclays US Corporate High Yield	74.32	41.50	83.21	80.14	54.61	83.92	44.22	39.19	90.69	75.25	80.00	72.86	68.35	74.09	34.75	94.17	80.95
Mortgage-Backed Securities Funds	Barclays US Aggregate Securitized - MBS	84.21	64.29	83.33	95.00	67.24	92.86	87.50	94.34	36.51	25.00	53.13	24.62	71.21	75.81	72.88	60.00	67.92
Global Income Funds	Barclays Global Aggregate	61.54	64.41	35.85	41.18	55.56	69.23	69.35	77.03	30.00	39.64	77.68	18.49	48.92	37.78	61.54	33.08	64.86
Emerging Markets Debt Funds	Barclays Emerging Markets	9.09	60.00	21.74	28.57	50.00	30.00	42.86	65.38	48.28	34.48	91.43	50.85	74.00	77.78	89.33	39.19	22.58
General Municipal Debt Funds	S&P National AMT-Free Municipal Bond	78.99	67.24	47.75	79.63	79.25	73.12	84.09	81.48	25.00	57.32	77.22	20.78	68.67	31.33	59.30	71.91	42.86
California Municipal Debt Funds	S&P California AMT-Free Municipal Bond	75.51	57.78	15.22	85.11	75.56	72.09	95.24	94.87	10.53	77.78	75.00	6.06	91.43	13.89	38.89	61.11	25.71
New York Municipal Debt Funds	S&P New York AMT-Free Municipal Bond	89.13	73.81	79.49	76.92	76.92	76.32	91.18	88.24	27.27	58.06	75.00	17.24	100.00	7.14	53.57	74.07	33.33
Loan Participation Funds	S&P/ LSTA U.S. Leveraged Loan 100	-	-	-	-	-	-	-	-	-	55.00	14.81	77.50	36.84	56.86	13.46	81.82	52.08

Source: S&P Dow Jones Indices.

- Over the 15-year horizon, more than 80% of active fixed income management funds underperform their index in every category except in investment-grade short funds, global income funds, and emerging markets debt funds, where more than 65% of funds still underperform.

Figure 44: Percentage of Fixed Income Funds Outperformed by Benchmarks

REPORT 11: PERCENTAGE OF FIXED INCOME FUNDS OUTPERFORMED BY BENCHMARKS

FUND CATEGORY	COMPARISON INDEX	1-YEAR (%)	3-YEAR (%)	5-YEAR (%)	10-YEAR (%)	15-YEAR (%)
Government Long Funds	Barclays US Government Long	96.43	100.00	98.31	95.24	98.00
Government Intermediate Funds	Barclays US Government Intermediate	57.89	90.91	80.00	78.05	90.48
Government Short Funds	Barclays US Government (1-3 Year)	47.83	69.23	79.31	76.47	88.24
Investment-Grade Long Funds	Barclays US Government/Credit Long	96.74	94.68	95.45	95.40	97.73
Investment-Grade Intermediate Funds	Barclays US Government/Credit Intermediate	31.37	35.53	40.94	51.06	73.53
Investment-Grade Short Funds	Barclays US Government/Credit (1-3 Year)	22.22	41.67	43.33	57.81	68.89
High Yield Funds	Barclays US Corporate High Yield	80.95	90.87	93.81	98.37	98.23
Mortgage-Backed Securities Funds	Barclays US Aggregate Securitized MBS	67.92	73.08	79.31	81.40	93.88
Global Income Funds	Barclays Global Aggregate	64.86	60.55	52.59	58.33	69.44
Emerging Markets Debt Funds	Barclays Emerging Markets	22.58	70.69	85.71	73.68	66.67
General Municipal Debt Funds	S&P National AMT-Free Municipal Bond	42.86	58.75	47.50	63.29	82.88
California Municipal Debt Funds	S&P California AMT-Free Municipal Bond	25.71	30.56	37.14	66.67	84.44
New York Municipal Debt Funds	S&P New York AMT-Free Municipal Bond	33.33	57.14	73.33	85.29	89.47
Loan Participation Funds	S&P/LSTA U.S. Leveraged Loan 100	52.08	56.25	52.78	100.00	-

Source: S&P Dow Jones Indices LLC. Data as of Dec. 29, 2017. Returns shown are annualized. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

Source: S&P Dow Jones Indices.

Advocates of active investing have questioned whether the SPIVA® results are a function of high reported retail fees, and therefore surmised that institutional investors such as pension funds, who have more bargaining power on fees, would fare better. As a result, SPIVA® started tracking returns both net-of-fee and gross-of-fee. Not surprising, managers' gross-of-fee returns competed slightly better – after all, it is adding back costs to all of the performance. But, it didn't help sufficiently. The large majority of managers still underperform, even gross-of-fees. While SPIVA's® institutional data does not go as far back as the retail data, there is every indication it points in the same direction.

Figure 45: The Majority of Active Managers Underperform

EVEN GROSS OF FEES, INSTITUTIONAL MANAGERS STRUGGLE TO OUTPERFORM OVER 10-YEAR HORIZON

Exhibit 1 a: Percent of Institutional Equity Managers Underperforming the Benchmark on Gross-of-Fees basis

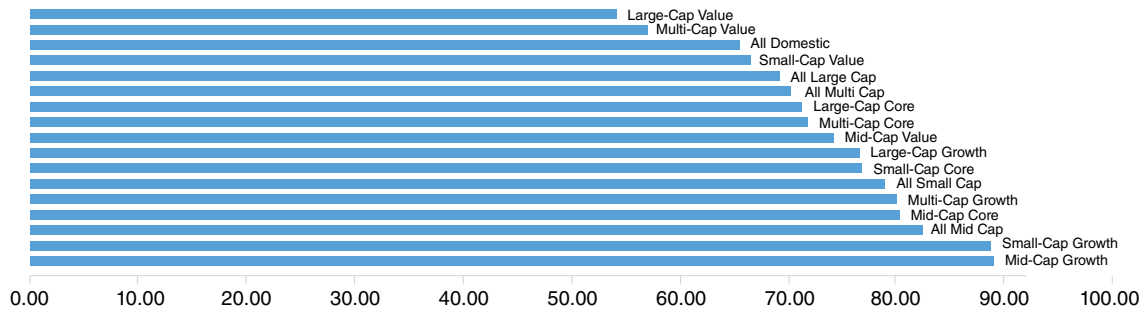
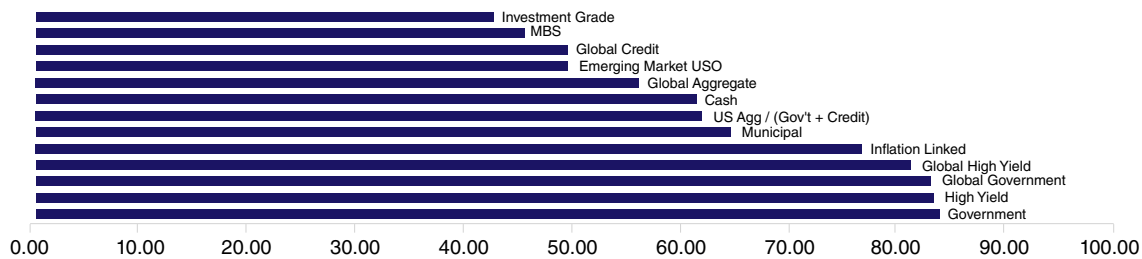


Exhibit 1b: Percent of Institutional Fixed Income Managers Underperforming the Benchmark on Gross-of-Fees basis



Source: S&P Dow Jones Indices LLC, eVestmentAlliance. Data as of Dec. 31, 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes only.

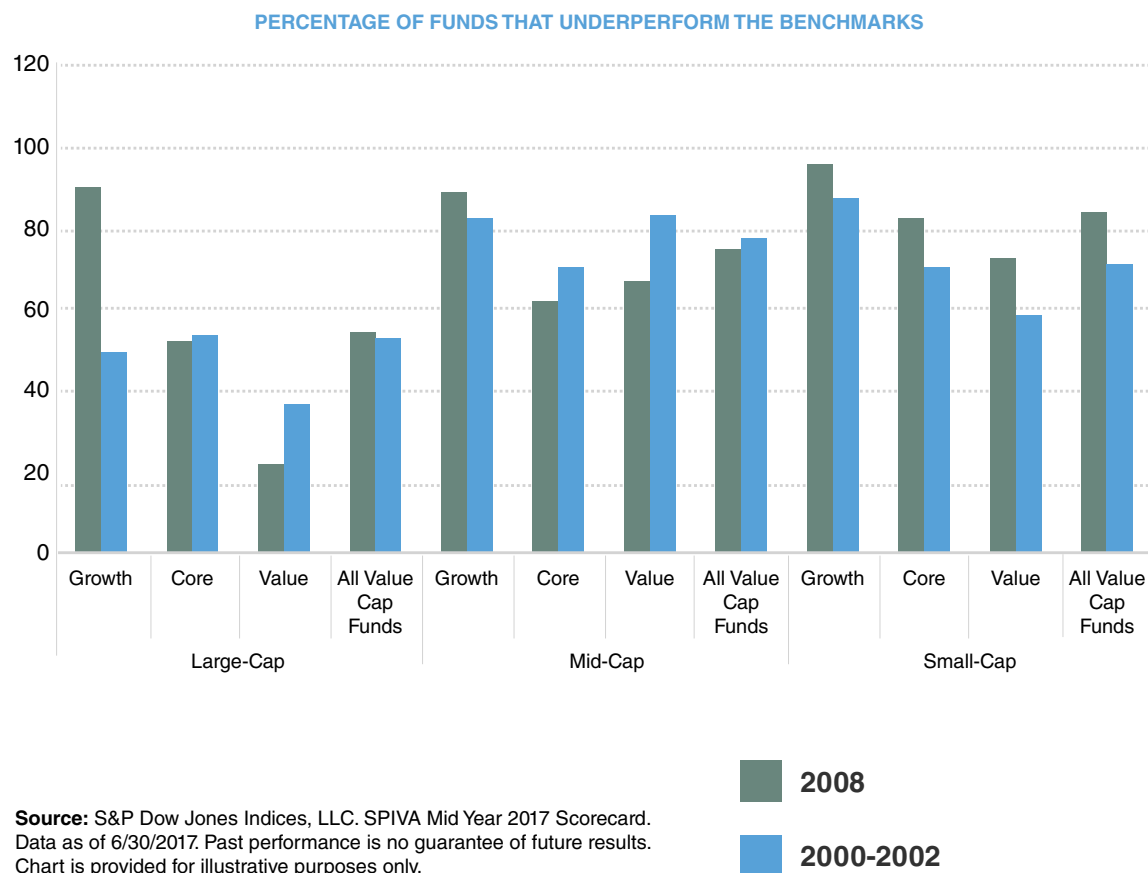
Source: S&P Dow Jones Indices

This data has been so compelling that indexing in large capitalization equities has experienced “explosive growth.” According to the September PPMAIRC testimony of Aye Soe, head of Research Design at Standard and Poor’s Dow Jones Indices, investors—both individual and institutional—had index funds in their portfolios for decades, but even though a close look at the data shows that active managers had been underperforming for years, it was only after the 2008 financial crisis that it really hit home for investors that their active managers had failed to provide downside risk protection.^{cxvii} Today, over 40 years since the birth of indexing, there is virtually no debate that indexing is the right choice for U.S. large capitalization equities.

While other studies and samples are sometimes cited in an effort to defend active management, they are usually based on smaller samples or less rigorous methodologies, making their conclusions suspect, and they are often cited or developed by vendors promoting active management. There are a few critiques that continuously surface from those that have not followed the data:

- “Active management protects on the downside.” In fact, in 2008, when the S&P 500 was down over 35%, in 12 out of 13 categories of equity funds, the large majority of active managers still underperformed their index. Today, there are many options other than active management available to protect on the downside, including low volatility indices or more conservative asset allocations.

Figure 46: Active Management During the Bear Years

ACTIVE MANAGEMENT DURING THE BEAR YEARS*Have active managers provided downside protection?*

Source: S&P Dow Jones Indices, LLC. SPIVA Mid Year 2017 Scorecard. Data as of 6/30/2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes only.

Source: S&P Dow Jones Indices.

- “The success of indexing will not last. This is just this cycle.” While there will be periods of time when active managers outperform indices, the consistency of the data across time suggests that the theoretical argument is sound, and periods of outperformance will be followed by, and in the long-run exceeded by, periods of underperformance.
- “Active management works better in inefficient markets like small-cap, high-yield and international.” In fact, the evidence suggests that there is no difference between markets that are considered more or less efficient. In any market where public securities span the opportunity set, SPIVA® scorecards show that these arguments are unfounded. The 15-year data show that over the long-run, active managers have failed to outperform, by wide margins, in every category, including those markets typically identified as “less efficient”:

[. . .] Over the 15-year investment horizon, 92.33% of large-cap managers, 94.81% of mid-cap managers, and 95.73% of small-cap managers failed to outperform on a relative basis[. . .] Over the 3-, 5-, 10-, and 15-year-investment horizons, managers across all international equity categories underperformed their benchmarks[. . .] Across all time periods studied, high-yield managers struggled to outperform their benchmark.^{cxviii}

Burton Malkiel has cited SPIVA® data in support of indexing, even in inefficient markets. According to Malkiel, “In emerging markets, because of the market inefficiencies, it is hard for active managers to outperform because the bid-ask spreads are larger, the trading markets are not as efficient, and there are big market impact costs and stamp taxes when you sell.”^{cxix}

Aye Soe notes that the one-year data for equity categories is more favorable, but that “one year is noisy” and, similar to international and high-yield, the number of managers who outperform dwindles over time.^{cxx}

- “Active management beats indexing in fixed income.” The SPIVA® data clearly refute this. Indexing in fixed income, however, has some subtleties. A manager can often appear to “beat” certain broad market fixed income indices, such as the Barclay’s Aggregate, simply by shifting the risk profile of the portfolio: by, for example, taking on more credit risk, or reducing the proportion of U.S. Treasuries. In such cases, there is actually an unrecognized mismatch between benchmark and portfolio. Managers aren’t “beating” the index; they are taking on more risk than the index to get higher return. Pension investors may wish to do exactly that. But with the proliferation of investable indices for virtually all subsectors of the fixed income market, investors who want their portfolios to have different risk characteristics from broad market indices can now do so through indexing. They will simply be making those choices more explicitly – and more cheaply – rather than doing so through an active manager’s account.
- “Indexing increases risk.” In fact, The S&P 2017 Risk Adjusted SPIVA® Scorecard found that active investing still underperformed in both equity and fixed income even when adjusted for risk:

Actively managed domestic and international equity funds across almost all categories did not outperform the benchmarks on a risk-adjusted basis. The figures improved for some categories when gross-of-fees returns were used. Similarly, in fixed income, fees were the biggest detractor from performance, not risk. Therefore, we did not see evidence that actively managed funds were better risk managed than passive indices.^{cxxi}

The assertion that indexing increases risk is often based on the mischaracterization, deliberate or accidental, that “indexing” means investing all of a fund’s assets, for example, in the S&P 500. “Indexing” does not mandate a given allocation to a given fund. It is rather a prescription for a systematic approach to investing through indices and other passive vehicles, recognizing that in the public markets, returns will come from the performance of asset classes, not of managers. How the allocations to various asset and sub-asset classes are made will determine risk and return. There has been a continuing development of new index products for nearly all sectors and approaches, with innovations such as equal-weighted rather than capitalization weighted indices, or low volatility indices. In fact, institutional investors now have sophisticated tools for addressing risk-mitigation through indexing that were previously thought to be only available through active management.

Persistence of Outperformance

While the SPIVA® data shows that most managers in every segment underperform, it also shows that a few managers in every segment can outperform, at least for a time. So it is reasonable for an investor to ask: even if only a handful of managers have outperformed indices, aren’t we better off identifying those managers and investing with them?

To answer “yes” means that two conditions would have to be met. First, a manager would need to consistently outperform on a net-of-fee and risk-adjusted basis. And, second, an investor would need to be able to tell – in advance – which managers will do so. Unfortunately, the data suggests that persistence of outperformance is

extraordinarily rare, and while those exceptional managers may exist, the combination of the ability to find them and to negotiate to share in the returns to their skill (through net-of-fee risk-adjusted excess returns) is rare at best.

According to S&P, “demonstrating the ability to outperform peers repeatedly is the one way to differentiate a manager’s luck from skill.”^{cxixii} In addition, the argument to continue with an active manager is often based on the manager’s past performance. The evidence reveals, however, that the disclaimer most mutual funds display up front – “past performance is not an indicator of future outcomes” – should be taken at face value. The S&P Persistence Scorecard shows that “out of 557 domestic equity funds that were in the top quartile as of March 2016, only 2.33% managed to stay in the top quartile at the end of March 2018.” What’s more, the ability of top-performing funds to remain in the top quartile declines over time, so that the longer the time horizon that is analyzed, the less persistence there is.^{cxixiii}

In reality, the SPIVA® data shows low persistence across fund categories, which are well below random probability, including for small-cap funds. And this basic finding has been replicated in a host of other studies.

Figure 47: SPIVA data on US Equity and bond persistence

SUCCESSFUL EQUITY PERFORMANCE DOES NOT PERSIST

US EQUITY FUNDS IN THREE CONSECUTIVE YEARS	
FUND CATEGORY	% REPEATING IN TOP QUARTILE
All Domestic Equity	2.33%
Large Cap	0.93%
Mid Cap	0.00%
Small Cap	3.85%
Persistence if Random	6.25%

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.
S&P Dow Jones Indices

SUCCESSFUL BOND PERFORMANCE DOES NOT PERSIST

US FIXED INCOME FUNDS IN THREE CONSECUTIVE YEARS	
FUND CATEGORY	% REPEATING IN TOP QUARTILE
Government- Long	7.14 %
Investment Grade - Long	4.35%
Investment Grade - Intermediate	2.04%
High Yield	1.96%
Persistence if Random	6.25%

Source: S&P Dow Jones Indices

The lack of evidence for the persistence of outperformance, and the lack of a reliable method for identifying outperformers with certainty in advance, is why we should be skeptical of basing decisions to actively manage based on the performance of any small set of managers, but rather look to the broader evidence. A given investor may say “But my manager has outperformed during a particular period,” and that may indeed be true. But what the broader evidence tells us – even assuming such outperformance has been correctly measured – is that it is probably not statistically significant, and potentially simply reflects luck rather than skill. Moreover, the evidence also tells us that past performance of a manager simply does not predict future performance: in the long run, results will revert to the mean.

So, an investor who has beaten the odds and succeeded at active management is better off harvesting those gains and switching to indexing, rather than naively believing he will continue to be the exception rather than the rule.

As Warren Buffett put it:

There are, of course, some skilled individuals who are highly likely to out-perform the S&P over long stretches. In my lifetime, though, I've identified – early on – only ten or so professionals that I expected would accomplish this feat. There are no doubt many hundreds of people – perhaps thousands – whom I have never met and whose abilities would equal those of the people I've identified. The job, after all, is not impossible. The problem simply is that the great majority of managers who attempt to over-perform will fail. The probability is also very high that the person soliciting your funds will not be the exception who does well . . . Further complicating the search for the rare high-fee manager who is worth his or her pay is the fact that some investment professionals, just as some amateurs, will be lucky over short periods. – Warren Buffet, Berkshire Hathaway, Inc., Letter to Shareholders, February 25, 2017, 24.

Foregoing Excess Return

Advocates of active investment management argue that investors who index will never “beat the market” because, by definition, their return will be equal to the market return, before costs.^{cxxiv} This was the argument given by Fidelity Investments Chairman Edward Johnson when John C. Bogle started Vanguard, as he was quoted as saying that he “[couldn’t] believe that the great mass of investors are going to be satisfied with receiving just average returns.”^{cxxv}

While forgoing the possibility of outperformance may seem like a disadvantage, indexing also forgoes the possibility of underperformance. Moreover, outperformance is uncertain, but the fees are not. As the data above shows, there is higher probability of underperforming than outperforming, particularly after costs.

In 2017, index management fees averaged 0.15%.^{cxxvi} Some index fund fees are now as low as zero.^{cxxvii} By contrast, in 2017, active fund fees averaged 0.72%.^{cxxviii} Active managers argue that those fees pay for the analytics, skills, and “trade secrets” that enable them to outperform.

In his October testimony before the PPM AIRC, renowned investment consultant Charley Ellis agreed that active managers are investing heavily in research and technology and processes, but he explained that doing so was necessary but not sufficient to generate true alpha:

Every firm that I've talked to knows that they're better. They've got better computers, they've got more carefully trained staff, they've got much better models on their computers, they've learned a lot, and they are raring to go because they know they're better than they were 10 years ago. What they don't recognize, but only an outsider might be able to recognize, is that they are actually getting closer and closer and closer and closer to being equal in their capabilities because they all have Bloomberg, they all have the Internet, they all have SEC Regulation Fair Disclosure, they all have 600 analysts at every major securities firm pumping stuff into them all the time. They all have everything you could dream of having. And they're therefore more and more and more and more equal. And when they get more and more equal it's harder for them to beat the other guys enough to cover their costs or the fees and you get back to even again. So they fall short. But it's real short. And it's not going to change.^{cxxxix}

Ellis urged the Commission to continue to move away from active management and toward indexing. "... it doesn't make any sense for someone to say, 'I am going to pay the fees that are being charged and I'm going to put up all the capital for a very unlikely rate of return,' he said."^{cxxx}

The fees conventionally described as "only 1 per cent" of assets are better seen for what they really are in a 7 per cent return market—15 per cent of returns. Worse, try taking incremental fees as a percentage of incremental returns—both versus indexing. When you do, incremental fees for active investment management are now actually over 100 per cent—a price-to-value ratio seldom seen.^{cxxxi}

Any choice to index will almost certainly result in periods where the indexed portfolio underperforms some active alternatives, whether quarters, years, or whole market cycles. But in the long run, indexing will – by definition – capture the market return, no more and no less. And the certainty of getting that market return at very low cost is a better proposition for investors than the bad odds of trying to “beat” the market on any consistent basis.

SURVIVORSHIP BIAS

When an actively-managed retail mutual fund underperforms its benchmark for a period of time, it will begin having difficulty attracting new investors and lose its current investors to other funds in the same fund family – or to competing fund families. This can lead to the fund closing or being merged with another fund in the same fund family, skewing any analysis of actively-managed fund performance. The issue of closed funds not being included in an analysis of actively-managed performance is generally referred to as survivorship bias. The SPIVA® analysis is unique in that it accounts for survivorship bias in its analysis. Charley Ellis, in a July 2018 piece by Elizabeth Macbride for CNBC, described survivorship bias as follows:

Imagine you sent 100 bombers on a mission. Fifty crashed, and 50 dropped their payloads and returned. What if you looked at the 50 that returned, called the mission successful and then wrote a report that never mentioned the 50 lost planes?

Similar patterns occur at the institutional level, but a greater impact is caused by the practice of manager rotation. Pension funds, for example, may say that “our managers have beat their benchmarks,” which may certainly be the case. However, pension funds regularly monitor manager performance and terminate those managers that have consistent periods of underperformance, as they very well should. By the time managers are terminated, the damage has already been done and can result in losses to the pension fund in the tens or hundreds of millions. This reinforces the importance of transparency in the reporting of performance by each individual manager (see Transparency Chapter for practices by peer funds that can be implemented at SERS and PSERS to address this).

Use of Active Management and Indexing in Public Markets Investments at Pennsylvania's State Pension Systems

The tables below show the assets managed by active investment managers versus those held in indices, for each of the two funds, as well as the potential savings from moving to indexing. (This section only considers the funds' holdings in equities and fixed income; it does not review other areas, such as real estate or commodities, which also have both active and index implementations.)

Figure 48: Public Equity Assets under active management v. invested in indices at SERS

	ALLOCATION		ANNUAL FEES		ESTIMATED ANNUAL FEES IF INDEXED	ESTIMATED ANNUAL SAVINGS
Active	\$3,418,000,000	22%	\$16,371,500	91%	\$4,211,650	\$12,159,850
Indexed	\$12,086,000,000	78%	\$1,562,200	9%		
Total	\$15,504,000,000		\$17,933,700			

Source: Analysis of SERS data.

Figure 49: Fixed Income Assets Under Active Management v. Invested in Indices at SERS

	ALLOCATION		ANNUAL FEES		ESTIMATED ANNUAL FEES IF INDEXED	ESTIMATED ANNUAL SAVINGS
Active	\$3,007,000,000	71%	\$7,071,400	96%	\$2,525,800	\$4,545,600
Indexed	\$1,232,000,000	29%	\$308,000	4%		
	\$4,239,000,000		\$7,379,400			

Source: Analysis of SERS data.

Figure 50: Public Equity Assets under active management v. invested in indices at PSERS²⁷

	ALLOCATION		ANNUAL FEES		ESTIMATED ANNUAL FEES IF INDEXED	ESTIMATED ANNUAL SAVINGS
Active	\$4,198,600,000	36%	\$19,723,599	91%	2,525,800	\$17,197,799
Indexed						
Passive Plus	\$7,392,489,000	64%	\$2,045,920	9%		
Total	\$11,591,089,000		\$21,769,519			

Source: Analysis of PSERS data.

⁽²⁷⁾ Estimated Fixed Income savings only includes public market managers. Internal management fees estimated using total internal expenses, ratio of allocation, and a 50% discount.

Figure 51: Fixed Income Assets Under Active Management v. Invested in Indices at PSERS

	ALLOCATION		ANNUAL FEES		ESTIMATED ANNUAL FEES IF INDEXED	ESTIMATED ANNUAL SAVINGS
Active	\$9,199,871,000	78%	\$108,525,000	91%	\$106,713,942	\$1,811,058
Indexed	\$1,388,310,000	12%	\$576,054	1%		
Passive Plus	\$1,235,757,000	10%	\$510,841	0%		
TOTAL	\$11,823,938,000		\$109,611,895			

Source: Analysis of PSERS data.

SERS has made impressive and commendable progress in the consolidation of managers and increased use of indexing in its public equity portfolio, of which 78% is now indexed. SERS continues to use active managers for the bulk of its fixed income portfolio, and in its international and small cap equity allocations. As a result, SERS' overall public equity and fixed income portfolio is approximately 67% indexed and 33% actively managed.

PSERS has significant portions of its portfolio, including all U.S. equities, that are not actively managed externally, but has a far smaller percentage of its public securities that are, strictly speaking, indexed: just \$1.3 billion of its fixed income allocation, or 6% of all its public equity and fixed income portfolio. PSERS manages many of its assets using a strategy it calls "Passive Plus." This is described elsewhere in this report, but typically involves combining some form of index replication with an overlay of an active management strategy to create "alpha" over the index. This approach is similar to an index in its low cost of execution, but can be similar to active management in its risks, and can produce returns which are markedly different from index returns. Concerns about those risks are detailed elsewhere in this report. Like SERS, PSERS relies on conventional active management for the bulk (78%) of its fixed income portfolio, and slightly more than half of its international equity portfolio. All US equities are managed through "Passive Plus."

While performance reporting of active managers should be interpreted in the context of discussions elsewhere in this report about, *inter alia*, benchmarking and indexing in fixed income, the data the Commission was able to review generally show what one would expect: some managers in some periods outperform, and some managers in some periods do not. The consultant performance report supplied by SERS, for example, shows that overall "manager skill" detracted slightly (20 bps) from fund performance in the most recent quarter, while adding slightly (10 bps) in the most recent year.

The survivorship effect is also relevant: of the 61 public equities and fixed income managers used by PSERS in June 2013, for example, fewer than 40% continued to manage money for the funds a short five years later (10-year data not readily available). Certainly not all of the managers no longer managing money for SERS and PSERS five years ago were terminated because of underperformance. But these numbers simply provide an illustration that looking at manager performance using the current roster can provide incomplete results.

In any case, the cautions heard in testimony to the Commission about outperformance persistence are especially relevant here. As Craig Lazzarra testified: "Even if you find one [a manager] who's been successful, either relative to a peer group or relative to a benchmark, historical success has no predictive value in predicting future success."^{exxxii}

The October testimony of Marcel Staub, CEO of Novarca Group, a firm that assists institutional investors in negotiating favorable contract terms, also sheds light on some of the data. His findings showed that the systems' passive mandates had more favorable terms than their active ones. He congratulated SERS for its index mandates, finding that in general all of SERS' index mandates were well-priced. In contrast, he found

some active mandate prices to be high, and recommended that four of those contracts be renegotiated.²⁸ With regard to one actively managed fund at SERS, he stated, “Almost half of the gross alpha has been, you know, paid through the manager. And we’ve had that discussion before, how much of the alpha could go to a manager or partner, and how much of that would be justified. And there’s a general understanding that 20 percent is acceptable. However, in this case, it’s been almost 50 percent, so we think that should be definitely renegotiated.”^{exxxiii} Staub also recommended that PSERS renegotiate eight of its mandates, including one for which SERS pays lower fees.

Recommendations

- The Commission recognizes that some level of investment in private markets, which are by definition actively managed, is likely reasonable for the two funds, and therefore that there is an appropriate role for active management in those allocations.
- Based on the compelling and substantial evidence and information presented to the Commission, we recommend that SERS and PSERS move to fully indexing all public market investments. Evidence clearly indicates that active management underperforms in the long run, and that outperformers cannot be reliably predicted in advance.
- We commend SERS for its strong movement toward indexing public equities in recent years, and recommend that it complete the move in that direction by indexing the remaining portions of its public equity portfolio that are currently actively managed. If this recommendation is adopted, SERS would save roughly \$12.2 million annually, for a savings of \$1.2 billion over 30 years.
- We recommend that SERS index its fixed income portfolio, for a savings of \$4.5 million annually, and \$449 million over 30 years.
- We commend PSERS for using an index approach for the passive portion of its “Passive Plus” management of all U.S. Equities, and we recommend that PSERS fully index its public equity portfolio, for an estimated savings of \$17.2 million annually, and \$1.7 billion over 30 years.
- We recommend that PSERS index the public security portion of its fixed income portfolio, for a savings of \$1.8 million annually, and \$179 million over 30 years. Even more savings would be had if they also convert all of their private market fixed income mandates (see Fee Analysis Chapter).
- We recommend that for every non-public investment considered, there is a careful pre-investment selection of a risk appropriate (levered if needed) investable market index or indices.

⁽²⁸⁾ See the “Performance and Asset Allocation Analysis,” “Cost-savings Options,” and “Cost-saving Analysis” chapters for the full report on mandates to be renegotiated.



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

PERFORMANCE EVALUATION

V. Performance Evaluation

Careful and rigorous performance evaluation is the best means for assessing the quality of past decisions and assumptions. Through performance evaluation we learn from past mistakes, allowing us to make changes to do better in the future.

A repeated refrain from some investors is that “it is only net-of-fee returns that matter.” The logic is that we should only care about where we are, and not about how we got there. Performance evaluation – in any sphere – is useful exactly because it does matter how we got there.

To do meaningful performance evaluation, returns must be judged within the context of the decisions and risk that generated them. Outcomes – good or bad – may result from luck rather than the quality of decisions – or lack thereof. Good decisions will sometimes have bad outcomes and vice versa.

The outcome of an investment decision, the realized investment return, is therefore compared to that from alternative choices – specifically, the returns of a benchmark portfolio or of a peer group. The choice of benchmark is critical. It must reflect the investment decision(s), it must be risk appropriate, and evaluation must account for additional risk such as premiums for illiquidity. Failure to have appropriate benchmarks, and therefore to properly account for risk, is among the most common mistakes made by investment professionals and boards.

Except for peer comparisons, it is best practice for benchmarks to be investable at low cost and to be highly liquid. That benchmark can then be adjusted for risk and the cost of illiquidity by adding a premium to it.

This chapter briefly reviews the different types of risk that need to be considered in establishing a benchmark, the risk adjustments to be made, and then the investment decisions that performance evaluation can inform. For further discussion of these risks, please refer back to the chapter on Portfolio Implementation.

Investment risk comes in many shapes and sizes. Risk has to do with the specific systematic risk exposures of an investment, its individual or idiosyncratic risk, as well as its liquidity, and leverage characteristics. There is also portfolio risk that results from how readily risks are monitored and managed.

Systematic Risk Exposures of an Investment. Any investment portfolio or specific investment security will have varying degrees of systematic risk exposure. Systematic risk exposure is the sensitivity of the security or the investment portfolio to economic risk factors that impact more than just the one security – for example, exposure (often measured as correlation) to the S&P 500 index, to a specific industry index, to changes in inflation expectations, or credit spreads. When these exposures are estimated, tested, or evaluated using correlation statistics, it is imperative to use gross-of-fee returns, not net-of-fee returns. The timing of fees paid has nothing to do with the underlying riskiness of the investment.

Liquidity. Liquidity measures how quickly and easily an investment can be exchanged for cash at values close to current market values. Levels of liquidity range from perfectly liquid, for cash, to highly illiquid – for example, limited partnership investments which typically are not liquidated for over ten years from the time of commitment. Liquidity is an important risk factor in two ways. First, illiquidity limits the ability to rebalance into or out of the particular investment. Second, on a portfolio level, there are levels of illiquidity which would result in forced sales at distressed values under certain market conditions simply to stay solvent, much less maintaining a desired asset allocation. An illiquid investment and illiquid portions of the portfolio must be limited and must earn a return over liquid benchmarks to compensate.

Leverage. Leverage is another unique and important risk factor. Leverage is borrowing money, either directly or indirectly,²⁹ for the purpose of increasing the exposure to a security or strategy. Leverage magnifies returns, making good performance even better and bad performance even worse. When markets rise, returns from more leveraged exposures outperform. Without adjusting benchmarks for the use of leverage, riskier portfolios may be mistaken for better performing ones.

While a levered position is always riskier than the unlevered position in the same security, a levered position in one security may or may not be riskier than an unlevered position in a different security. For example, most investment professionals and finance academics would agree that a 2-year Treasury note levered 2 to 1 (or 100%) would be considered less risky than an unlevered position in a 30-year Treasury bond.

In addition to magnifying returns, leverage is its own risk factor because of the obligation to fund investments or losses and post additional collateral in order to maintain positions. While performance evaluation cannot directly take that risk into account, it should inform risk constraints.

Leverage must be fully understood, disclosed, and analyzed. Comparing returns generated with leverage to a benchmark without leverage is misleading. Performance should always be reported on a levered and an unlevered basis and compared to an equally levered benchmark. As described below, private markets returns should always be reported with and without the use of subscription lines of credit, and unlevered returns of the underlying assets should be measured.

What Questions Should Performance Evaluation Answer?

The purpose of performance evaluation is to assess investment decisions and assumptions driving those decisions. When asked what the right response would be if an investor shows persistent underperformance, Aon Hewitt's Kristen Doyle responded that an investor must "study it and learn about why it's happening and understand what might be different about the asset allocation or the way the performance of the asset classes is. And then determine if you think that there's something there that needs to be changed or tweaked or enhanced or improved."^{xxxiv}

What follows is a list of best practice questions that stakeholders should evaluate. This follows the discussion of investment decisions in the chapter on Portfolio Implementation.

For each decision point outlined below, stakeholders should compare the pension fund's returns to a carefully chosen risk-appropriate benchmark(s), established at the time the investment decision is made, including an appropriate peer performance measure.

A NOTE ABOUT TIME PERIODS FOR ANALYSIS:

While it is standard practice to report 1-, 3-, 5- and 10- year returns that all end at the most recent observation date, this is not the best practice. Statistically, those return periods are autocorrelated, meaning that they each contain overlapping periods – they all contain the most recent 1-year return, the 5-year return only has two years of returns that are different than the 3-year return, and so forth. As such, they can all be significantly influenced by any unusual experience of the overlapping time periods. It is much more rigorous to look at the consistency of performance comparisons as shown by rolling returns of different lengths. This involves displaying much more data, but if reports focus on the question the data is meant to address, simple graphics are quite useful.

⁽²⁹⁾ Direct leverage occurs when the pension fund borrows money directly to fund an investment. For example, using a line of credit or issuing bonds. Indirect leverage occurs when the pension fund buys securities with embedded leverage. For example, an investment in a share of a company's equity has indirect leverage if the company has issued debt. There are sources of leverage that are more of a hybrid, where the pension fund is obligated to cash outlays dependent on market or other events out of their control. Unfunded capital commitments, swaps and futures are examples. The amount of cash collateral needed to buy a future contract is much smaller than the economic exposure of the futures contract. However, the pension fund is obliged to fund losses and post additional collateral if the value of the contract moves against their position. An unfunded capital commitment can be called at any time by the general partner.

Total portfolio risk budget. A pension fund board will establish an acceptable risk budget and a simple index-based investment strategy, say 70% S&P 500 and 30% aggregate bond index, that maximizes expected return for that level of risk (the simple benchmark). The performance evaluation questions are:

- o How has the pension fund performed relative to this simple risk portfolio?
- o Was the risk budget prudent: How has the simple risk portfolio performed relative to other simple risk portfolios – either more or less risky? For example, comparing a 60/40 to a 70/30 or a 65/35.

Investment allocations. Using an asset or risk allocation model, a pension board establishes a second benchmark portfolio that is more diversified across other market or systematic risks, but still invested in liquid markets indices (the diversified benchmark). Note that if the portfolio is levered the risk budget above must reflect that risk and the allocation considered here should include the leverage. The performance evaluation questions are:

- o How has the pension fund performed relative to this diversified benchmark?
- o How did the diversified benchmark perform compared to the simple benchmark – did diversification across other systematic/market risks add value? This can be evaluated in aggregate and separating out the risk-seeking allocations relative to the equity index and the risk-mitigating allocations relative to the bond index.

Manager selection. If active management is used, at the time any active manager is hired, or an active management style is employed by internal investment staff, three decisions are made: (1) what allocation in the diversified benchmark is replaced; (2) what portfolio of market risk exposures through indices most closely reflects the risk exposures of the strategy – the replicating portfolio; (3) what is a tolerable level of performance deviation from the replicating portfolio. For example, a manager that invests in U.S. technology stocks may be considered part of the domestic equity allocation, but their performance should also be compared to a technology index since the pension fund could have implemented the decision to concentrate in technology with an index. If the manager uses more leverage than the technology index, then the correct benchmark would be a levered investment in the technology index. The performance evaluation questions are:

- o How has the manager performed relative to the portion of the diversified benchmark that it replaced?
- o How does that relative performance break down between the change in systematic risk exposures that could have been achieved with indices and the added value of the manager relative to that replicating portfolio (after fees and costs and adjusted for leverage, of course)?

Peer Analysis. In addition to evaluating each layer of investment decisions relative to low fee alternatives, it is also important to consider peer performance. At each decision point above, an analysis of performance relative to a robust peer set is informative, as it will highlight when decisions have been significantly better or worse than those made by peers with similar opportunity sets.

Areas for additional performance analysis. Using the same risk-appropriate choices for benchmarks, there are certain choices of investment styles and implementation that should be analyzed regularly.

- **Active management versus index performance:** There is a large body of evidence produced by S&P and others that shows that active management underperforms appropriate risk equivalent indices. To the extent that active management is used, the aggregate added/detracted value after fees is important to measure. It should be analyzed in aggregate as well as in different asset classes.

- **Internal asset management:** A pension fund board has additional responsibility relative to internal asset management as discussed elsewhere in this report. The board provides the only level of risk oversight for internal assets. The aggregate performance of investments managed directly by internal staff, as well as subsectors of them, must be reviewed independently. Returns relative to benchmarks – either positive or negative – must be consistent with the risk exposures and risk limits granted. Tactical asset allocation positions should be measured and reported on as their own category as well.
- **Co-Investing:** Co-investments are a unique vehicle where a pension fund may invest in a particular security alongside a manager, often at reduced fees. There is significant debate about whether or not co-investing is subject to negative selection bias where co-investments underperform alternatives, even after fees. Co-investments therefore need to be evaluated very carefully and consistently, again adjusting for leverage and liquidity. In addition to being compared to a similar risk public market portfolio, there needs to be a comparison to other investments of the sponsor.³⁰

Private Investment Performance – Unique Issues with Measurement and Evaluation:

Private markets investing is described in detail in other chapters of this report. This section highlights some unique challenges that exist when evaluating performance of private markets investments.

Valuations and Illiquidity. Private markets investments are often largely illiquid for 10-15 years. In the interim, the general partner supplies valuations of their investments based on their models of future cash flows and multiples, amongst other assumptions. While general partners give their best estimate of market value, these valuations may have little to do with a currently available sales price.³¹ If these reported values are smoothed – valuations increase/decrease more slowly in a market where public equity values are increasing/decreasing – then measures of performance based on these valuations will under-report risk relative to public markets. It is estimated that 21% of the SERS portfolio and 31% at PSERS are reported at Net Asset Value (see sidebar on “Net Asset Valuations” for additional information).

Timing of cash flows. Private markets investments have inflows and outflows that are driven by capital calls and distributions made by the general partner. As will be discussed below, the meaning of commonly used performance measures such as IRR or multiples is greatly affected by the timing of cash flows. By using subscription lines of credit to time these cash flows, a general partner can attempt to increase reported IRRs. While not perfect, PME is a measure that accounts for timing of cash flows in the comparison metric.

“PASSIVE PLUS”

“Passive plus” – also known as “alpha transfer” – is an active management style used by PSERS where derivatives are used to generate the return of a given index (less the financing rate implied by the derivative), and then the cash that would have otherwise purchased that index exposure is invested in other securities with the aim of outperforming the implied financing rate. A common example is investing in a swap contract to earn the total return of an index less a financing rate, and then using the cash in excess of the collateral needed for that swap to invest in 1-3 year duration debt securities with credit risk exposures. Whenever the debt securities earn a return in excess of the financing rate inherent in the swap contract, this strategy will “outperform” the index. This is a riskier and different strategy than simply investing in an index portfolio. It employs leverage and all of the complexity associated with leverage discussed in the Portfolio Implementation chapter. If the index has a significant drawdown and additional collateral has to be posted and/or returns need to be paid, it may be that the debt securities have to be liquidated at distressed levels. Understanding these risks and evaluating the performance of these strategies with the correct risk context is critical.

⁽³⁰⁾ In other words, compare the performance of co-investments offered by the manager to how the manager’s overall portfolio performs as well as how well the pension staff selects amongst co-investment opportunities.

⁽³¹⁾ The website <https://www.bison.co/blog/how-do-gps-calculate-net-asset-value/> provides a very good write up of the techniques used for these valuations and the distinction between Level 1, 2, and 3 assets in financial statements.

Leverage. Private markets investments involve making a legally binding commitment of capital to a partnership. The general partner has the right to call the pension fund's capital, up to the amount of the committed capital, at any time during the investment period. Failure to fund the partnership with cash as requested by the general partners has legal and financial consequences. The unfunded commitment to such an investment is therefore a type of leverage representing true economic value – in fact, general partners can and will establish subscription lines of credit against these commitments. There is no commonly accepted value associated with this liability, but it should impact the appropriate level of excess return these investments require.

Private markets investing also uses leverage at the asset level. Because this leverage is usually within a limited partnership legal structure, it is not generally recourse to the pension fund, but it still impacts the riskiness of the underlying investments. A fund manager that takes less risk by using less asset level leverage should not be penalized in performance evaluation.

Best practice requires private markets managers to report on their use of subscription lines, performance with and without the use of subscription lines, and to report the levered and unlevered returns of their investments, using both gross fees and net of fees, as always – since gross fee returns help monitor the riskiness of the investments.

Performance Measures. Since private markets investments are levered vehicles, illiquid and subject to general partner valuations of their assets, there is no perfect way to compare performance to a liquid public market alternative. We discuss here the common measures used and some cautions about each: IRR, Multiples, PME.

- All of the performance measures discussed below share two common problems: (1) unless the investment is fully realized, some portion of the return calculation depends on the net asset valuations described above. (2) If risk appropriate benchmarks are not used, then comparisons will conflate returns from skill with returns to systematic risks or leverage.
- Internal rates of return (IRRs): This is the most commonly reported measure of performance of a private markets investment and performance-based fees are often tied to it. It is the rate of return that will bring a series of cash flows to a net present value of zero. IRR has been identified by many academics as subject to factors that either by design or coincidence can enhance reported performance and potentially the fees earned by managers.^{xxxxv} In the following example, Fund A has consistent cash distributions that over the life of the investment equals \$4,150. Fund B, on the other hand, has a much smaller total return – less than half – but the same IRR-based “return” due to distributions being received early in the life of the fund.

Figure 52: IRR

	FUND A			FUND B		
	COST	DISTRIBUTED	NET CASH FLOW	COST	DISTRIBUTED	NET CASH FLOW
1990	100	-	(100)	100	-	(100)
1991	100	-	(100)	100	-	(100)
1992	100	-	(100)	100	-	(100)
1993	100	225	125	100	-	(100)
1994	100	225	125	100	500	400
1995	100	225	125	100	500	400
1996	100	225	125	100	500	400
1997	100	225	125	100	35	(65)
1998	100	225	125	100	35	(65)
1999	100	225	125	100	35	(65)
2000	100	225	125	100	35	(65)
2001	100	225	125	100	35	(65)
2002	100	225	125	100	35	(65)
2003	100	225	125	100	35	(65)
2004	100	225	125	100	35	(65)
2005	100	225	125	100	35	(65)
2006	100	225	125	100	35	(65)
2007	100	1,000	125	100	35	(65)
	1,800	4,150	31%	1,800	1,885	31%

Source: Ludovic Phalippou, 2018.

Same IRR even though Fund A has delivered over twice the distributions of Fund B

Source: Ludovic Phalippou, 2018.

- Multiples of invested capital measure the sum of distributed capital and the remaining net asset value divided by the amount of capital paid into the fund. These measures can be useful when combined with IRR, but are particularly challenging to interpret because they need to be contextualized with the investment time horizon. The doubling of invested capital over a five-year period, for example, is certainly preferred to the doubling of invested capital over a ten-year period.
- The most useful metric of performance increasingly used in recent years by investors and academics is the Kaplan-Schoar Public Market Equivalent (PME), which provides a value of over 1 to indicate outperformance compared to a public market index (such as S&P 500), equal to 1 to indicate equivalent performance, and under 1 to indicate underperformance. While this metric, like others, is biased by the accuracy of the reported net asset values determined by the manager and only independently-audited periodically, and the appropriateness of the public markets index chosen, it allows investors to evaluate how well private markets did relative to the specific investable public alternative chosen.

NET ASSET VALUATIONS

SERS

The Comprehensive Annual Financial Report dated December 31, 2017, (SERS CAFR) notes that:

Management of SERS has made certain estimates and assumptions relating to the reporting of assets and liabilities, and the disclosure of contingent assets and liabilities to prepare these basic financial statements in conformity with U.S. generally accepted accounting principles. Actual results could differ from those estimates.

Private equity, real estate, hedge funds, and commingled fixed income funds are reported at fair value as estimated and reported by general partners, based upon the underlying net asset value (NAV) of the fund or partnership as a practical expedient of fair value. Adjustments from NAV are required when SERS expects to sell the investment at a value other than NAV.^{cxxxvi}

And later:

Private equity limited partnerships are valued at the NAV of SERS ownership interest in partners' capital, which approximates fair value. NAV is determined by the general partners using assumptions and estimates that have been reviewed and approved by valuation committees. Since private equity investments in such partnerships are generally illiquid with holding periods lasting seven to 10 years, the value realized by SERS upon disposition may differ from estimated values reflected in the basic financial statements.^{cxxxvii}

The amounts of these investments total \$6,261,925,000 (21%) for SERS as of December 31, 2017 (SERS CAFR).

The SERS reports are audited to the standards of the Governmental Accounting Standards Board. The SERS Auditors, KPMG, sample the values that are submitted to SERS by the General Partners. All values submitted by the General Partners are audited by the General Partners' auditors. There is some non-audited reporting, but the non-audited reports (by General Partners) are primarily, if not always, older legacy investments. SERS Auditors will also evaluate a sampling of the General Partners' investments.

The invested companies report their value (some audited/some not audited by the invested companies) to the General Partners who then audit all, or samplings of the companies invested in and report the value of the General Partner's calculations to the systems. SERS is invested in over three hundred and fifty Private Equity General Partnerships reporting the value of thousands of investments. All of these values are based on unobservable data. There are formulas, testing and discussion but the NAV will always involve educated guessing and two experts could arrive at different values.

The amount of \$6,261,925,000 is an estimated value. This calculation is included in the value of the entire SERS investment portfolio and is noted in the SERS CAFR as quoted above (italicized).

PSERS

The Comprehensive Annual Financial Report June 30, 2018 (PSERS CAFR), in the "Notes to Financial Statements," notes on the Net Asset Value Investments that

For alternative investments, which include private equity, private debt, venture capital and equity real estate investments where no readily ascertainable market value exists, management, in consultation with the general partner and investment advisors, has determined the fair values for the individual investments based upon the partnership's most recent available financial information.

Directly-owned real estate investments are primarily valued based on appraisals performed by independent appraisers and, for properties not appraised, the present value of the projected future net income stream is used.^{cxxxviii}

The amounts of PSERS Net Asset Value investments totaled \$17,046,603,000 (30.6%) for PSERS as of June 30, 2017 (PSERS CAFR). The table on page 52 (PSERS 2018 CAFR) states the amount of the NAV investments to be \$31,057,796,000, but \$14,011,193,000 representing Collective Trust Funds has been subtracted from the total.

The PSERS reports are audited to the standards of the Governmental Accounting Standards Board. PSERS Auditors, CliftonLarsonAllen LLP, sample the values that are submitted to PSERS by the General Partners. All values submitted by the General Partners are audited by the General Partners' auditors. There is some non-audited reporting, but the non-audited reports (by General Partners) are primarily, if not always, older legacy investments. PSERS' Auditors will also evaluate a sampling of the General Partners' investments.

The invested companies report their value (some audited/some not audited by the invested companies) to the General Partners who then audit all, or samplings, of the companies invested in and report the value of the General Partners' calculations to the systems. PSERS is invested in over 200 Private Equity General Partnerships reporting the value of thousands of investments. All of these values are based on unobservable data. There are formulas, testing and discussion but the NAV will always involve educated guessing, and two experts could arrive at different values.

The amount of \$17,046,603,000 is an estimated value. This calculation is also included in the value of the entire PSERS investment portfolio and is noted in the PSERS CAFR as quoted above (italicized).

Case Studies in Performance Evaluation: SERS and PSERS

Private Equity

The private equity programs of SERS and PSERS provide examples of the different ways that performance can be reported and evaluated. The following image shows the private equity performance of SERS as reported by the general consultant and in the CAFR, by the staff when discussing performance, and by the private equity consultant (which is using IRR). Finally, a variety of public equity market benchmarks are provided to illustrate how benchmark choice can impact the evaluation of performance.

Figure 53: SERS Private Equity Performance

RETURNS AS OF DECEMBER 31, 2017*	1 YEAR	3 YEARS	5 YEARS	7 YEARS	10 YEARS	15 YEARS	20 YEARS	25 YEARS	30 YEARS	SINCE SERS INCEPTION (1/1/86)
General Consultant (RVK) and CAFR										
SERS PE Performance	12.8	8.6	10.3	10.8	7.5					10.9
Burgiss All Private Equity Custom Index	14.9	11.1	13.0	12.9	8.5					16.6
Russell 3000 Index+3%	22.3	14.1	17.7	17.7	10.8					14.3
Staff Presentation										
SERS PE Performance						11.4	11.8	13.7		
Presentation - U.S. Stock Index (R3000)						10.4	7.2	9.5		
Private Equity Consultant (StepStone)										
StepStone - PE IRR	15.50	8.40	11.50		6.90					12.30
Burgiss Private IQ Pooled PE	17.70	11.40	13.30		9.00					
Russell 3000*	21.10	11.10	15.60		8.60					10.10
Russell 3000 + 300 bps**	24.10	14.10	18.60		11.60					13.10
Additional Information										
SERS PE Performance	12.83	8.64	10.31	10.80	7.46	11.41	11.75	13.74	12.16	10.92
Russell 3000 + 3%	21.51	12.11	17.59	18.35	10.30	11.69	10.47	12.73	12.68	13.72
Russell 3000 Index	18.71	10.74	14.23	14.28	7.57	10.37	7.20	9.75	9.60	11.00
Russell 2000 Index	20.74	12.18	13.79	13.51	7.85	11.37	7.53	10.01	9.08	10.05
S&P 500 - Total Return Index	18.61	10.81	14.22	14.38	7.44	10.04	7.00	9.62	9.53	11.09
S&P MidCap 400 Index	17.52	11.18	14.43	13.92	9.00	11.97	10.29	12.21	12.31	13.39
S&P Smallcap 600 Index	21.05	14.07	15.60	15.60	9.27	12.34	9.34	11.77	10.19	10.85

Red text: indicates underperformance against both board-approved or staff-utilized indices

Green text: indicates performance against one board-approved or staff-utilized indices

Blue text: indicates underperformance against one board-approved index

*Benchmarks lagged 3 months

**Benchmark is a dollar-weighted calculation of quarterly changes in the Russell 3000® Index

***(1/1/86-12-31-17, 10/11/85-9/30/17 for indices)

Source: BNY Mellon, RVK, StepStone and SERS CAFR.

Additionally, the tables below provide Kaplan-Schoar Public Market Equivalent (K-S PME) values for both SERS and PSERS (please see Transparency chapter for additional information on how estimates were calculated). As discussed earlier, Kaplan-Schoar PME values for an individual fund provide the underperformance or over performance for the life of that fund. For example, a value of 1.20 equates to a roughly 20% outperformance over the public market index for the life of the fund. A fund with a life of ten years would work out to an approximate 2% outperformance per year. For an entire portfolio, average fund duration is used to interpret what a PME value would approximate on an annual basis. Dr. Ludovic Phalippou in his analysis for Treasury estimated a weighted average implied investment duration of 5.01 years for SERS and 4.01 years for PSERS. Harris, Jenkinson, Kaplan describe their findings of the average buyout PME of 1.20 “works out to an outperformance of at least 3% per year” based on a five-year duration.

I'm not going to give you any information on IRRs and money multiples to address that balance because many academics say there is far too much focus on these metrics. I'm going to show you private equity returns relative to public equity returns, which allows you to answer the question . . . "why bother?" - Dr. Tim Jenkinson, testimony before the Commission, September 20, 2018

Figure 54: SERS PME Estimates versus Reported Values Since Inception

SERS PRIVATE EQUITY PERFORMANCE VS:	S&P 500	RUSSELL 3000	RUSSELL 2000
KS-PME – Estimate July 2018	1.22	1.20	1.15
KS-PME – SERS Reported October 2018	1.26*	N/A	N/A

*reported as 1.3, rounded up from actual value 1.26

Source: Analysis using PSERS and Preqin data.

Figure 55: PSERS PME Estimates versus Reported Values Since Inception

PSERS PRIVATE EQUITY PERFORMANCE VS:	S&P 500	RUSSELL 3000	RUSSELL 2000	DJ WILSHIRE 5000	RUSSELL 3000 70% / MSCI ACWI IMI EX US 30%
KS-PME – Estimate July 2018	1.10	1.09	1.07	N/A	N/A
KS-PME – PSERS Reported October 2018	1.10	1.09	1.05	1.09	1.11

Source: Analysis using PSERS and Preqin data.

Kaplan Schoar PMEs reflect estimates of investment duration as well as the index chosen to reflect the types of companies managed by private equity managers. Index selection can lead to non-trivial differences in reported performance. These KS-PMEs **do not** reflect liquidity and complexity risk. Pensions funds should expect a liquidity premium for investing in high cost and illiquid investment vehicles. Some funds, such as the New Mexico Educational Retirement Board, use a benchmark of Russell 3000+ 3% for calculating its PME values in order to account for the expected liquidity premium for investing in private equity.^{cxix} SERS' private equity consultant, StepStone, recommends that a liquidity premium be included in the evaluation of performance: "StepStone believes the Russell 3000® Index plus 300 bps from inception appropriately reflects the opportunity cost of investing in Buyout, Venture, and Special Situations investments versus publicly traded common stocks and therefore is an appropriate benchmark for SERS."^{cxl} While there is ongoing debate about the most appropriate public market index to which private equity should be compared, Dr. Ludovic Phallipou has suggested that based on the size of companies in most PE deals, the Russell 2000 index is the nearest and most accurate proxy.

It is not known how/why SERS determined the S&P 500 as an index choice at which to compare private equity performance. The S&P 500 is not mentioned as a benchmark for SERS' private equity program in the CAFR, the RVK performance reports, or the board-approved Strategic Investment Plan. Compared to the PME values of other benchmarks and to the PSERS' results, it appears to exaggerate outperformance.

Recommendations

- We recommend that returns be measured and reported such that actual investments can be compared for risk and return versus a low-cost, index implementation, including:
 - o Gross-of-fee and net-of-fee performance should be reported.
 - o Report manager returns relative to both a risk matched benchmark established at the time of the investment and relative to the investible liquid allocation it replaces.
 - o Returns for the portfolio, asset classes, and individual mandates should include annual returns, 1-, 3-, 5-, 10-, 15-, and 20-year returns ending in the current period, along with rolling 5-year returns.
 - o Attribution analysis should be performed for each manager to identify whether the drivers of performance were aligned with expectations.
- We recommend that where portfolio leverage is used, both levered and unlevered returns should be reported, against an appropriately levered or unlevered benchmark.
- We recommend private markets, including private equity, performance be measured against relevant stylistic benchmarks, as well as the liquid public market Kaplan-Schoar PME values, where the choice of the market index is first that which is consistent with the risk taken by the manager and second, with the index that the manager replaces in the diversified portfolio benchmark.
- We recommend private market risk reports measure and describe subscription lines with performance adjusted for the use of those financing facilities as well as other uses of leverage.



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

CONSULTANT REPORT

Public Pension Management and Asset Investment Review Commission Consultant Report

November 2018

This report (also referred to herein as “set of chapters”) has been prepared pursuant to a financial consulting agreement between RCI App 1, Inc. (“Consultant”) and the Pennsylvania Treasury Department (“Client”), dated on or about June 1, 2018, which terms govern Consultant’s and Client’s respective rights and obligations with respect to the report and its content. The report is intended for Client’s exclusive use, and Consultant assumes no responsibility or liability to any other person or entity who relies upon the information contained herein. This report is not intended to be an exhaustive source of information on the topics covered herein, and Client is advised to consult with its independent legal, tax, and other professional advisors before taking any action based upon Consultant’s conclusions and recommendations. Many of the conclusions and recommendations contained herein are based on information provided to Consultant by Client, and Consultant assumes no responsibility or liability for its conclusions and recommendations to the extent they are based on inaccurate or incomplete information provided by Client.

This consulting engagement was led by Dr. Ashby Monk with assistance from Dr. Rajiv Sharma, Marcel Staub (Novarca), Jorge Madrazo Gonzalez, Amit Bansal (Novarca), and David Goerz (Strategic Frontier Management).

Executive Summary

This report (also referred to herein as “set of chapters”) has been prepared to assist the Public Pension Management and Asset Investment Review Commission (PPMAIRC) established by the Commonwealth of Pennsylvania through Act 5 of 2017, to study the investment performance, fees and costs of the State’s two largest pension funds, Public School Employees’ Retirement System (PSERS) and State Employees’ Retirement System (SERS). Specifically, this set of chapters set out to analyze the asset allocation and investment performance of the two plans as well as the fees and costs of the plans’ external asset managers. Based on this analysis, we put forward recommendations to help the PPMAIRC generate actuarial savings of \$1.5 billion over 30 years for each plan from the effective date of the legislation.

At the outset, we note that the analysis for this project has not come without its challenges, specifically with regards to obtaining the necessary data to carry out a comprehensive evaluation. We have not been granted access by the pension plans to the full amount of data needed to carry out an exhaustive performance and fees/costs analysis. We were also not granted access to conduct a full governance analysis of the two plans. The lack of data forthcoming has been surprising and in some ways alarming to us. This data was requested by a Commission set up by the State Legislature for oversight. Notwithstanding these limitations, we have applied best practice methodologies to publicly available information to achieve meaningful insights that the Commission can use in their recommendations.

The analysis in this set of chapters is structured in three main sections. The first provides a detailed account of the performance and asset allocation of the two PA plans against a peer group. This section includes a risk-adjusted performance analysis specifically of the two plans. The second analysis section provides an overview of the different cost-saving strategies on offer to the PA plans highlighting which of these strategies might not be currently appropriate. This section provides a preliminary assessment of the PA plans’ governance structure. The final analysis section provides a detailed evaluation of the current public equity mandates for the two plans and identifies from where the statutorily-required cost-savings can come. This analysis culminates with the specific cost-saving calculations required by the Commission.

The objective of the first section of analysis in this set of chapters was to assess the asset allocation and investment performance against a peer group with comparable characteristics to the PA pension plans. The peer group for the analysis consisted of 11 U.S. public pension funds that had similar characteristics to SERS and PSERS in terms of size of assets, discount rate and funding ratio. Analysis was carried out on data from all plans in the peer group between June 30, 2007, and June 30, 2017, from the Public Pension Database (PPD) at the Center for Retirement Research at Boston College. Our findings from this analysis are summarized as follows:

- Over the ten-year time period examined, SERS has progressively increased its allocation to public equities, while PSERS has decreased its public equities allocation. PSERS has increased its hedge fund, commodities and fixed income allocations and maintained a relatively high private equity allocation.
- The 2017 asset allocation of SERS was relatively consistent with the peer group. The asset allocation of PSERS contained a number of differences compared with the peer group:

namely, it had the lowest allocation to public equity, the highest allocation to fixed income, commodities and one of the highest allocations to private equity and hedge funds. PSERS was the only fund to use leverage in their asset allocation.

- Excluding one fund that used the CPI, the total portfolio benchmark performance for PSERS was the lowest in the peer group across the 1-year, 3-year, 5-year and 10-year time horizons. The total portfolio benchmark performance of SERS in contrast was consistently above the average for the peer group across all time periods.
- The absolute performance of PSERS and SERS were the lowest in the peer group over ten years at 3.8% and 3.9%, respectively. To control for bias in the peer group, we analyzed the two PA funds' performance in the wider universe of the PPD. From the wider database, PSERS and SERS ranked 50th and 49th, respectively, out of 52 U.S. public pension plans.

We acknowledge that there are challenges in conducting peer comparisons because of the unique characteristics of each fund. Despite the limitations, our analysis clearly shows that the PA plans have underperformed the peer universe over the last 5 and 10 years, and there are certain anomalies in asset allocation (particularly for PSERS) compared with the peer universe.

We also conducted analysis on risk-adjusted performance of the two plans specifically, calculating their Sharpe ratios and information ratios over the 10- and 30-year periods from June 2018 for PSERS and December 2017 for SERS. We constructed various multi-asset benchmark portfolios using simple public total return indices to compare the funds and calculate the information ratios. These benchmarks (which included a simple U.S.-based balanced portfolio, a global balanced portfolio, a global mix of public indices similar to the policy allocation of the two funds, and a quasi-LDI [Liability Driven Investing] benchmark) compounded monthly data to provide annual returns comparable to annual plan returns. We used 30 years of data to develop a comparable history with large enough sample size to provide significant calculations.

Our risk-adjusted performance figures confirm the absolute performance assertions. The Sharpe Ratios for PSERS and SERS were calculated to be slightly lower than the alternative simple balanced indices at the 30-year level and significantly less at the 10-year level. Negative information ratios for both plans at the 10-year level and 30-year level for SERS indicate that both plans have significantly and consistently underperformed simple multi-asset index portfolios.

The performance and asset allocation analyses indicate that the asset allocation strategy of the funds might need to be addressed. For PSERS, it would appear that the use of leverage to extend duration in fixed income, the allocation to illiquid asset classes such as private equity, and the allocation to commodities and hedge funds should all be looked at and reconsidered. For SERS, the allocation to private equity should be addressed, although we note that SERS' allocation to public equities is more in line with its peers and what is likely to contribute most to total portfolio returns.

The second area of analysis for this project highlighted the various cost-saving pathways available to institutional investors. We summarized the drivers and related strategies to be:

- Investment innovation – seeding new managers, new collaborative vehicles, platform companies.

- Strategy simplification – active to index, illiquid to public.
- Cost Arbitrage – risk factor approach for more efficient access points, internal management.
- Monitoring and Revisiting – renegotiating current mandates.

We highlight with illustrative examples how the above strategies can lead to significant savings for pension plans. We do note, however, that some of these strategies are not likely appropriate for PA because of their unique characteristics and the governance requirements for investment innovation and internal management.

After conducting a preliminary governance assessment, we note that both PSERS and SERS do not appear to have the governance expertise to adequately oversee complex strategies such as investment innovation and internal management. This is evident from the number of board members, the composition and nomination procedures for expertise when compared with best-practice investment boards, as adopted by certain other U.S. public pension funds that have implemented innovative strategies. **Our cost-saving recommendations therefore focus on strategy simplification and monitoring/revisiting current mandates.**

The recommendation of strategy simplification is in line with our asset allocation and performance analysis where, particularly in the case of PSERS, we observed complexity in the portfolio with regards to the use of leverage, private equity, and internal management. Our risk-adjusted performance analysis indicates that a shift to a lower-cost simple balanced public index would have performed significantly better on a risk-adjusted basis than the current complex strategies. There are a number of aspects that would need to be addressed when considering a simplification of strategy such as how the change in active risk exposure would impact the plans as well as the potential for increased volatility that would be associated with moving to public indices. Our preliminary analysis in this project would suggest that strategy simplification should be explored as a cost-saving strategy for the two plans. Further analysis would be needed to confirm this.

Our fee and cost analysis of current mandates was restricted to the public equity asset class for the two plans. We were not provided with the necessary information to do a detailed analysis on the other asset classes of the plans.

From the analysis conducted on SERS, we note that most of the public equity index mandates are priced fairly. There are four active mandates of SERS that are primary candidates for in-depth review and potential renegotiation, based on being old agreements that should be updated and appear expensive compared to best practice.

For PSERS, we found, contrary to their explicit assertion that more expensive mandates lead to better returns, the cheapest out of their five mandates in International All Cap Equities (which is almost half the cost) has enjoyed the best returns. All of the five International Small Cap Equities mandates should be reviewed for renegotiation, as should one index mandate where SERS pays lower fees for the same allocation, and two active mandates, where there is an absence of tiers for discounts above \$200m in one and the other is the worst performer in its category, despite having the highest fixed fee. We also found that within the High Yield/Opportunistic asset class for

PSERS, there are significant savings that can be achieved based on the current fee levels paid and performance achieved.

Having not had full access to the Private Equity investment details of both plans, it is very difficult to make a thorough statement on cost-savings here. Nevertheless, based on our experience, we have made reasonable estimates of the potential cost-savings from the asset class for the two plans.

From the analysis carried out on the current mandates in Public Equity and through estimations of Private Equity, we believe that both plans are able to meet and exceed the cost-savings target stated in Act 5, although due to the different size of the plans, achieving the target proves to be more difficult for the smaller of the two plans, SERS.

Over a 30-year time horizon, taking into account a 7.25% expected return for both SERS and PSERS, our analysis in this set of chapters shows that without changing the plans' current investment strategies, the following actuarial savings can be achieved:

Plan	Identified Savings Potential
PSERS	4.96 B USD
SERS	1.51 B USD

Our analysis and recommendations above are premised on not having the full amount of data to do a comprehensive analysis on the plans. We thus caveat the recommendations put forward as being subject to doing a fuller analysis in certain areas such as governance and in analyzing cost-savings on the plans' current mandates in all asset classes.

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Section 1: Background and Context

1.1 Introduction

This set of chapters is intended to complement and assist the work carried out by the Public Pension Management and Asset Investment Review Commission (PPMAIRC), set up by the Commonwealth of Pennsylvania as part of the broader pension reforms of Act 5, which, in relation to the two largest Pension systems in the State, has been tasked to study:

- (1) The performance of current investment strategies and procedures of the Systems, comparing realized rates of return to established benchmarks considering the associated fees paid for active and index management,
- (2) The costs and benefits of active and index investment strategies in relation to future investment activities, and
- (3) Alternative investment strategies that will maximize future rates of return net of fees.

Furthermore, this set of chapters also provides guidance to the PPMAIRC for developing a plan to identify at least \$1.5 billion in cost-savings over 30 years for each of the two systems and to identify the lowest amount of fees to achieve the actuarial assumed rate of return. At the core of the Commission and the impetus behind this set of chapters are two key objectives: (1) To understand whether the current practices employed by the pension systems are in the best interest of the plans' beneficiaries and (2) to explore how the funds' investment operations could be improved.

This set of chapters aims to understand how the Pennsylvania funds are performing in the context of the fees and costs they are paying to external managers. This set of chapters provides a detailed analysis of the performance and asset allocation of the systems in comparison to their benchmarks and a peer grouping of funds. This performance analysis provides context for how the current PA funds are performing and operating in comparison with other similar funds in terms of size, return expectations and funding status. The performance of the PA funds is also specifically analyzed on a risk-adjusted basis.

The second part of this set of chapters' analysis presents the various options available to the plans for achieving at least \$1.5 billion in savings each, over the next 30 years. There are a number of strategies that investors have adopted to run more cost-effective investment operations, without compromising performance. We go through these options and highlight some key factors that need to be considered when adopting and implementing these strategies. We highlight that governance plays a key role in adopting certain cost-saving strategies and, as a result, we suggest that certain approaches to saving costs, such as those that are particularly governance-intensive, may not be appropriate for the PA plans.

The final part of the analysis for this set of chapters focuses on the fees and costs associated with the current external managers utilized by the pension plans in the public equity asset class. This set of chapters analyzes the performance of these managers in the context of the fees they charge, examining the extent of these fees and identifying areas where the systems can improve. The analysis of fees and costs is restricted to the public equity mandates of the PA plans due to the PPM AIRC not being given access to necessary data for other asset classes. From this analysis and from other publicly available information, we put forward the specific strategies and accompanying calculations for saving at least \$1.5 billion for each of the PA plans over 30 years.

1.2 Setting the Scene - Fees, Risks and Performance

In the wake of challenging macroeconomic conditions (including stagnant economic growth, geopolitical uncertainties, and aging populations), it seems unlikely that pension funds will be able to overcome their underfunded liabilities without making well-considered changes. The threat of deep funding shortfalls is quite real, and this precarious investment climate is making many plan sponsors (which are ultimately on the hook for the pension promises) rather uncomfortable. But the choices available to plan sponsors are all seemingly bad: cutting benefits, increasing contributions, delaying people's retirement, or improving investment returns. The one that has seemed the least painful to stomach by politicians and plans alike has been the latter.

In the pursuit of higher returns, however, funds have moved into riskier and alternative investment strategies, which are associated with more expensive asset manager relationships. While this move into more costly, riskier investment products has resulted in some investment outperformance among some American public pensions, most stakeholders of these funds have not clearly understood the process of taking more risk via external managers in complex strategies. Many have also not grasped the sheer scale of compensation that these investors have paid to external managers and the associated consequences. In many cases, investors around the world and in the U.S. took this delegated approach without explaining all aspects of it clearly to their stakeholders. This lack of understanding was a recipe for stakeholder conflict and loss of trust.

Today, there is a lack of understanding among pension stakeholders about the external costs because much of the compensation data has been buried in fund footnotes, hidden in net asset value calculations, waived away as profit sharing or ignored by the funds themselves under the false protection of a most favored nation ("MFN") provision. A lot of this information has not been reported, measured, tracked and ultimately not managed. The obfuscation of fees and costs by managers has enabled these managers to gain economies of scale, which have been wielded back against pension plans at the negotiating table. The gap in skills, capabilities and resources between public pension funds and private managers has grown, without much understanding as to the reasons since the fees weren't being tracked diligently. This reinforced the asymmetries of information, skill and ultimately power in favor of the managers. Managers have thus been able to demand more and more of the returns to capital as a fee.

A major consequence of opaque fees and costs has been pension fund under-resourcing. The responsibility of a pension fund Board and senior management team is often as much about building professional and effective investment organizations as it is about making investment decisions. The Board has a duty to help ensure their plans remain the principals in the complex chain of principal-agent relationships. In order to properly resource an investment organization for success, to remain the principal, a pension fund has to first assess the true cost of producing a target return – whether those returns are produced internally or externally, *i.e.*, how much it costs to generate a certain amount of return per unit of risk.

In sum, fee opacity may have allowed the pensions to pursue riskier and higher returning strategies, but it also prevented the Boards from properly resourcing and thus overseeing and holding accountable their pension organizations and the associated strategies. The principals (pension funds) have found themselves increasingly subservient to their own agents (investment managers).

We thus applaud the efforts of the Commonwealth of Pennsylvania in addressing the issue of fees and costs for pension fund investment management through setting up the PPMAIRC. The SEC has investigated fees and costs of alternative managers and has uncovered a startling amount of over-charging. The process of achieving fee and cost transparency can be one of the most powerful catalysts for Boards and legislators to become reinvigorated and re-empowered to consider, from first principles, how they should design their organizations to achieve their investment objectives.

1.3 Data Considerations

As will be documented throughout this set of chapters, we have come across a number of challenges in carrying out the analysis, none more so than the lack of data provided by the Plans to do a thorough analysis. Access to reliable and accurate data is essential to any robust financial and investment analysis.

Most notably, we have not received any reliable data on illiquid investments from either of the PA plans, especially as it pertains to performance and the contracts associated with managers used for these investments. We have therefore not been able to appraise in detail the costs associated with the illiquid investments made by the plans, in particular in private equity, which is widely regarded as the most expensive asset class, and where overcharging of fees by managers has been found to be prevalent.

Furthermore, while we were able to get access to the PSERS' public equity agreements, SERS did not provide unredacted contracts for their public equity mandates. The analysis on fees and costs has thus been restricted and is incomplete. We were forced to use consultant reports where certain information could be extracted, but these also mostly just provided headline figures without underlying fund or investment-related data required to perform independent analysis and deductions. Within the public equity mandates, and in particular for SERS, we have not been able to get an appreciation of the true cost of

investment with external managers, including Holding Costs, Transaction Costs, Other Operating Expenses and 2nd Tier Fund costs.

As part of our analysis for providing cost-saving recommendations to the plans, we needed to conduct a thorough governance analysis. In order to carry out this analysis, we requested on-site individual meetings with senior investment staff and board members of each plan in an off-the-record setting. We were not granted access to meet individually with members, which has meant a thorough governance analysis was not possible.

The lack of data forthcoming has been surprising to us particularly given that this analysis was commissioned by the Legislature. We understand that even more data of underlying cash flows of private equity investments have been provided by public pension funds in other states for academic research, which further emphasizes the irregularity of the situation here in Pennsylvania.

Not being transparent about asset managers' contractual details serves only one party's interests: the asset managers. A reason SERS claimed for not providing the information was that the contracts contained confidential proprietary information and/or trade secrets. From our experience, whenever clients are told that contractual terms are a trade secret of the manager, it is an indication that these should be reviewed immediately.

Notwithstanding the data challenges, the analysis has adopted methodological best practices using the available data to provide and produce meaningful insights and evidence for the recommendations put forward. The data and methodology used for the analysis in this set of chapters are documented in the individual sections.

The next section provides the detailed analysis of the asset allocation and performance of the two plans. Section 3 outlines the available options to investors looking to save costs across their portfolio and highlights the key factors that need to be considered before adopting any of these strategies. It then provides an analysis of which cost-saving strategies are most appropriate to the PA plans. Section 4 provides a detailed analysis of the current public equity mandates for the two plans and a detailed breakdown for where the \$1.5 billion of cost-savings can be achieved for the plans. The final section summarizes the findings from this project.

Section 2 - Performance and Asset Allocation Analysis

2.1 Objectives and Scope

The objectives of this body of work were to assess the asset allocation and investment performance of SERS and PSERS in relation to a select group of pension funds ("the peer group") with comparable characteristics.

The scope of the assessment focuses on the asset allocation and investment performance of SERS, PSERS, and the peer group. The following four elements were defined at the outset and guided the team's efforts throughout the project:

- Time range – The time range for analysis was defined as a 10-year period ending with the last year of readily available data for analysis. The time range was set for fiscal years 2008-2017.
- Data – While certain fund documents were made available by both SERS and PSERS for this work, due to inconsistencies in the data, the bulk of analysis leveraged publicly available data.
- Analysis – The analysis for the project was scoped to cover both asset allocation and investment performance for each fund in the peer group across the 10-year time frame, subject to data availability. To support data rationalization and comparability, the level of analysis was set to a primary asset category level (*e.g.*, Equity), rather than a sub-asset class level (*e.g.*, Domestic Equity, International Equity, Global Equity, Emerging Market Equity, etc.). The major areas of analysis focused on:
 - Asset allocation variations for 2017 and over the 2008-2017 period.
 - Annualized 1-year, 3-year, 5-year, and 10-year absolute performance at the total fund and asset class levels from the last year of available data.
 - Risk-Adjusted Performance (Sharpe Ratio, Information Ratio) was calculated specifically for the two PA funds over the 5-year, 10-year and 30-year period.
- Peer Group – A range of 10-12 funds for the peer group was established at the beginning of the project with the anticipation that funds would potentially drop-off as the criteria for selection and analysis evolved throughout the project. The final peer group consisted of 11 funds and constitutes a group of U.S. state-based public pension funds that are comparable to both SERS and PSERS across a set of pre-established criteria.

2.2 Analysis Structure

The analysis in this section is structured in four main parts. The first part consists of a literature review on key topics for the analysis such as asset allocation, investment performance, benchmarks, as well as important features of pensions like funded status and discount rate. The second part provides a description of the methodology used for the assessment and it highlights the major challenges associated with performing asset

allocation and investment performance assessments for pension funds. The third part consists of the asset allocation analysis across the peer group. The final part includes the investment performance analysis of SERS and PSERS against the peer group for absolute returns and the risk-adjusted performance specifically for the two funds.

2.3 Literature Review and Background Information

2.3.1 Asset Allocation Literature Review

Asset Allocation Overview

Asset allocation refers to how funds allocate their investments across different asset classes. It consists of the deployment of strategies that seek to balance rewards in the form of investment returns and risk in the form of investment losses through the selection of a specific asset mix based on an investor's profile and return objectives.

At a high-level, a pension fund's asset allocation should balance risk, return, and cost. However, several other internal and external factors that can influence each other should be considered holistically, rather than in isolation. A recent study on global pension fund best practices illustrates that drivers such as diversification, risk management, inflation hedging, asset liability management, and return on investments should all be key determinants of asset allocation.ⁱ

These drivers can influence very different decisions across pension funds, as each must consider their specific internal objectives and external constraints. For example, a pension fund that is mostly focused on guaranteeing long-term solvency may follow an asset allocation strategy that enables investments in a manner that is more risk-averse than others.

Given that the overarching objectives of public pension funds are usually determined by its board and public officials, asset allocation decisions are also normally influenced by the larger economic and political context at play. For example, a pension fund that seeks to avoid imposing short-term increases in employee contributions may choose to adopt an asset allocation strategy that enables the organization to chase riskier investments that could generate higher returns.

To set their asset allocations, pension funds usually identify a specific objective or set of objectives and the considerations that will help execute against them. This is usually done through a board-approved strategic investment plan that includes a pension fund's investment strategy, structure, implementation, and asset allocation. While the process is different for each organization, in general an asset allocation structure is developed and weighted by considering each asset class's expected return, volatility and correlation with other asset classes. The pension fund's investment office, usually in consultation with its board and external investment consultants, then combines these asset classes in ways that could provide the highest expected returns for a level of risk, subject to liquidity and diversification constraints.ⁱⁱ

Asset Allocation and Investment Performance

Asset allocation is widely accepted across industry and academia as a critical driver of fund performance.ⁱⁱⁱ A study often cited on this topic was released by Brinson, Hood and Beebower in 1986 and argues that 93.6% of the variation in quarterly returns for a typical large fund can be attributed to their asset allocation.^{iv} In 1994, Jack Bogle, the founder of the Vanguard Group, noted that "the most fundamental decision of investing is the allocation of your assets. How much should you own in stocks? How much should you own in bonds? How much should you own in cash reserves? This decision has accounted for 94 percent of the differences in total returns achieved by institutionally managed pension funds."^v Other studies, such as Ibbotson, Roger G., and Kaplan, Paul D. argue that a fund's allocation roughly accounts for 40% of the variance among funds.^{vi}

While the magnitude of impact of asset allocation is still up for debate, most academics and industry experts agree that "asset allocation is the most important decision for any pension fund and that there is no right or wrong way of determining asset allocation. In the end it is a question of finding the best solution to a set of constraints, some implicit (fund structure) and some explicit (legislation)."^{vii}

Given the relevance of asset allocation to a fund's performance, it is crucial that pension funds design appropriate strategies that consider the asset diversification needed to respond to their individual objectives and constraints. Diversification of assets is important because it enables funds to reduce or spread risk while maintaining expectations of returns. Asset classes do not produce the same results in particular economic contexts; therefore, funds must diversify their investments to help reduce overall volatility.

Funds must also continuously revisit and adapt their asset allocation plans. This is particularly important when considering how pension funds have shifted their investments over the past two decades.

2.3.2 Investment Performance Literature Review

Absolute Investment Performance

A fund's investment performance is usually assessed in two ways. The first is a comparison of the fund's actual returns against the fund's benchmark returns. This view helps to assess the plan's ability to execute their investment strategy (*i.e.*, beat their benchmark returns and add value). The second method of assessment consists of a comparison of investment returns across similar plans, both at the total fund level and for the various asset classes in which the plans invest. This second method helps to determine the relative performance of a fund against other similar players in the market.

These two assessments are usually performed for absolute returns and risk-adjusted returns. An absolute return is simply what an asset or portfolio returns over a certain

period of time. This measure looks at the appreciation or depreciation of an asset expressed as a percentage. For example, if a stock or bond returns 10% in a certain year, that is the absolute return.

Risk-adjusted returns is a measure that helps investors assess how an asset has performed relative to the amount of risk the investment has taken over a period of time.^{viii} This is important when comparing different investments because, if two or more assets have the same return over a given period of time, the one with the lowest risk will have better risk-adjusted returns and therefore could be more attractive for investors looking to maximize returns while minimizing risk.

Investment Risk and Risk-Adjusted Performance

Investment risk is commonly defined as volatility of security returns or changes in asset prices. Investors must be compensated by return for the risk that they assume, but there are various dimensions of portfolio risk that investors need to consider. Investment risk can be a function of either allocations to market risk factor exposures or active management decisions, deviating from a representative single index or multi-asset benchmark. As mentioned, portfolio asset allocation is the most significant decision that affects long-term appreciation, and thus must be aligned with not only investors' investment objectives, but also their risk tolerance. It is important to note that all performance ratios and risk measures can be historically representative, but past performance may be inconsistent or even misleading predictors of future return and/or risk.

Risk-adjusted performance is an effective way to compare different portfolio strategies from within asset classes to strategic allocation policies of multi-asset funds. Investors focus over various time horizons on total returns as well as active returns or value added in excess of index benchmarks net of costs and fees. Below we discuss the use of various risk-oriented statistics that can be useful for evaluating both total return and value added at the total fund or individual strategy level, as well as how portfolio diversification improves performance efficiency, as described in Modern Portfolio Theory. Finally, we highlight some practical assumptions and challenges related to performance measurement, portfolio attribution, and risk management that can be critical to achieving successful outcomes relative to investment objectives.

The likelihood of achieving or exceeding an expected return over a given time horizon is a function of its risk factor exposures (asset allocation) and specific or idiosyncratic risk (security selection). Just as a portfolio of securities can diversify company or issuer specific risk, a portfolio of different asset classes (i.e., equities, bonds, alternative assets, etc.) and across countries, sectors, currencies, industries, investment styles, or capitalization size, for example, can diversify market risk factors or systematic risks. Similarly, we can adjust cumulative active performance or value-added returns (excess return versus a similar representative index or benchmark) by tracking error (standard deviation of excess return) to evaluate performance between different strategies.

Academic literature has repeatedly confirmed the need to manage investment risk, as well as the importance of asset allocation to achieving desired investment objectives to more recent studies that reinforce the need to appropriately classify risk.^{ix}

All investments involve various types of risk; thus, assessing investment risk is critical to performance evaluation and attribution. There is no guarantee any particular asset allocation or investment mix will achieve or exceed given return objectives over any particular time horizon. Adverse fluctuations in the financial markets may not affect the inherent value of investments, but misunderstanding risk inherent in particular portfolio holdings may be inconsistent with an investor's risk tolerance, resulting in adverse behavior with respect to future investment decisions.

By risk-adjusting investment performance, one can compare total and active management performance of different strategies or investment allocations more effectively. Risk-adjusted returns also help management to make strategic organizational decisions for a fund.

Although the importance of measuring risk-adjusted performance is widely recognized, different methods exist through which to do so. A common set of measures used across the investment management industry are the Sharpe Ratio, the Sortino Ratio, and the Information Ratio.

The Sharpe Ratio, derived by Nobel laureate William F. Sharpe, calculates a fund's risk-adjusted return—the ratio discounts a fund's investment returns based on the risk taken on by that fund. The Sharpe Ratio is the annualized absolute investment return earned minus a risk-free rate divided by the standard deviation of the absolute return. Through this formula, the Sharpe ratio provides investors with the return a fund earns in excess of a risk-free rate, per unit of volatility (the higher the rate the better the performance on a risk-adjusted basis). While today many institutional investors use the Sharpe Ratio to examine risk-adjusted performance, a look at other measures is important in identifying some of the approaches, advantages, and limitations. The Sharpe ratio focuses on comparing a risk-free asset to measure both the combined riskiness of the fund's asset allocation, choice of security selection, and risk factor or systematic market exposures. It can also be used to compare underlying strategies or relative efficiency of different asset classes or indices.

The Information Ratio is another way of measuring performance efficiency, but focused on active or tactical management of a given strategy or portfolio. The approach is similar to other efficiency ratios of return versus risk, but here the excess return is calculated versus a similar benchmark index, rather than the risk-free rate used in the Sharpe ratio. Moreover, this excess return is divided by the standard deviation of the excess return, also known as tracking error. While the information ratio allows analysts to look at how well a fund has done relative to its benchmarks, it is important that the selected benchmark index chosen is similar and comparable to the strategy's risk profile. A benefit of information ratios is that comparable benchmarks may be either systematic

indices or peer group composite returns, but benchmark selection also can be misleading if the choice is biased (low hurdle) or inconsistent with the strategy being evaluated.

Investors utilize the Sharpe Ratio to examine risk-adjusted performance of individual strategies of multi-asset fund portfolios.^x However, there are certain challenges and limitations that are noteworthy, whether calculating the Sharpe Ratio, Information Ratio, Performance Attribution, or other statistical characteristics of individual strategies or fund portfolio performance. One challenge of any statistical calculation is having a reasonable and representative sample size. In the special case of asset management, the period should be long enough to span at least one business or investment cycle, which can vary from 5 to 10 years or even longer, as observed recently. Thus, observation frequency over a given period becomes important, governing the sample size for the comparison of both risk and return. Another important consideration is the assumption that investment returns are normally and independently distributed, but we know that asset return distributions tend to be skewed with fat tails, and returns are hardly independent given non-zero correlations between asset class returns.

We know investors are more risk-averse to losses; thus, if the Sharpe Ratio uses the simple standard deviation of returns, this calculation does not differentiate between upside versus downside risk. For example, the Sortino ratio (Frank Sortino) is similar in construction to the Sharpe Ratio, except it subtracts a target return from net return. In addition, instead of dividing by the standard deviation of returns, risk is evaluated as the downside variability or standard deviation of “0” or underperformance versus the target return. This statistic seeks to measure the standard deviation of only negative excess returns, thus downside risk. Studies such as Rollinger & Hoffman suggest investors should consider downside volatility of returns or “bad” volatility, rather than upside or “good” volatility.^{xi} For example, if a fund experiences an extraordinary positive total or excess return, Sharpe or Information Ratios are adversely penalized for such inconsistency, albeit welcomed by investors. The Sortino Ratio is therefore a complementary performance statistic that can be worth evaluating, as well, although it too will be subject to sample size concerns, if not more so than the Sharpe Ratio if downside frequency is materially less than upside frequency. Assuming total and excess returns are normal again may cause bias in Sortino Ratio calculations if positive returns are skewed or biased by significant outliers.

As discussed, a key challenge with these statistical performance ratios or measures is that investment returns are not normally distributed, which can bias these calculations. Research suggests this effect may be less pronounced for public listed markets evaluated over longer periods of time. Private markets and private funds are subject to capacity constraints (including higher cash drag), limited mark-to-market frequency (annually or quarterly), pricing uncertainty, and illiquidity that can adversely bias risk measures of volatility and correlation of hedge funds and real estate to venture capital, private equity, private debt, infrastructure, and even some derivative or option-based (hedging or speculative) strategies, where returns depart from a more normal return distribution.^{xii} In 2012, the *Journal of Risk*, as one of many for example, outlined how a Sharpe Ratio may overstate the performance of hedge funds, which exhibit a specific type of non-normal

distribution.^{xiii} Thus, statistical performance ratio analysis may be more appropriate to evaluate public market strategies, which are more normally distributed.^{xiv}

Despite the challenges and limitations, statistical performance ratios are still widely used by investors across a wide range of different investment strategies, asset classes and multi-asset portfolios for comparative analysis. For example, the OECD and World Bank conducting a wide ranging performance analysis of pension funds worldwide concluded that, while there are concerns with regard to specific methodologies as applied to *individual* strategies, “one can meaningfully assess, using Sharpe ratios, whether the different pension systems have obtained a risk premium or have beaten their own benchmarks or low risk preferences.”^{xv} In other words, the cross-sectional universe of investment outcomes appears more normally distributed than time-series evaluations of individual strategies versus non-normal asset class returns. We conclude that the Sharpe ratio and other statistical performance analytical tools are effective in quantitatively comparing strategies and portfolios relative to peer groups or index benchmarks with a good understanding of some shortcomings, concerns, and potential ways to bias any evaluation.

Furthermore, we suggest that a range of measures provides a more useful and robust relative analysis in comparing investment performance. Data for performance analysis or security prices is too often insufficient for statistical significance, but experience and intuition may help overcome such limitations caused by limited data frequency or time period, assuming the underlying strategies are consistently implemented and security prices reflect market values. Finally, private market investments introduce various uncertainties, including infrequent limited mark-to-market pricing, which should not be mistaken for greater diversification effects or lower risk than is reasonable to assume for smaller company or illiquid securities.

2.3.3 Benchmarks Literature Review

Benchmarks allow investors to assess their performance against specific measures in the market that reflect their investment preferences. Moreover, they allow for an assessment of performance that focuses on each investor's ability to execute their own investment strategy and objectives.

Benchmarks at the portfolio level generally reflect a plan's asset allocation. They are rooted in the plan's objectives and help define investment direction, risk tolerance, as well as the strategic role of individual asset classes. They might also be influenced by regulation (*e.g.*, minimum funding requirements) and accounting standards.^{xvi}

There are two main types of asset class benchmarks. The first is external asset-class benchmarks, which set a benchmark for the fund's performance in that asset class. The second consists of peer-group benchmarks, which compare an individual fund to other similar funds.^{xvii}

Pension fund benchmarks are typically a combination of market indices weighted by the specific benchmark allocation of the fund.^{xviii} The most commonly used indices aim to cover the investable universe in an asset class and weigh the different securities included in the index on the basis of their market value.^{xix}

Focusing on benchmarks as part of a fund's assessment is important because a chosen benchmark or set of benchmarks can influence the investment strategy of a fund. For example, selecting a very high benchmark for the total portfolio could create incentives for a pension fund to increase their allocations towards riskier asset classes like hedge funds or private equity and increase their risk profile in order to try to outperform that benchmark. A benchmark can also influence the means through which a pension fund invests. For example, if a pension fund is looking to cut external management costs, it could select a benchmark that is more easily achievable by its own internal financial managers, rather than with the support of external managers.

Benchmarks can also be used to disguise underperformance. As Ania Zalewska argues in a wide-ranging study of over 4,500 pension funds in the UK, several funds may be exaggerating their performance by selecting benchmarks that are easy to outperform.^{xx} The study suggests that pension fund benchmarks may not always truly reflect a fund's investment profile, as they can create a spurious impression of good performance. Therefore, as illustrated above, it is important to compare the absolute and relative performance of an individual fund against its benchmarks, as well as to its peers.

2.3.4 Discount Rate Literature Review

The discount rate is crucial for guiding investment decisions because it reflects what the plan's assets can reasonably be expected to return over the long term. In other words, the discount ratio is the rate at which pension funds expect their portfolios to appreciate over the long term. It is used to discount future benefits payments (liabilities for the pension fund) to calculate what contributions are required today.^{xxi}

The theoretical basis for selecting discount rates to calculate liabilities varies among plans and is subject to ongoing debate.^{xxii} Nevertheless, the assumptions behind discount rate calculations must be robust to avoid negatively impacting current pension plan members and future retirees. For example, if a discount rate assumption is too high and investments earn less returns than expected, a pension plan could face a funding shortfall and therefore require younger or future beneficiaries to contribute more to the plan today, distribute lower benefits to retirees, or both. If a discount rate assumption is too low, current members could be forced to pay more than necessary or benefits could be reduced more than necessary. The discount rate is therefore a key calculation that will impact the investment decisions of the organization and the benefits and contributions that plan members will be subject to over time.

Overall, the most important determinant of discount rate sensitivity is the mix of active and retired plan members.^{xxiii} However, a fund's asset mix is also an important consideration and boards and management usually conduct studies to ensure that their

plans' target asset mix can lead to allocations that optimize the plan's ability to meet their discount rate. The discount rate therefore is a key determinant of a fund's asset allocation strategy.

According to the National Association of State Retirement Administrators, most public pension plans in the U.S. use a discount rate of between 7% and 8%, with an average of 7.6%.^{xxiv} It is outside the scope of this study to scrutinize the discount rate used by SERS, PSERS, and the peer group. Instead we take the discount rate as a given and approach our analysis with this assumption.

2.3.5 Funded Status Literature Review

The funded status of a pension fund compares its assets against its liabilities. There are two main factors that determine the funded status of pension plans: the payment of annual required contributions by plan sponsors and investment returns earned on pension fund assets.^{xxv} Most public pension funds rely heavily on investment returns to fund future benefits; therefore, a key component of their long-term sustainability is their ability to achieve adequate returns.

Most public pension plans face significant challenges with their funded status. Bloomberg recently reported that of the 200 largest defined-benefit plans in the S&P 500 based on assets, 186 are not fully funded.^{xxvi} In other words, 93% of these large defined-benefit plans do not currently have enough money to fund current and future retirees within their plans. Poor asset returns post-financial crises and throughout the low interest rate environment are often cited as major reasons for this.

This relationship between asset allocation and funded status is dependent on various factors like types of liabilities and liabilities terms. To contextualize some of the insights from this report, it should be noted that, in general, plans tend to become more risk averse as their funded status improves.^{xxvii} However, as this set of chapters will illustrate, this can translate into diverse asset allocation strategies.

A recent report of Fortune 1000 pension plans illustrates that "plans whose funded status ranged between 80% and 99% generally held less public equities and more debt than their less funded counterparts, suggesting that return/higher-risk investments become less attractive as a plan nears full funding."^{xxviii} However, this was not true for funds whose funded status was 100% or higher. Through a more granular data analysis, the authors found that among plans with a funded status between 90% and 99%, more than half the assets were invested in fixed income and cash.^{xxix} These insights are consistent from an earlier study from the Society of Actuaries, which illustrates that "plans that are 100% funded . . . tend to get less equity."^{xxx} It should be noted, however, that actual allocation decisions depend on various other factors that have been discussed previously.

Table 2.1 Willis Towers Watson Fortune 1000 Average Asset Allocations by Plan Funded Status (2016)

ASSET CLASS	FUNDED STATUS				
	LESS THAN 70%	70% TO 79%	80% TO 89%	90% TO 99%	100% OR MORE
Cash	2.7%	2.5%	2.8%	3.5%	2.3%
Debt	38.5%	42.2%	44.7%	49.9%	43.2%
Equity	48.3%	44.5%	41.2%	40.0%	47.3%
Hedge funds	3.5%	3.3%	2.9%	0.8%	0.2%
Other	3.4%	3.3%	3.2%	2.4%	4.4%
Private equity	1.5%	2.0%	3.0%	1.5%	1.5%
Real estate	2.1%	2.3%	2.2%	1.9%	1.2%
Total %	100%	100%	100%	100%	100%
N	78	126	111	62	26

Source: Aguirre and McFarland 2018

2.4 Context and Approach

Having provided a brief literature review and an overview of key pension fund characteristics that will influence asset allocation decisions, this section moves into describing the approach, methodology, and data used for this assessment. It also provides a brief description of the main challenges associated with the performance of the asset allocation and investment performance analysis.

2.4.1 Approach and Methodology

Considering the project objectives and data required for the assessment of asset allocation and investment performance across pension funds, the research team designed a tailored analytical approach that leveraged common practices from the fields of strategy and investment management. The approach was reviewed by project staff prior to the launch of the project to validate that rigor had been applied across every project stage to ensure that the data and funds selected would provide objective and valuable insights.

The project consisted of three main phases. Phase 1 focused on defining the scope and focus of the analysis and identifying peers that are comparable to SERS and PSERS through an established set of criteria. The second phase focused on exploring data sources and gathering and validating data against individual final reports. In this phase, the research team also defined an analytical framework to guide the future peer analysis. The

final phase focused on performing the analysis and generating insights. For more information on the project approach, refer to the appendix.

Below is a summary of the methodology used to define the peer group selection criteria, the peer group selection process, and the asset allocation and investment performance analysis.

Peer Group Selection Criteria – Candidate funds for the peer group were screened and selected against five main criteria elements.

- **Size:** Funds of a comparable size to SERS/PSERS (+/- \$20B from SERS' \$29.1B and PSERS' \$53.2B as of 2017).
- **Discount Ratio:** Funds with a similar discount ratio to SERS/PSERS' 7.25%.
- **Net Reporting Data:** Given that both SERS and PSERS report Net performance in their annual reports, funds that reported Gross performance or a combination of Gross and Net were removed from the peer group.
- **Fiscal Year End Dates:** Given that ~75% of U.S. Public Pension plans have a fiscal year end date of June 30th, funds with September and December fiscal year end dates were removed. SERS has a December 31st fiscal year end date and therefore Q2 2017 data was incorporated for this fund in order to normalize the time period with the other funds in the peer group.

These criteria were selected with the intent of establishing a set of peers for comparison that had similar characteristics to SERS and PSERS.

The appetite for selecting funds that were both smaller and larger (+/- \$20B) than SERS and PSERS was also driven by the fact that, despite a common narrative that larger plans perform better than small plans due to economies of scale, smaller plans have also proven to outperform larger plans.^{xxxix} Therefore, the peer group consists of plans that are similar enough in size to SERS and PSERS to control for the heterogeneity of the pension fund universe, but also with enough variability that could provide insights into differences in performance.

Table 2.2 below illustrates the final peer group selected for assessment, which is composed of U.S. state and local public pension plans. While there is a wide distribution in terms of pension fund assets (\$11B South Dakota to \$71B Georgia Teachers), SERS and PSERS rank towards the middle of the group in terms of size. Discount Rates range from 6.5% to 7.5%, with an overall peer group average of 7.2%. Funded Ratios vary widely across the group, with funds like South Dakota having a 100% funded ratio or Iowa PERS and LA County at 81% and 80%, respectively, to lower-funded funds like PSERS at 56% and SERS at 59%, or Illinois Teachers at 40%. Finally, it is important to highlight that except for SERS, all other funds in the peer group have a June 30th fiscal year end date. As previously described, this difference in fiscal year end date was corrected for in the analysis.

Table 2.2 Peer Group

Plan	Net Assets FY17 (000s)	FY17 Discount Rate	Funded Ratio	Fiscal Year End Date
Georgia Teachers	\$71,340,972	7.50%	74%	June 30 th
Virginia RS	\$70,159,680	7.00%	77%	June 30 th
Oregon PERS	\$66,371,703	7.20%	75%	June 30 th
Pennsylvania PSERS	\$53,155,336	7.25%	56%	June 30 th
LA County ERS	\$52,225,457	7.38%	80%	June 30 th
Illinois Teachers	\$49,375,665	7.50%	40%	June 30 th
Arizona SRS	\$36,202,756	7.50%	71%	June 30 th
Iowa PERS	\$30,779,116	7.00%	81%	June 30 th
Pennsylvania SERS	\$27,934,000	7.25%	59%	December 31 st
New Mexico Educational	\$12,509,356	7.25%	63%	June 30 th
South Dakota RS	\$11,644,039	6.50%	100%	June 30 th

Source: Public Plans Database (PPD) 2018

Asset Allocation Analysis - The asset allocation analysis examined the peer group's actual allocations across asset classes for the 2008-2017 period. The asset classes included in the analysis were drawn from data available from the Public Plans Database (see next section for more information on data sources) and consisted of seven major categories: equity, fixed income, real estate, private equity, hedge funds, commodities and cash. Funds within the peer group were first individually assessed to determine the extent to which their actual asset allocations reflected their target asset allocation, as well as how their portfolio asset class mix changed over time. Insights from these individual assessments were then used to compare SERS and PSERS against other funds in the peer group.

Investment Performance Analysis - The Investment Performance analysis consisted of two main components: an absolute performance assessment and a risk-adjusted assessment. While the absolute performance analysis leveraged the data from the Public Plans Database, the risk-adjusted performance incorporated additional inputs required for the calculation of the Sharpe Ratio and Information Ratio.

The absolute performance assessment looked at fund investment returns at both the total portfolio level, as well as for individual asset classes, and examined 2017 investment returns and three-, five-, and ten-year compounded absolute returns. Absolute performance was also assessed against each fund's benchmarks at the total portfolio level, as well as asset class specific benchmarks.

Recognizing that an in-depth assessment of investment performance requires the analysis of the risks that underlie a fund's absolute investment returns, the research team utilized the Sharpe Ratio and Information Ratio to calculate risk-adjusted returns. The analysis on risk-adjusted performance was carried out on the two funds themselves and not the entire

peer group. This was due to lack of access to the necessary data from the peer group to achieve statistically significant risk-adjusted performance results.

2.4.2 Data and Constraints

Project Data Source

Considering both the composition of the peer group and the project objectives, the Public Plans Database (PPD) was selected as the main data source for analysis. The PPD database has been developed and is maintained by the Center for Retirement Research at Boston College. It contains annual data on the largest state and local pensions in the U.S. from 2001 and 2017. Overall, the database includes 180 plans (114 state-run and 66 locally-run) which account for 95% of state and local pension assets and members in the U.S.^{xxxii}

The database includes investment performance for each plan's overall portfolio as well as for individual asset classes. The PPD database sources its data from each plan's Comprehensive Annual Financial Report (CAFR) and other investment reports and manually aggregates the data with staff from the Center for Retirement Research.

The PPD database was selected because it has been used widely across academic research and contains the data elements that were required for the asset allocation and investment performance analysis of this assessment. To validate the accuracy of the data, an extensive audit was carried out of the PPD database against the annual reports of the funds in the peer group.

Challenges and Constraints

Prior to introducing insights from the assessment, a few comments on challenges and constraints are in order. The following describes the five major challenges and constraints faced by the authors throughout the execution of the project, as well as details of how these were addressed throughout the analysis.

Heterogeneity of the pension fund universe -The pension fund space is far from homogeneous. While most U.S. state and local government pension plans are defined-benefit plans, significant differences exist in the structure, short- and long-term goals, costs, and investment strategies of these funds. These differences make an "apples to apples" comparison of investment performance across pension funds a challenging exercise. However, to help overcome this challenge, the research team developed, validated, and applied the selection criteria described above to identify those funds that are most comparable to both SERS and PSERS and for which data was readily and comprehensively available.

There is no established methodology for performing asset allocation and investment performance assessments – Industry research and interviews with practitioners confirmed that there is no established process or methodology for performing asset

allocation and performance assessments for pension funds. Moreover, as a World Bank-OECD 2010 publication suggests, pension fund performance globally is often measured by tools that focus on short-term market gains rather than what pension funds were designed to do—provide stable and sufficient income to its members in retirement.^{xxxiii} The research team addressed this challenge by ensuring that the data and measures selected would provide insights on long-term performance (10-year annualized returns) and validated the tailored approach with industry practitioners and the project team.

Data transparency and availability – Public pension funds in the U.S. are required to file Comprehensive Annual Financial Reports. However, pension funds deploy diverse investment strategies across multiple asset classes, and the way asset allocations and performance are reported lacks standardization, which creates significant challenges for conducting longitudinal comparisons between pension funds. Thus, the type, level, and quality of data that is published and publicly availability for analysis varies widely. This is true not only across pension funds, but also for specific pension funds across time.

It is not uncommon for a pension fund to change how it categorizes or reports a certain asset class across different years or even within the same year. For example, Table 2.3 and Table 2.4 below illustrate how SERS reported Asset Allocation in 2015 and 2017 respectively. As it can be observed, the only consistency in naming of asset classes between both years is for Global Public Equity and Fixed Income.

Table 2.3 Pennsylvania SERS' Asset Allocation Reporting (2015)

Asset Allocation			
(\$ millions)			
Asset Class	Market Exposure ^{1/}	% of Total Fund	Long-Term 10-Year Strategic Target
Alternative Investments	\$4,683.4	18.0%	15.0%
Global Public Equity	10,046.7	38.7	40.0
Real Assets	3,590.7	13.8	17.0
Diversifying Assets	1,673.3	6.4	10.0
Fixed Income	4,285.2	16.5	15.0
Liquidity Reserve	1,703.9	6.6	3.0
Total Fund	\$25,983.2	100.0%	100.0%

Source: SERS Comprehensive Annual Financial Report (CAFR) 2017

Table 2.4 Pennsylvania SERS' Asset Allocation Reporting (2017)

Asset Allocation

(\$ millions)

Asset Class	Market Exposure ^{4/}	% of Total Fund	Long-Term 10-Year Strategic Target
Private Equity	\$4,077.5	13.9%	16.0%
Global Public Equity	15,505.3	53.0	43.0
Real Estate	2,207.4	7.5	12.0
Multi-Strategy	2,121.4	7.2	12.0
Legacy Hedge Funds	191.0	0.7	0.0
Fixed Income	4,238.2	14.5	14.0
Cash	948.4	3.2	3.0
Total Fund	\$29,289.2	100.0%	100.0%

^{4/}Includes securities, cash, and accruals.

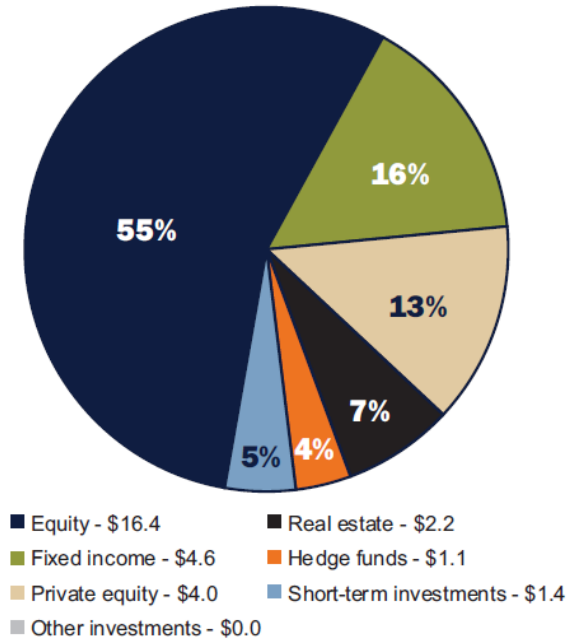
Source: SERS Comprehensive Annual Financial Report (CAFR) 2017

When incorporating Figure 2.1, a view of investments at fair value for 2017, which was sourced from the same annual report document, we further see the challenges of pension fund reporting as the breakdown of assets is presented with different terminology (*e.g.*, Global Public Equity vs. Equity) and the figures are similar but don't exactly match those reported earlier in the report (*e.g.*, Global Public Equity 53% vs. Equity 55% or Fixed Income 14.5% vs. Fixed Income 16%).

Figure 2.1 Pennsylvania SERS Reporting of Investments at Fair Value (2017)

Investments at Fair Value (2017)

(\$ billions)



Source: SERS Comprehensive Annual Financial Report (CAFR) 2017

It is important to reiterate that the research team worked primarily with publicly available data for this assessment. As discussed elsewhere in this set of chapters, the authors were not granted full access to the plans' data for this analysis. Therefore, differences could exist between this report's inputs and findings, and those commissioned by pension funds from private consulting groups, which often have access to more updated and detailed data, as well as access to the individual pension teams and staff making asset allocation and investment performance decisions.

Rationalization of asset classes - Not all pension funds invest in the same asset classes, and even when they do have similar investments, there are differences in how they categorize their asset classes. Further to the example from SERS above, the research team identified that, for example, Nevada PERS incorporates Private Equity and Real Estate into an overall "Private Markets" category, while other funds categorize them independently. Another example can be drawn from Mississippi PERS, which breaks down Equity investments into US Equity, International Equity, and Global Equity. This contrasts with other funds, some of which categorize Equity into US Equity and International Equity, while others simply aggregate all these investments into an Equity category.

Another consideration is how pension funds report Cash investments. The team's analysis identified that various funds roll-up their Cash investments into Fixed Income, while others report it separately. Those that roll-up Cash into Fixed Income often only do so for

asset allocation, but there is often no information available for Cash benchmarks of investment returns.

It is important to note that some improvements are being made towards the rationalization of asset classes. For example, one of SERS' strategic initiatives for 2016-2017 was to "improve transparency and efficiency of managing assets by eliminating SERS' specific terminology and renaming asset classes according to common industry conventions with similar risk/return profiles."^{xxxiv}

To overcome the naming convention and rationalization challenge and ensure there was an "apples to apples" comparison, the team leveraged the PPD Database, which has rationalized investment categories for 180 plans across the 9 major asset classes mentioned above. The major asset classes presented in the PPD data are generated from the specific asset classes that plans report. PPD also provides access to the raw investment data reported by plans.^{xxxv} An added advantage of leveraging the PPD data is that once there is a data refresh, individual pension funds are contacted by the Center for Retirement Research to validate how their data is represented in the PPD and provide feedback as appropriate.

Differences in reporting cycles - As was previously described, pension funds have different fiscal year end dates and therefore different reporting cycles. For example, PSERS' fiscal year ends on June 30th, while SERS' fiscal year ends on December 31st. The lack of consistency in reporting and fiscal year end dates eliminated various potential funds from the peer group. To ensure the analysis of SERS covered a similar period to the rest of the peer group, the research team sourced Q2 2017 data from a performance report provided to the Commission and incorporated it as the overall 2017 data for SERS.

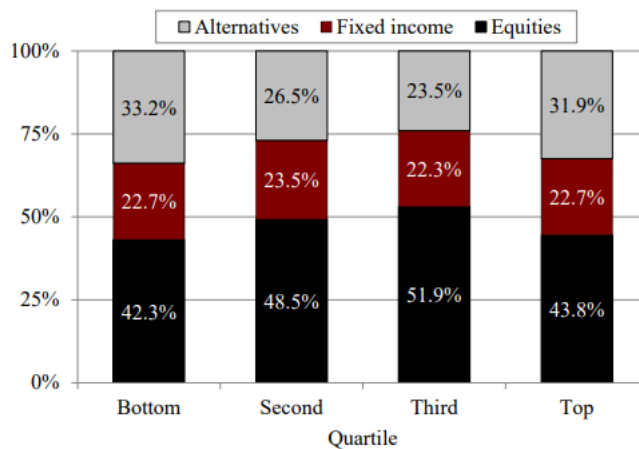
2.5 Pension Fund Asset Allocation and Investment Performance Trends

Prior to illustrating the asset allocation and investment performance of SERS and PSERS relative to the peer group, this section will provide a brief overview of U.S. public pension trends in the market.

At a high-level the asset allocation of most U.S. public pension plans has been relatively similar since 2000. A recent study published by the Center for Retirement Research looked at data collected from Comprehensive Annual Financial Reports of over 60 U.S. state and local pension plans between 2001 and 2016 and reveals various similarities and trends in the current and historical asset allocation of these funds.^{xxxvi}

As Figure 2.2 below illustrates, in 2016 most pension plans (divided across four performance categories or "quartiles") had similar splits of equity, fixed income, and alternative investments.

Figure 2.2 Asset Allocation for State and Local Pension Plans 2016

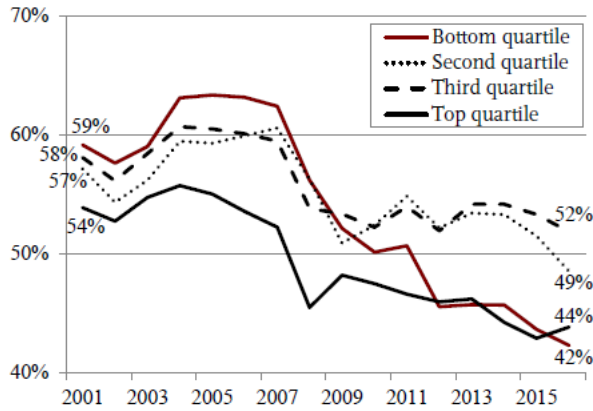


Source: Aubrey, Chen, et al., 2018

This current allocation, however, represents a significant shift from how these funds invested in 2000. Findings from this research indicate that, in general, most public plans in the U.S. have diversified their assets away from equities and fixed income and into alternatives like real estate, hedge funds, and private equity.

Figure 2.3 and Figure 2.4 illustrate this shift away from equity and fixed income, which followed the precipitous drop in values during the financial crisis in these asset classes compared to alternative investments.

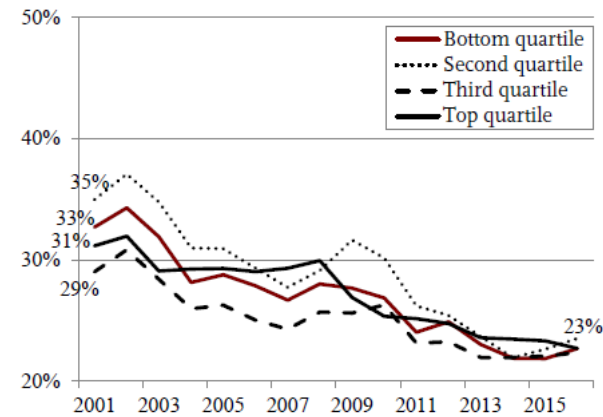
Figure 2.3 Allocation to Equities over time



Source: Authors' calculations from the PPD (2001-2016).

Source: Aubrey, Chen, et al., 2018

Figure 2.4 Fixed Income Allocations over time

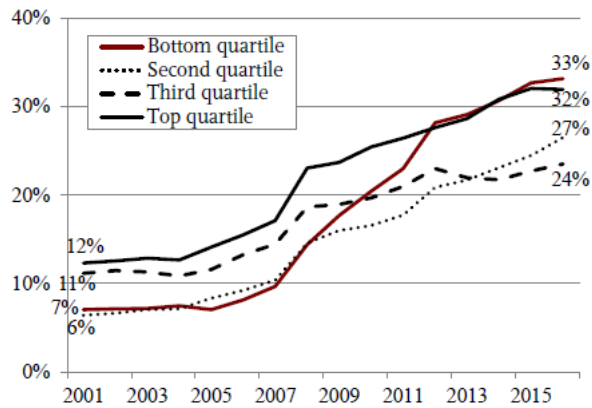


Source: Authors' calculations from the PPD (2001-2016).

Source: Aubrey, Chen, et al., 2018

The reverse trend can be observed in Figure 2.5 below, with funds across all quartiles more than tripling their investments in alternatives between 2001 and 2006. It is important to note that this trend remained even as the stock market recovered after the Great Recession in 2008, which suggests that pension funds deliberately chose to continue deploying more alternative-heavy asset allocation strategies.

Figure 2.5 Allocation to Alternatives 2001-2016



Source: Authors' calculations from the PPD (2001-2016).

Source: Aubrey, Chen, et al., 2018

This shift reflects pension funds' search for greater yields in a low growth environment beyond traditional stocks and bonds, which can be seen in Table 2.5 below.

Table 2.5 Asset Class Returns (2001-2016)

Asset class	Top	Third	Second	Bottom
Public equities	6.2%	5.1%	4.1%	4.1%
Fixed income	6.2	6.2	6.3	6.1
Alternatives				
Private equity	8.8	8.5	6.6	8.5
Hedge funds	5.7	4.5	6.3	5.0
Real estate	10.2	9.3	8.2	7.0
Commodities	5.0	6.6	-2.8	4.8

Source: Aubrey, Chen, et al., 2018

The move into alternative asset classes, however, also brings with it additional challenges and considerations for investors. To begin with, in general, alternative investments represent riskier and more illiquid investments than traditional equity and fixed income. The illiquid nature of these asset classes can pose greater risks and constraints for pension funds, which require constant liquidity for liability payments. Moreover, alternative investments are usually also more complex, and investors may not always fully understand the nature of the investments and their associated risks.^{xxxvii} Finally, these asset classes will also usually be associated with higher fees from investment managers.

Although pension funds largely moved in sync towards alternative asset classes, important differences do exist in the types of alternatives selected by these funds. The Center for Retirement Research indicates that funds in the bottom quartile have invested more in commodities and hedge funds and less in private equity and real estate. In contrast, those in the second and third quartiles hold more assets in real estate, hedge

funds, and private equity. These are important differences given that these assets have generally led to different returns over time, which directly affects the overall performance of pension funds.

Table 2.6 illustrates the annualized average returns for each of these alternative asset classes between 2000 and 2016 and how they compare against traditional equity. As it can be observed, real estate and private equity generally performed better over time than hedge funds and commodities. These differences illustrate that although asset allocation could differ slightly, the returns of specific asset classes could have large implications for returns over time.

Another important insight to note is the rebound of traditional equity. While this asset class was severely affected by the global financial crisis in 2008 and 2009, with losses of -21.3%, traditional equities bounced back between 2010 and 2016 for returns of 14.9%. This is crucial because the upswing occurred while U.S. pension funds began reallocating their portfolios and maintained higher allocations towards alternative asset classes, which indicates that if these alternative asset classes performed worse than traditional equity towards the second half of the period, then the diversification strategy may not have been as fruitful as originally planned.

Table 2.6 Returns from Alternative Asset Classes and Traditional Equities (2000-2016)

Asset class	2000-2007	2008-2009	2010-2016
Private equity (before fees)	14.6 %	-13.0%	25.0 %
Hedge funds (after fees)	10.7	-10.9	1.3
Real estate (before fees)	14.5	-6.3	12.1
Commodities (after fees)	16.2	-4.1	-3.0
Traditional equity	2.7	-21.3	14.9

Sources: Authors' calculations based on Thomson Reuters Private Equity Index, Hedge Fund Research Global Hedge Fund Index, NCREIF Property Index, S&P GSCI Index, and Wilshire 5000 Index (Total Return).

Source: Aubrey, Chen, et al., 2017

In summary, U.S. pension funds have reallocated their portfolios away from equity and fixed income in favor of riskier alternative investments in search of greater yields and greater portfolio diversification. The magnitude of these greater yields, however, has been dependent on which specific alternative investments these pension funds have moved into and how well the funds have managed the associated risks/manager selection and monitoring. As the following two sections illustrate, this has had a significant impact in performance for SERS, PSERS, and funds within the peer group.

2.6 Asset Allocation Analysis

As has been previously discussed, asset allocation is a strong determinant of fund performance and the asset allocation of most U.S. public pension plans has been quite

similar since 2000. This section will therefore explore how SERS, PSERS and funds in the peer group have made asset allocation decisions that have influenced investment performance over time.

This section will begin by assessing the current asset allocation of SERS, PSERS and funds from the peer group, including how they allocate assets to liquid and illiquid asset classes. It will then move into how the asset allocation of these funds has shifted over time and illustrate how SERS and PSERS have followed opposite trends across time. It will end with a synthesis that includes more general considerations.

2.6.1 Asset Allocation Assessments

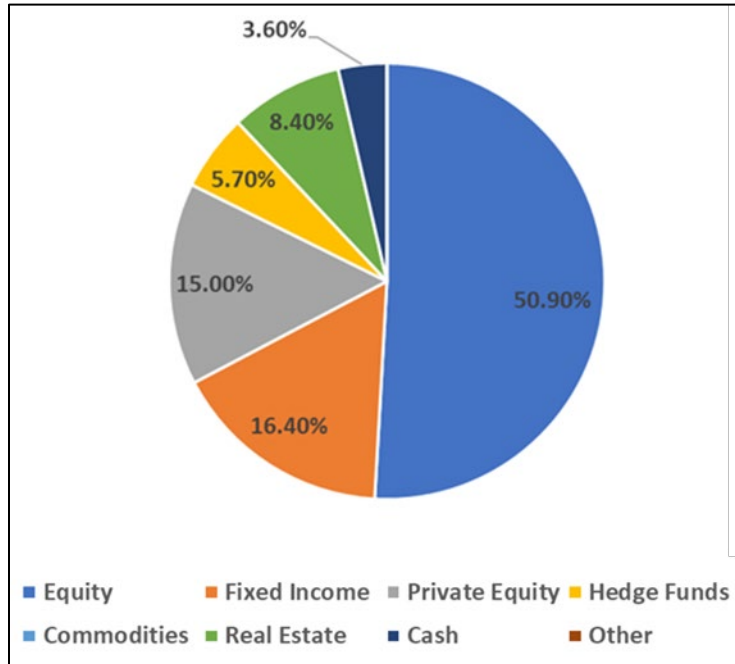
When considering asset allocation trends of the pension fund industry and more specifically the selected peer group, we can observe that SERS and PSERS have followed different and at times opposing strategies.

To develop its strategic investment plan, SERS relies on its internal investment professionals and works with consultants to "analyze major quantitative and qualitative factors—including the unique needs, preferences, objectives, and constraints of [the] pension plan and expected long-term market conditions."^{xxxviii} In developing long-term asset allocation policy targets, SERS' investment teams consider:

- Maintaining an appropriate level of cash to pay retirement benefits and covenants during prolonged periods of market decline and potential state budgetary constraints;
- Improving the liquidity profile of the total fund to align with the projected increase in retirement benefits payments; and,
- Pursuing the highest returns possible at the level of risk deemed prudent by SERS' board.^{xxxix}

In terms of current asset allocation, as Figure 2.6 illustrates, in 2017 SERS had a diversified asset allocation strategy with investments in equity, fixed income, private equity, hedge funds, real estate, and cash. SERS' two largest asset classes were equity at 50.9% and fixed income at 16.4%, for a total of 67.3% of the fund's portfolio.

Figure 2.6 Pennsylvania SERS Asset Allocation (2017)



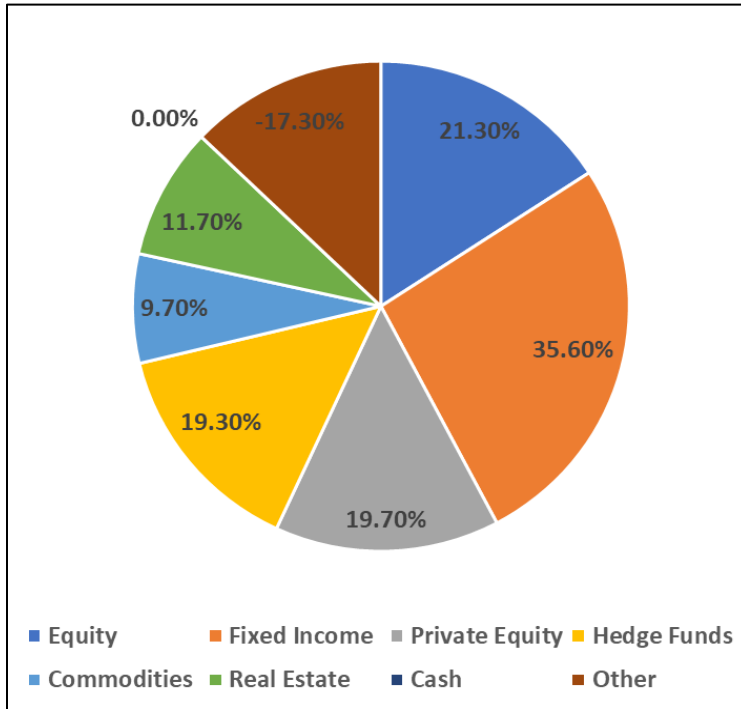
Source: Authors' analysis and Public Plans Database (2018)

In an investment document published by PSERS in August 2016, the fund notes that its "asset allocation plan is designed to meet the unique needs of a defined benefit system that is currently underfunded and had been receiving employer contributions below the actuarial required contribution for over 10 years."^{xi} The investment considerations identified to guide this asset allocation are:

- PSERS' investment time horizon;
- Capital market assumptions (*e.g.*, expected return, risk, correlations);
- Return targets;
- Demographics of plan participants and beneficiaries, and actuarial analysis;
- Cash flow requirements;
- PSERS' funded status;
- The Commonwealth's and School District's financial strength; and,
- The Board's willingness and ability to take on risk^{xli}

Like SERS, PSERS also had a diversified asset allocation strategy in 2017 with investments in equity, fixed income, private equity, hedge funds, and real estate. However, as Figure 2.7 illustrates, unlike SERS, PSERS had a more diversified portfolio across asset classes, with fixed income being its largest asset class at 35.6% (vs. SERS' largest asset class being equity at 53%) and with investments in commodities and leverage financing (categorized as "other").

Figure 2.7 Pennsylvania PSERS Asset Allocation (2017)



Source: Authors' analysis and Public Plans Database (2018)

Leverage finance is used by PSERS to execute its risk parity strategy. The fund uses derivative instruments to "allow [PSERS] to gain asset class exposure with minimal margin requirements and utilizes it in fixed income, real assets, and risk parity allocations."^{xliii} This use of leverage financing is a characteristic that makes PSERS unique not only among funds in the peer group, but also among other U.S. public pension funds. As Table 2.7 below illustrates, only 10 out of 180 funds in the PPD database report an explicit use of leverage as part of their asset allocation strategies. Moreover, PSERS' leverage is the third largest behind Missouri State Employees at 52.1% and Ohio Police & Fire at 20%.

Table 2.7 Major State and Local Plans That Use Leverage (2017)

Plan Name	Type of Leverage	Percentage of Portfolio That is Levered
Massachusetts SRS	Uses leverage for real estate investments	1.7%
Massachusetts Teachers	Uses leverage for real estate investments	1.7%
Missouri State Employees	Uses leverage to achieve a beta balanced portfolio	52.1%
Ohio Police & Fire	Policy to leverage fixed income portfolio 2x	20.0%
San Francisco City & County	Uses leverage for real estate investments	0.0%
Virginia RS	Uses leverage in its real assets portfolio	3.6%
Wisconsin RS	Policy to leverage in fixed income portfolio	10.0%
Sacramento County ERS	Uses leverage for real assets portfolio	0.8%
San Diego City ERS	Uses leverage for real estate investments	1.8%
Pennsylvania PSERS	Uses leverage in fixed income portfolio	17.30%

Source: Aubrey 2018

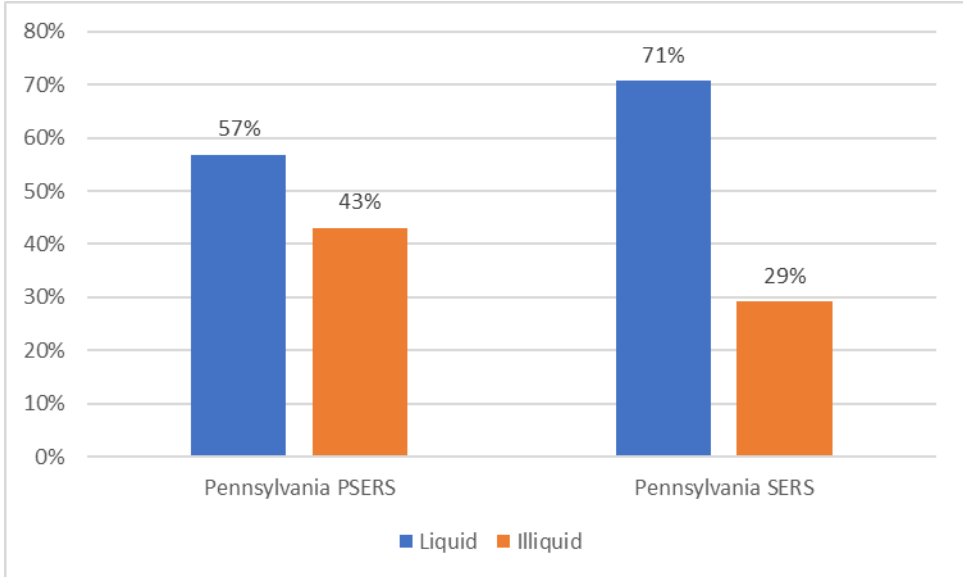
Leverage is a method of balancing risk-adjusted return within a portfolio by taking on additional economic exposure without committing a full amount of capital that an equivalent cash investment would require.^{xliii} While the merits of leverage are recognized by industry and academia, investors are often reluctant to aggressively adopt the use of leverage because it is seen as a "double-edged sword," as leverage could increase both good and bad outcomes. On the one hand, it allows investors to change the payoff of an underlying investment strategy as it requires a lower return on an underlying risky portfolio to achieve a target level of performance. This is particularly attractive for investors who are looking for more upside potential. It requires more sophisticated risk management to be in place for its effective use. On the other hand, leverage introduces additional complexities and liabilities, such as additional cash-flow uncertainties. Finally, the downsides of leverage often become most apparent only at the worst times, like during a recession.

Literature on the subject illustrates that effective governance is key for the proper use of leverage. For example, since the Board sets the risk and return policy for funds, the Board should be the party that defines and specifies how and when leverage should be used. A proper governance structure that regulates leverage at the total fund should also be in place. If, for example, leverage was predominantly managed at a more local level in each individual investment program, it could lead to potential overlaps of risk that could accumulate at the total portfolio level.^{xliv}

Another important differentiation between SERS and PSERS is their allocations towards liquid and illiquid asset classes. Liquidity represents how easily an investor can move in and out of assets. Therefore, an asset would be considered less liquid if an investor cannot quickly sell a significant quantity of that asset at a price near fundamental value. Academic literature classifies cash, equities and fixed income as liquid assets, while illiquid asset classes consist of real estate, private equity, hedge funds and infrastructure.^{xlv}

As Figure 2.8 below illustrates, PSERS in 2017 had a higher allocation when it came to illiquid asset classes, while SERS had significantly lower (14 percentage points) allocations towards liquid asset classes.

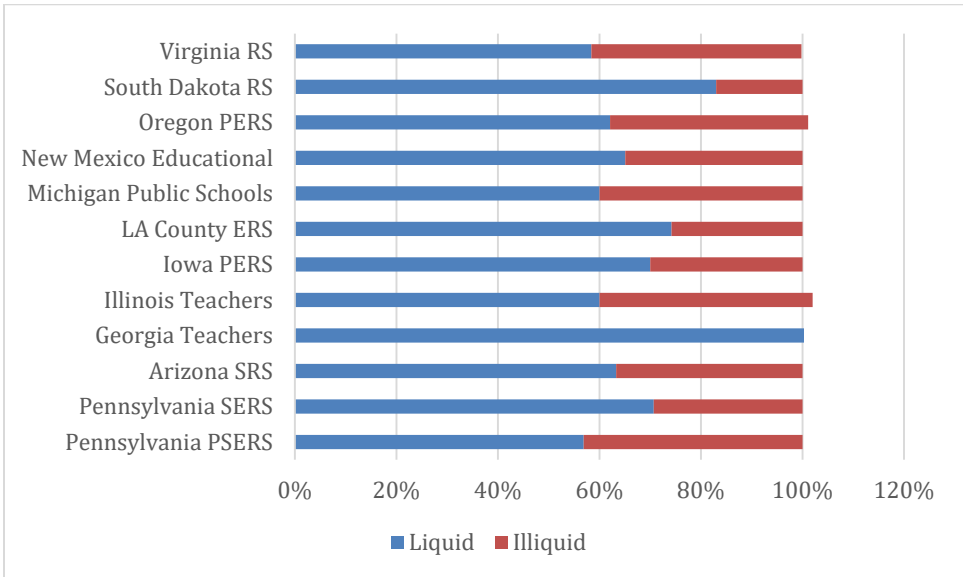
Figure 2.8 PSERS and SERS Liquid vs. Illiquid Asset Allocation (2017)



Source: Authors' analysis and Public Plans Database (2018)

A look at how the peer group allocated its assets between liquid and illiquid investments in 2017 reveals that SERS invested more in line with peer practices, which had an overall average of 69% of assets in liquid investments and 32% in illiquid investments. The same can be observed when looking at a breakdown by individual asset classes.

Figure 2.9 Peer Group Allocation of Liquid vs. Illiquid Asset Classes (2017)



Source: Authors' analysis and Public Plans Database (2018)

Figure 2.10 illustrates the asset allocations of funds within the peer group broken down by asset class. As it can be observed, there is general consistency in how these funds

allocated their assets in 2017 based on the 7 major asset classes: equity, fixed income, hedge funds, private equity, commodities, real estate, and cash. PSERS has the highest allocation to illiquid investments of this peer group.

Figure 2.10 Peer Group Asset Allocation (2017)



Source: Authors' analysis and Public Plans Database (2018)

In general, equity is the largest asset class for funds in the peer group, followed by fixed income, with a cumulative value of more than 50% across most portfolios. Private equity is usually the third largest asset class, with allocations ranging from 7% to up to 26%.

There are also a few differences within the asset allocation of the peer group worth noting. For example, Georgia Teachers is unique in that it is the only fund that has a strategy that allocates funds solely to equity and fixed income. Also, South Dakota RS has a high percentage (25%) allocated towards cash, versus other funds in the group with ~3%. Finally, only half of the funds in the peer group have investments in commodities and for those that do invest in this asset class, PSERS is the largest investor with 10%.

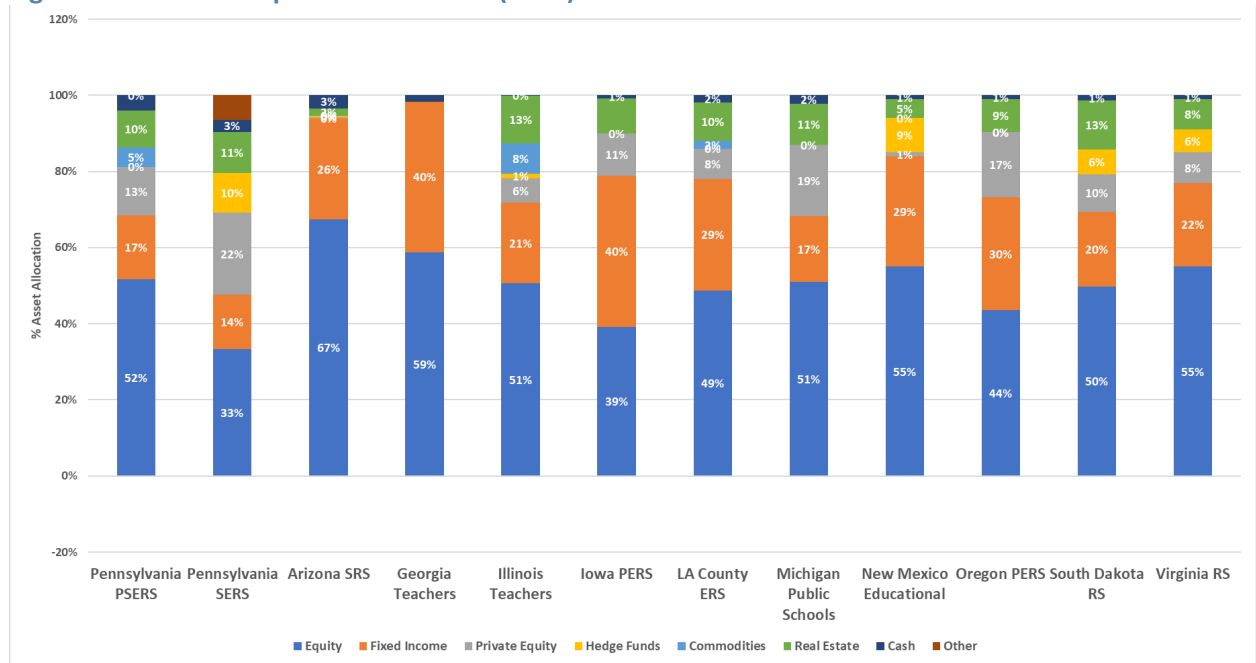
When compared against the peer group, we can see that SERS mostly allocates assets in line with the rest of the funds, while PSERS is a significant outlier. Like most funds in the peer group, SERS has a diversified asset allocation strategy with equity as its largest asset allocation (50%) and also major allocations towards fixed income (16%) and private equity (15%).

PSERS' asset allocation strategy is unique amongst the peer group due to three main characteristics. First, it is the only fund that has greater allocations to fixed income than to equity derived from its overall risk parity approach. Second, it is the only fund with the largest asset allocations towards fixed income. Finally, it is the only fund in the peer

group that uses leverage. As illustrated above, a major challenge with deploying this strategy is that it increases volatility for the fund. For example, if a fund invests all that leverage into equity, it will still have to fund that debt against it given that debt is fixed, but assets are not. The inclusion of leverage into PSERS' asset allocation therefore magnifies the fund's risk exposure, as it increases its exposure to the financial markets.

A historical (2008-2017) look at asset allocation reveals that PSERS and SERS started the period with very different asset allocations than in 2017 and moved in opposing directions throughout the period. As per Figure 2.11 below, PSERS was more aligned with the asset allocation of the peer group at the beginning of the period, with the majority of its assets allocated towards equity and fixed income. In contrast, in 2008, SERS' asset allocation was different than the rest of the group as it was the only fund to allocate the majority of its assets to alternatives (53%) instead of equity and fixed income (cumulative 47%).

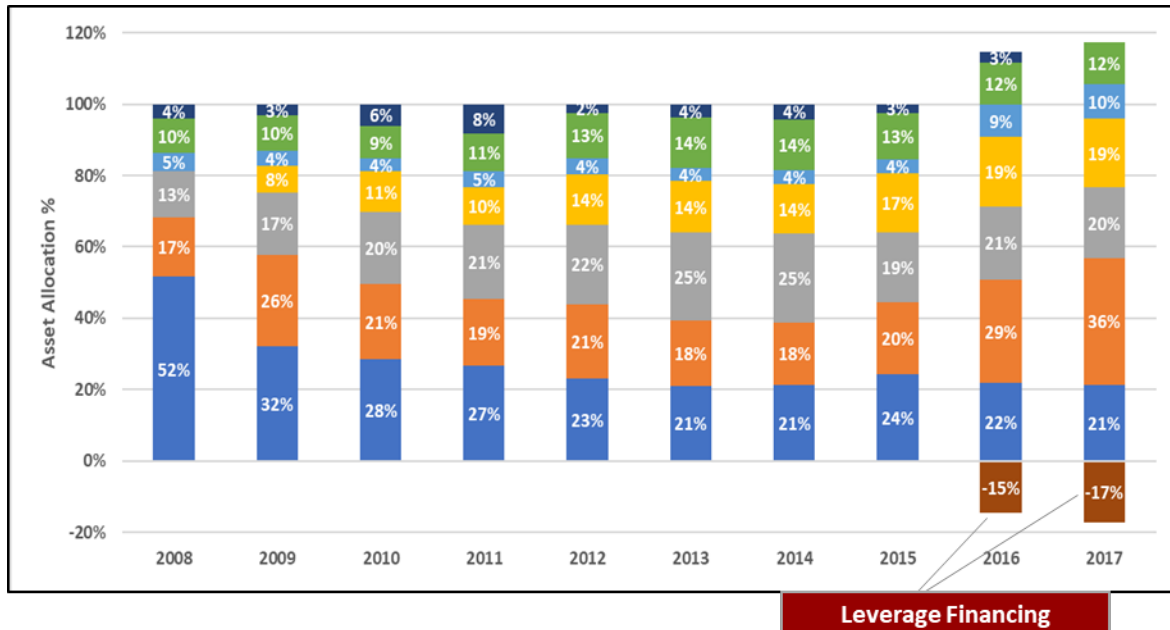
Figure 2.11 Peer Group Asset Allocation (2008)



Source: Authors' analysis and Public Plans Database (2018)

In 2008 most of PSERS' portfolio consisted of allocations towards equity and fixed income. However, similar to the trend across most U.S. pension funds, PSERS began reducing its exposure towards equity and fixed income at the beginning of the period in favor of alternative asset classes like private equity and commodities. This trend continued through to 2016, which led to significant changes in PSERS' overall portfolio across the time period. For example, equity ceased to be the largest asset class (52% in 2008 vs. 21% in 2017), allocations to fixed income (17% in 2008 vs. 36% in 2017) and commodities (5% in 2008 vs. 10% in 2017, respectively) doubled, and leverage financing was introduced in 2016. With the introduction of leverage financing, PSERS began increasing its equity and fixed income allocations once again, although they still consisted of under 50% of the fund's portfolio.

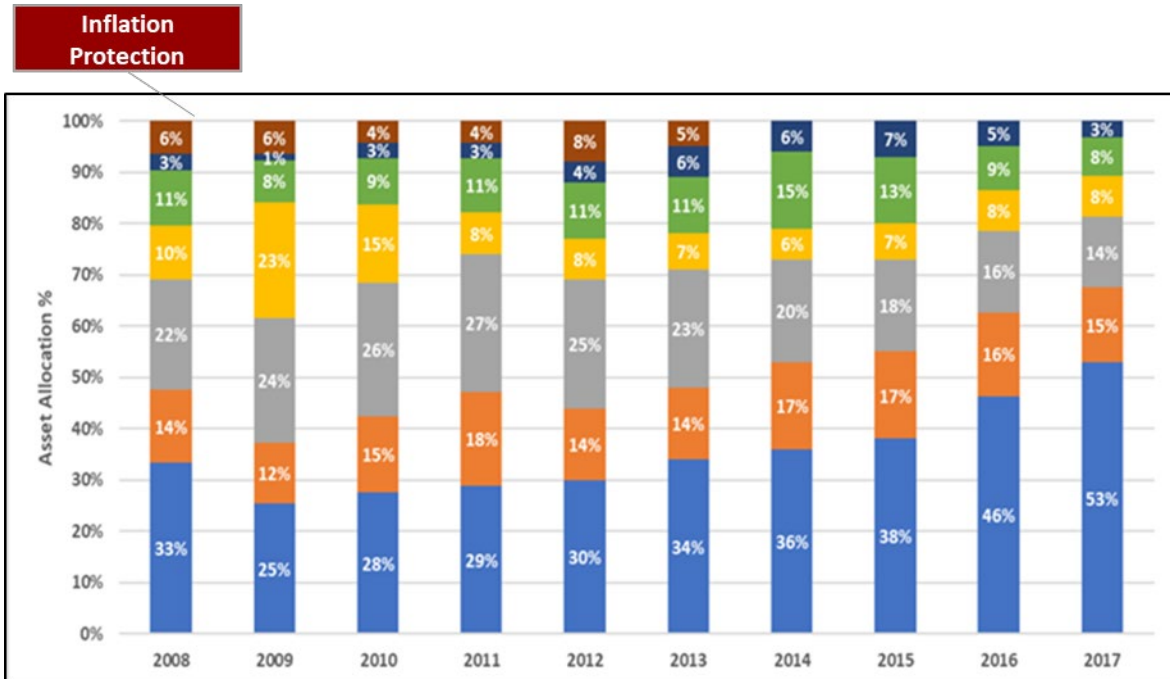
Figure 2.12 Pennsylvania PSERS Asset Allocation (2008-2017)



Source: Authors' analysis and Public Plans Database (2018) (asset class labels same as above)

- In contrast to PSERS, SERS had greater allocations towards alternatives than equity and fixed income from the beginning of the period and through to 2014. As Figure 2.13 illustrates, three major shifts can be observed for SERS across the 2008-2017 period. The first is an initial reduction in equity exposures in 2008 and 2009 following the asset class's low performance during the global financial crises. The second – after that initial reduction, we see a continuous increase in equity exposures and a reduction in hedge fund allocations. Finally, we also observe the elimination of an "Inflation Protection" strategy deployed between 2008 and 2013, which had an objective to "provide diversification within the total fund and act as a hedge against inflation."^{xlvi} Therefore, SERS' portfolio in 2017 was less diversified than what it was at the beginning of the period, due to strong increases in equity and fixed income allocations vis-à-vis alternative investments.

Figure 2.13 Pennsylvania SERS Asset Allocation (2008-2017)

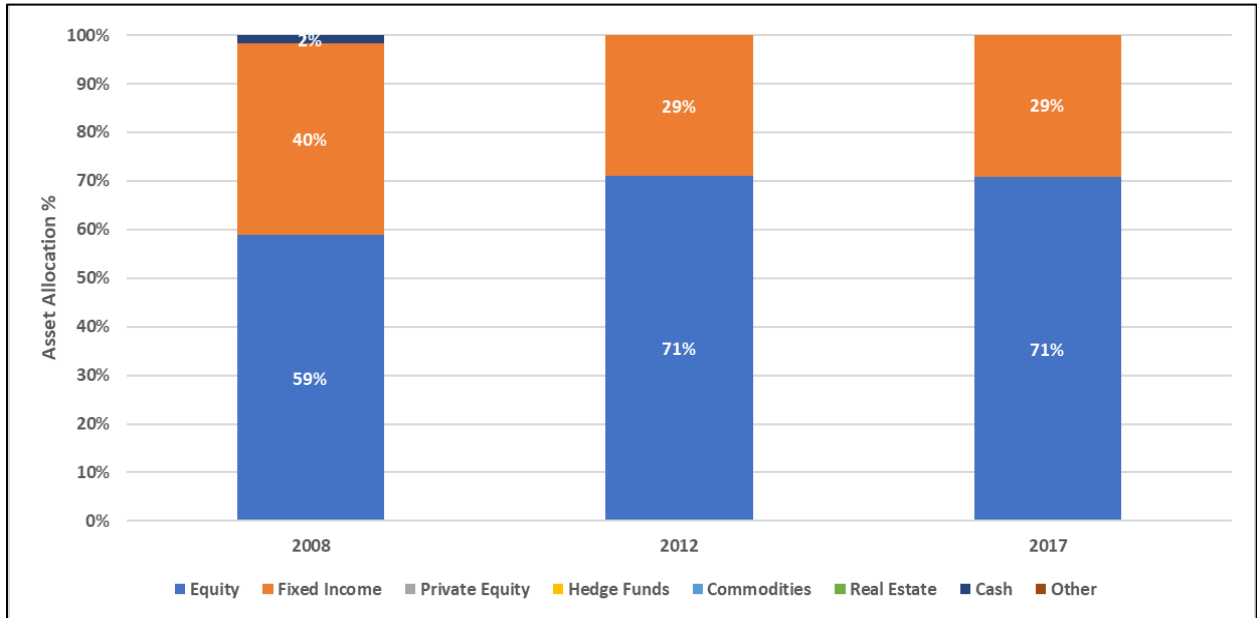


Source: Authors' analysis and Public Plans Database (2018) (asset class labels same as above)

Most funds in the peer group reduced their exposures to equity across time and further diversified their portfolios with new or increased investments in alternative asset classes like private equity, hedge funds, and commodities. SERS, as illustrated above, followed an opposite trend of moving away from alternatives and opting for less diversification in its portfolio with greater allocations in equity and fixed income.

- An important exception within the peer group to note is Georgia Teachers, which maintained a clear split between equity and fixed income allocations across the period. As Figure 2.14 illustrates, Georgia Teachers had separate allocations towards cash in 2008, but these were no longer present by 2012 and the fund maintained a defined split between equity and fixed income across the period, although equity has gradually gained over fixed income. Georgia and SERS are therefore the only two funds in the peer group that increased, rather than decreased, their equity allocations over time.

Figure 2.14 Georgia Teachers Historical Asset Allocation (2008-2017)



Source: Authors' analysis and Public Plans Database (2018)

2.6.2 Asset Allocation Synthesis

The market value in different asset classes has experienced significant shifts since 2000. Changes in historical returns of equity and fixed income at the beginning of the period, coupled with a significant downturn in 2008 and 2009 during the global financial crisis, contributed to a broad reallocation of portfolios towards alternatives and a redesign of asset allocations among U.S. public pension funds. This diversification was maintained even after equities recovered post-global financial crisis after 2010, which highlights an explicit choice by U.S. pension funds to search for greater yields through riskier and more complex alternative asset classes.

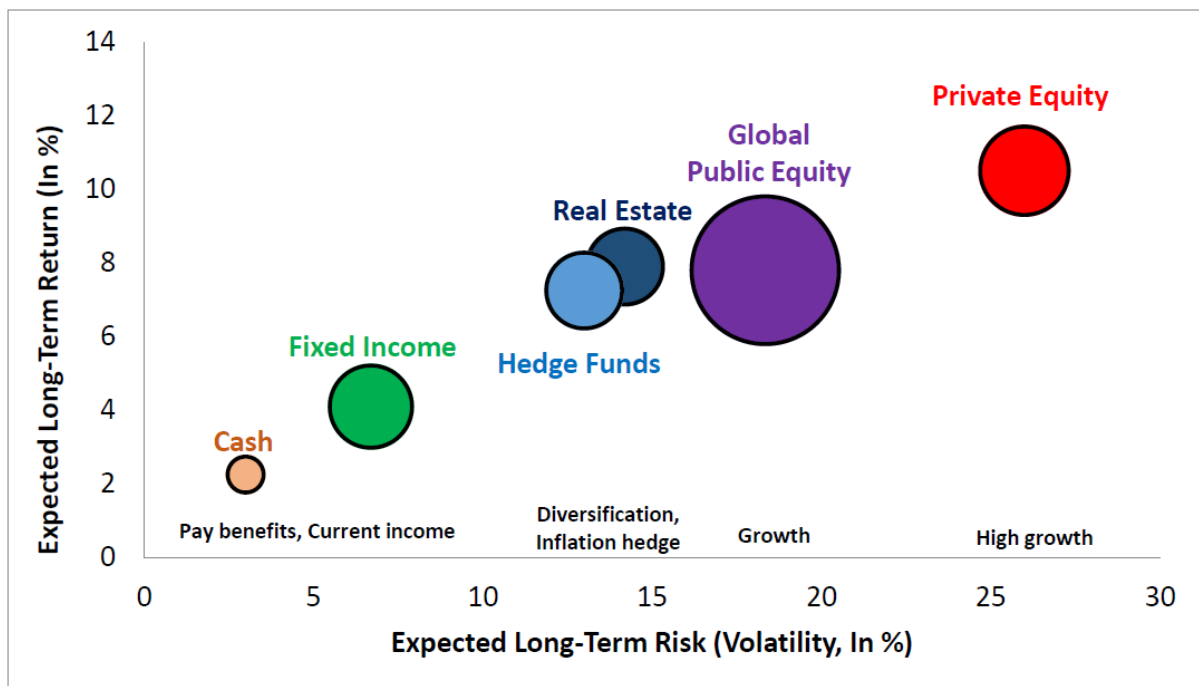
The asset allocation strategies that SERS and PSERS followed during this period brought the former more in line with the peer group, while significantly differentiating the latter.

SERS is a mature pension plan with negative cash flows, which means that retirement benefit payments are greater than contributions from employees and employers.^{xlvii} The fund's asset allocation policy has been geared towards achieving the fund's actuarial rate of return, while ensuring "there is sufficient liquidity to pay retirement benefits."^{xlviii} The way SERS' asset allocation strategy evolved from 2007-2018 reveals an explicit decision to increase allocations to equity and fixed income to help achieve these objectives.

In 2008, SERS' asset allocation looked very different than it does today, with more investments in alternatives (cumulative 53%) than equity and fixed income (47%). It should be noted that this allocation did not provide the expected diversification benefits, as SERS' return for calendar year 2008 was negative 28.7% — which resulted in an \$11.1 billion loss to the fund.^{xlix} A simple low cost Vanguard global 60-40 index fund

would have lost 26.5%.¹ While the fund followed the peer group and the majority of U.S. pension funds in an initial move away from equity and fixed income in 2008 and 2009, SERS reallocated assets mostly towards equity as the asset class recovered in 2010. Since then, equity has become a cornerstone of its investment strategy consisting of over 53% of its portfolio. The focus on equity, along with sustained allocation levels of fixed income, is consistent not only with one of its main investment plan objectives to "reduce gradually the percentage of fund assets committed to long-term illiquid investments,"^{li} but also, as Figure 2.15 below illustrates, key drivers of income and growth for the fund.

Figure 2.15 SERS 10-Year Target Asset Allocation (2017)



Source: SERS 2016-2017 Strategic Investment Plan

PSERS' asset allocation over the time period indicates an explicit decision to move away from equities towards broader, more complex, and more unconventional strategies. In 2008, the fund's asset allocation was similar to the rest of the peer group. It also followed the U.S. pension fund trend of moving away from equity and fixed income during the global financial crisis. However, PSERS did not reallocate assets back into equity as the asset class began recovering in 2010. Instead, it continued to increase commitments to investments in private equity, hedge funds, and commodities. In 2016, the fund continued to reallocate away from equity and further diversified by introducing leverage financing, while at the same time, it began refocusing on fixed income and almost doubled its allocation to this asset class in two years (2015 20% vs. 2017 36%).

PSERS' emphasizes portfolio diversification as the core of its asset allocation strategy. In its 2016 Summary Annual Financial Report (SAFR), it states that "PSERS believes that the best way to achieve its long-term objectives is to maintain a very diversified portfolio

which includes all asset classes available to it, such as equities, fixed income, real assets, risk parity, and absolute return."^{liii} Its reduction in exposure to equity has been motivated by significant negative cash flows experienced by the fund. As it illustrates, "PSERS' risk profile is . . . driven by its cash flow needs. Over the past fifteen years . . . PSERS paid out more than \$42.6B more in benefits than it received in member and employee contributions [with] a negative cash flow of over \$2.0B per year during this period."^{liiii} As a result, "the Board" has attempted to reduce its risk profile by decreasing PSERS' dependency on public equity markets and its exposures to other asset classes that are "less correlated to equity markets such as global inflation-linked securities and commodities."^{liiv} While the goal of such an asset allocation is to generate desired returns with less volatility, this strategy has not been yielding the desired results when looking at the absolute and risk-adjusted performance of the fund.

2.7 Investment Performance Analysis

As has been previously discussed, differences in overall portfolio performance could be attributed to differences in asset allocation and asset class returns. This section will therefore continue to build on the assessment of SERS and PSERS by looking at the overall performance of the funds, as well as the performance of their individual asset class investments.

The following section will dive deeper into concepts introduced in the literature review section (discount rate, funded status, and benchmarks) to illustrate how these compare against SERS and PSERS and could influence investment decisions. The next section will move into an assessment of the absolute performance of SERS and PSERS at the total portfolio level and by asset class. The final section will illustrate how SERS and PSERS perform from a risk-adjusted perspective by measuring the respective Sharpe Ratio and Information Ratio of the funds.

2.7.1 Investment Performance Assessment

Peer Group Discount Rates

Discount rates are important indicators that affect the magnitude of a pension plan's liabilities and are determinants of their ability to meet their obligations to future retirees. Given that this indicator will guide investment decisions, it is important to look at how it has evolved over time and assess it against the fund's investment returns to answer the following question: Is the pension fund generating enough investment returns to help meet its liabilities?

As Table 2.8 below illustrates, funds within the peer group have similar FY17 discount rates, with a peer group average of 7.21%. SERS and PSERS are both above the group average, with the same discount rate as New Mexico Educational at 7.25%. Three funds (Arizona SRS, Georgia Teachers, and Illinois Teachers) have slightly higher rates of 7.5%, while South Dakota has the lowest discount rate at 6.5%.

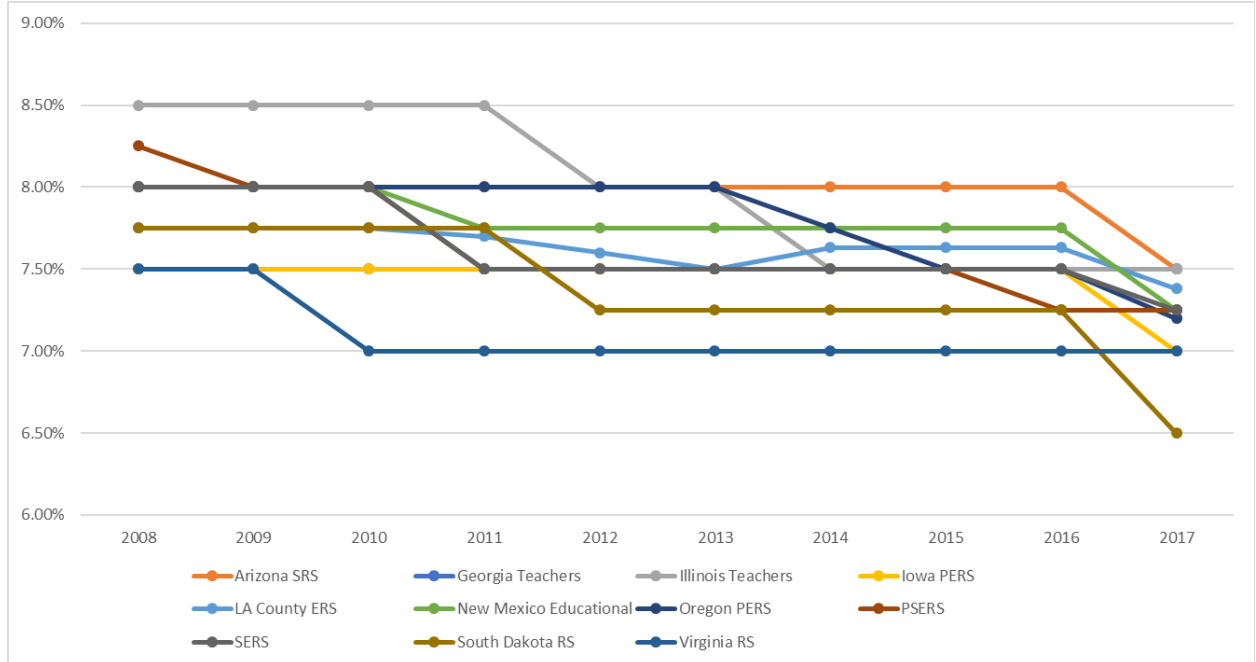
Table 2.8 Peer Group FY17 Discount Rates

Peers	FY17 Discount Rate
Arizona SRS	7.50%
Georgia Teachers	7.50%
Illinois Teachers	7.50%
Iowa PERS	7.00%
LA County ERS	7.38%
Oregon PERS	7.20%
Pennsylvania PSERS	7.25%
Pennsylvania SERS	7.25%
South Dakota RS	6.50%
Virginia RS	7.00%
New Mexico Educational	7.25%
Peer Group Average	7.21%

Source: Public Plans Database (2018)

From a historical lens (2008-2017), we can observe that discount rates have been between 8.5% and 6.5% across the peer group, with most funds experiencing relatively stable declines across the period. This is consistent with other studies which have demonstrated that despite fluctuations in interest rates and financial markets, pension funding levels have remained relatively stable since 2009.^{lv} At a more granular level, however, funds within the peer group experienced a decline in their discount rate between 2016 and 2017, settling at a rate of between 7% and 7.5%.

Figure 2.16 Historical Peer Group Discount Rates (2008-2017)



Source: Authors' analysis and Public Plans Database (2018)

Funded Status

As Table 2.9 below illustrates, PSERS and SERS are among the lowest funded pension funds in the peer group with a funded status of 56% and 59% respectively. In fact, when compared to the rest of the peer group, only Illinois Teachers had a lower funded status than SERS and PSERS at 40% in FY17. After accounting for New Mexico Educational at 63%, the rest of the funds in the peer group were funded at 70%+ in 2017, with South Dakota being funded at 100%.

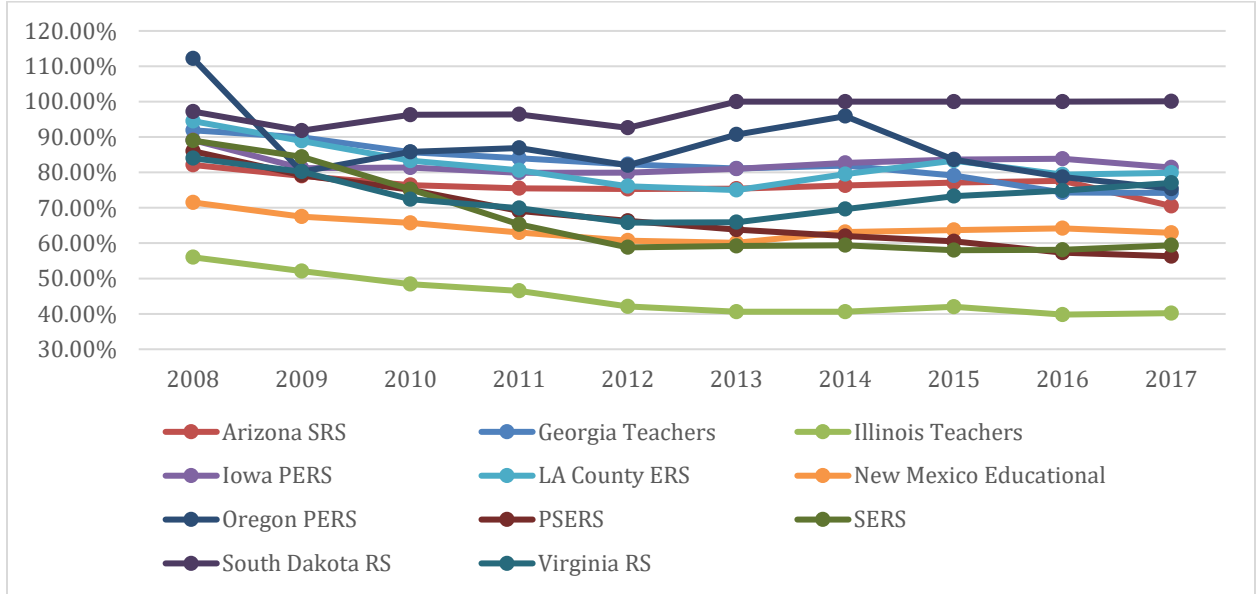
Table 2.9 Peer Group FY17 Funded Status

Plan	FY 17 Funded Status
Georgia Teachers	74%
Virginia RS	77%
Oregon PERS	75%
Pennsylvania PSERS	56%
LA County ERS	80%
Illinois Teachers	40%
Arizona SRS	71%
Iowa PERS	81%
Pennsylvania SERS	59%
New Mexico Educational	63%
South Dakota RS	100%
AVERAGE	71%

Source: Public Plans Database (2018)

A look at funded status across time reveals that while the funded status of pension funds has mostly moved in sync across time, large differences exist in the funded status of peers in the group. As per Figure 2.17, most funds have seen a decrease in their funded status across time, with ranges as high as 112% by Oregon PERS in 2008 to 29.8% from Illinois Teachers in 2016.

Figure 2.17 Peer Group Historical Funded Status



Source: Authors' analysis and Public Plans Database (2018)

This figure illustrates the historical (2008-2017) funded status of SERS (66%) and PSERS (67%) is lower than the group average of 74%.

Total Portfolio Benchmarks

Benchmarks allow pension funds to assess their performance against specific measures in the market and will influence a fund's investment strategy, including asset allocation and risk profile. For total fund performance, pension funds normally develop custom benchmarks that reflect the type and relative weight of assets within their portfolio. For example, SERS uses a custom, composite benchmark for its overall total fund portfolio, on a five- to ten-year rolling time horizon. The composite benchmark is composed of benchmarks of individual asset classes (equity, private equity, fixed income, hedge funds, infrastructure, real estate, and cash). The weight of each asset class is based on the asset allocation set forth in the investment plan approved by the board. PSERS also uses a custom Fund Policy Index for its overall portfolio benchmarking, based on the Board-established asset allocation structure that seeks to generate a return that meets the actuarial rate of return assumption.

As Table 2.10 below illustrates, for the most part, funds in the peer group follow similar approaches at the total portfolio (custom benchmark) level. An important exception within the peer group is Georgia Teachers, which uses a CPI benchmark that follows inflation rather than the weight of the equity and fixed income allocations in its portfolio.

Table 2.10 Peer Group Total Portfolio Benchmarks (2017)

Plan (2017)	Total Portfolio Benchmark
Arizona SRS	Interim SAA Policy Benchmark
Georgia Teachers	CPI
Illinois Teachers	TRS Policy Index
Iowa PERS	Policy Benchmark
LA County ERS	Policy Benchmark
Oregon PERS	Policy Benchmark
PSERS	Total Fund Policy Index
SERS	Total Fund Custom Benchmark
South Dakota RS	Markets Benchmarks Returns
Virginia RS	VRS Custom Benchmarks
New Mexico Educational	Policy Index

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Despite having similar approaches towards defining their total portfolio benchmarks, the performance of these benchmarks differs significantly between SERS, PSERS, and the peer group.

The performance of a benchmark is dependent on the performance of the assets that make up the benchmark. Therefore, benchmark performance will fluctuate over time. The concept of “beating the market” or “exceeding a benchmark” is therefore not a stagnant one. For pension funds, "beating the market" means producing higher returns in their investment portfolios than their benchmarks. Therefore, assessing the relative performance of benchmarks is helpful in understanding how ambitious pension funds must be in their investment strategies and how effective they are relative to peers. After all, selecting benchmarks that generally produce lower returns allows funds to construct narratives of high performance by beating their benchmarks when, in fact, those benchmarks to begin with set a relatively low bar.

Table 2.11 below illustrates the 1-year, 3-year, 5-year, and 10-year performance of the benchmarks selected by the funds in the peer group based on 2017 figures. In other words, these are the returns that the various custom benchmarks achieved over time based on 2017 figures. The discount rate of each fund has been included in the table, because it is a good indicator of relative benchmark performance against the rate that funds have determined is required to meet their liabilities and funding obligations. Therefore, benchmark performance that is significantly and consistently below a pension fund's discount rate could indicate that the benchmark may not necessarily be most suitable for the liabilities of the fund.

Table 2.11 Peer Group Total Portfolio Benchmark Performance (2017)

Peers	FY17 Discount Rate	2017 Benchmark Performance			
		Total Portfolio 1Y	Total Portfolio 3Y	Total Portfolio 5Y	Total Portfolio 10Y
Arizona SRS	7.50%	14.00%	4.80%	8.80%	5.20%
Georgia Teachers	7.50%	1.60%	0.90%	1.30%	1.60%
Illinois Teachers	7.50%	11.40%	6.10%	9.30%	5.30%
Iowa PERS	7.00%	11.17%	5.79%	8.61%	6.28%
LA County ERS	7.38%	11.20%	5.90%	8.80%	5.40%
Oregon PERS	7.20%	13.02%	6.59%	9.85%	N/A
Pennsylvania PSERS	7.25%	6.39%	3.49%	5.47%	2.80%
Pennsylvania SERS	7.25%	11.70%	5.10%	8.10%	5.30%
South Dakota RS	6.50%	10.96%	5.24%	9.07%	5.31%
Virginia RS	7.00%	11.80%	5.70%	8.50%	4.50%
New Mexico Educational	7.25%	12.10%	5.40%	7.80%	4.60%
Peer Group Average		10.49%	5.00%	7.78%	4.63%

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

The difference in performance in these benchmarks is inherent to the fact that they are custom built by peers to measure the performance of the assets within their portfolios. A look at the peer group average allows us to identify consistent returns and a downward trend across most benchmark returns for the peer group. For the most part, benchmarks had strong returns in the 1-year time frame with an average of 10.4% across the peer group. These returns, however, are almost cut in half when considering 3-year figures, where the average benchmark drops to 5%. After a slight increase to 7.7% for the 5-year peer group average, benchmark returns drop once again for the long-term 10-year figure of 4.6%.

These low return 10-year figures are important because long-term performance is key for pension funds and none of the 10-year benchmarks beat the discount rates for the various funds. One consideration is that the 10-year benchmark falls within a time frame that includes the Global Financial Crisis, which, as illustrated above, led to a period of low growth and low returns. Over the 5-year period, all fund benchmark returns, except for Georgia Teachers and PSERS, exceeded their fund's discount rate.

When compared to the peer group benchmark returns, the benchmark returns of SERS and PSERS illustrate two different outcomes. On one hand, SERS' benchmark returns are higher than the peer group average across all time periods. On the other hand, when isolating for Georgia Teachers' CPI benchmark, PSERS' benchmark performance is the lowest in the group for the 1-year, 3-year, 5-year, and 10-year period. Moreover, PSERS' benchmark returns never exceed the peer group average.

When assessed against individual discount rates, SERS' benchmark performance is in line with the peer group in exceeding its discount rate in the 1-year and 5-year periods, but its performance is below the discount rate in the 3-year and 10-year periods. PSERS' benchmark returns did not exceed the fund's discount rate of 7.25% across the time period.

Asset Class Benchmarks

The selection and performance of benchmarks across asset classes varies widely across the peer group (for more information on the specific asset class benchmarks selected by peers, please see appendix). A look at the performance of these benchmarks reveals important insights about how funds within the peer group look at returns for the assets they invest in.

Table 2.12 below illustrates the performance of peer group asset class benchmarks for the 1-year, 3-year, 5-year, and 10-year returns based on 2017 figures and available data. The highest average benchmark returns across the peer group and time frame come from private equity (12.49%), followed by equity (10.94%) and real estate (7.78%). The lowest benchmark returns can be observed for commodities, with a negative overall average of -1.8% across the peer group and period. This was followed by cash at 0.42% and fixed income with 2.6%.

Table 2.12 Peer Group Asset Class Benchmark Returns (2017)

	Equity				Fixed Income				Private Equity				Hedge Funds				Commodities				Real Estate				Cash			
	1Y	3Y	5Y	10Y	1Y	3Y	5Y	10Y	1Y	3Y	5Y	10Y	1Y	3Y	5Y	10Y	1Y	3Y	5Y	10Y	1Y	3Y	5Y	10Y	1Y	3Y	5Y	10Y
Pennsylvania PSERS	19.91%	7.79%	12.92%	5.59%	3.09%	2.69%	2.83%	6.10%	3.05%	0.55%	3.96%	3.61%	5.17%	3.72%	2.73%	3.34%	-6.41%	-10.45%	-6.49%	-5.08%	2.92%	7.38%	8.59%	5.20%	-	-	-	-
Pennsylvania SERS	23.90%	9.50%	11.00%	5.00%	3.50%	2.20%	2.10%	4.00%	22.30%	14.10%	17.70%	10.80%	11.30%	3.40%	7.10%	5.60%	-	-	-	-	5.60%	9.40%	10.40%	4.10%	0.90%	0.40%	0.90%	0.40%
Peer Group Average	19.60%	6.83%	11.81%	5.52%	0.93%	2.43%	2.39%	4.70%	17.51%	9.88%	13.44%	9.14%	8.11%	4.10%	6.51%	4.81%	-0.22%	-4.03%	-1.31%	-1.63%	5.60%	9.72%	10.32%	5.83%	0.60%	0.36%	0.22%	0.52%
Average Benchmarks Across 1,3,5,10y	10.94%				2.61%				12.49%				5.88%				-1.80%				7.87%				0.42%			

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Benchmark returns were significantly different across asset classes. On average, both equity and hedge funds experienced a downward trend across time, which included a slight uplift from 3-years to 5-years, followed by a drop towards the 10-year mark. Fixed income and real estate both experienced steady average increases across the time period, although real estate saw a ~50% reduction from the 5-year to the 10-year period. Although private equity has the highest average benchmark returns, the average return decreases constantly across the time period and finishes at about 50% of the value when compared to the 1-year return. As expected, cash remains relatively stable across the time period, while commodities experience negative returns across every period in the time horizon and, despite a slight recovery between the 1-year and 3-year returns, all benchmark returns remain negative across the time period.

When looking at the benchmark performance of SERS and PSERS, performance is asset class dependent. For equity, all of PSERS' benchmark returns beat the peer group average across the time period, while SERS' benchmark performance is higher for the 1-year and 3-year returns, but lower for the 5-year and 10-year returns. Similar patterns can be

observed for fixed income, except SERS' 3-year benchmark (2.2%) also underperforms the peer group average of 2.4%.

Private equity and hedge fund benchmark returns had very different performance. For private equity, SERS' benchmark returns are above the peer group average for all years, while PSERS (1-year 3%; 5-year 0.5%; 5-year 3.9%; 10-year 3.6%) significantly underperforms the peer group averages (1-year 17%; 5-year 9.8%; 5-year 13.4%; 10-year 9.4%). The same applies for hedge fund benchmark returns, where SERS' benchmark returns outperform the peer group average, while PSERS underperforms across all years.

For commodities, PSERS' benchmark returns once again significantly underperform the peer group average, which already represents poor performance with negative returns across all years. (SERS does not invest in commodities as per available data.) For real estate, PSERS' benchmark returns are also below the peer group average across all years. Meanwhile, SERS' benchmarks outperform the peer group average across the 1-year, 3-year, and 5-year figures, but are lower in the 10-year time frame.

No cash benchmark returns were available for PSERS. For SERS, cash benchmark returns have similar performance than real estate, where the benchmarks outperform the peer group average in the 1-year, 3-year, and 5-year time frames, but produce lower figures for 10-year results.

At a high level, this indicates that while PSERS' benchmark returns are high for equity and fixed income, the fund's benchmarks significantly underperform in all other asset classes across the time period. This suggests that PSERS' performance is measured against benchmark returns that are generally lower than those of its peers. For SERS, one can observe that the fund's benchmarks generally perform better than the peer group average in the shorter term (1-year, 3-year and 5-year), but the fund benchmarks have generally underperformed in the long-term (10-year). This illustrates that SERS has established benchmarks that generally outperform those of its peers. Thereby, when assessing the relative performance of SERS' returns against its benchmarks, we must consider that these benchmarks are relatively higher and more ambitious than those of PSERS and the peer group.

Absolute Performance

To perform a comprehensive assessment of the absolute performance of SERS and PSERS against the peer group, the section will first look at their absolute return for their total portfolio (2017), followed by their “value added,” which is the difference between their total absolute return and their benchmark returns (this is a measure of actual value produced over what could have been earned passively). Finally, it will reincorporate insights from the benchmark section to assess the relative strength of the benchmarks these funds were being measured against.

Absolute Returns

Table 2.13 below illustrates the 2017 absolute returns at the total portfolio level for the peer group across 1-year, 5-year, and 10-year annualized figures. The data shows that the peer group experienced a general trend of declining returns for longer time horizons, as shown by a declining trend in the peer group average from 12.3% for the 1-year, to 9% in 5-years, and 5.1% in 10-year returns.

Table 2.13 Peer Group Total Portfolio Returns (2017)

Plan (2017)	Total Portfolio Returns 2017		
	1Y	5Y	10Y
Arizona SRS	13.90%	9.60%	5.60%
Georgia Teachers	12.50%	9.40%	6.10%
Illinois Teachers	12.60%	9.20%	4.80%
Iowa PERS	11.70%	8.65%	5.89%
LA County ERS	12.70%	9.00%	5.20%
Oregon PERS	12.00%	9.19%	5.37%
Pennsylvania PSERS	10.14%	7.35%	3.80%
Pennsylvania SERS	12.00%	7.90%	3.90%
South Dakota RS	13.81%	10.97%	6.14%
Virginia RS	12.10%	9.10%	4.90%
New Mexico Educational	12.00%	8.70%	5.20%
Peer Group Average	12.31%	9.01%	5.17%

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

This table also illustrates that when compared to the peer group, SERS and PSERS experienced relatively lower total portfolio returns across most years. For example, SERS experienced high returns for the 1-year measure at 12%, but still below the peer group average of 12.3%. It underperformed the peer group average both in the 5-year time frame (SERS 7.9% vs. 9% peer group average) and the 10-year time frame (SERS 3.9% vs. 5% peer group average). PSERS had the lowest total portfolio returns among the peer group for the 1-year (10.1%), 5-year (7.3%), and 10-year (3.8%) measures.

It is particularly important to highlight the relative low performance of both SERS and PSERS in the long-term. As SERS indicates in its 2017 annual report, “while year-to-year returns are important, as long-term investors, a longer time horizon is a more appropriate view of returns.”^{lvi} With this lens in mind, we can see that in the 10-year time frame PSERS is the lowest performing fund with 3.8%, while SERS is the second lowest performer at 3.9%.

As we indicated above, the 10-year time frame includes the volatile 2008-2009 period of the Great Recession. When looking at 5-year figures, however, we see a similar performance from both SERS and PSERS. That is, PSERS is the lowest performing fund with 7.3%, while SERS is the second lowest with 7.9%. In contrast, South Dakota RS and Arizona SRS emerge as strongest performers across total portfolio returns. South Dakota had the highest returns across the 1-year (13.8%), 5-year (10.9%), and 10-year (6.1%)

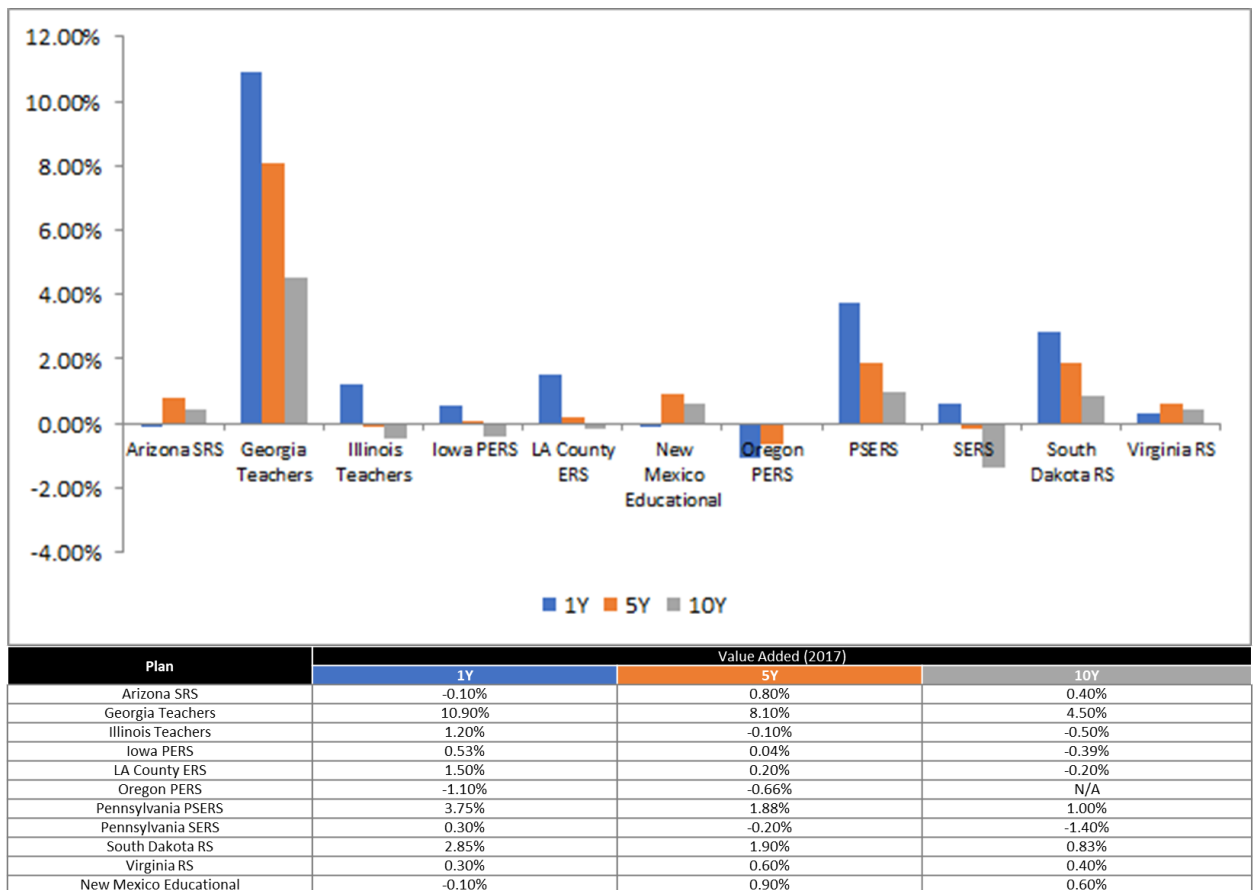
time frames, while Arizona had the second highest for the 1-year (13.9%) and 5-year (9.6%), and the fourth highest for the 10-year (5.6%) time frame.

Value Added

While returns are important indicators of performance, we can also assess the funds' ability to generate value over what could have been earned passively.

- Figure 2.18 below illustrates “value added” figures for the peer group based on 2017 data. A key insight from the data is that the peer group saw a declining trend in their ability to add value over the long-term. Most funds in the peer group experienced declines between 1-year and 5-year figures and between 5-year and 10-year figures. In general, the peer group is not very effective at adding value, with low averages across all three annualized figures and with various funds experiencing negative value (their benchmark returns were higher than their absolute returns) across time.

Figure 2.18 Peer Group Value Added (2017)



Source: Authors' analysis and Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Georgia Teachers is a clear outlier amongst the group, as it saw significantly higher value-added performance than the rest of the group with 10.9%, 8.1%, and 4.5% across the 1-year, 5-year, and 10-year marks respectively. As for SERS and PSERS, performance compared to peers changes slightly than when simply looking at investment returns. When considering “value added,” PSERS does not emerge as the lowest performer. In fact, it beats the peer group average across all three time horizons with 3.7%, 1.8% and 1%. In contrast, SERS emerges as one of the funds with the lowest value-added figures across time. For 1-year figures, SERS’ 0.30% is the third lowest amongst the group (ahead of Oregon PERS with -1.10% and Arizona SRS and New Mexico Educational, both with -0.10%). For 5-year figures, SERS is the second lowest with negative figures at -0.20% and just ahead of Oregon PERS at -0.66%. Finally, SERS is the lowest performer out of the group in the 10-year category with -1.4%.

A look at “value added,” however, must also consider the relative performance of the benchmarks being used for comparison. If we simply look at the peers' ability to generate value against their self-chosen benchmarks, we see that SERS has not performed well over time, while it appears that PSERS has performed better than the peer group average. However, it is important to consider that “value added” is derived from the fund’s ability to beat their benchmark returns, and if the benchmarks selected by these funds generate lower returns, then it is easier for funds to have the appearance of higher value-added figures.

A Benchmark Perspective

By reincorporating the benchmark lens, we can see that SERS' low value-added figures are in part due to the fact that they have benchmarks that are among the highest performers in the peer group. Therefore, even if SERS had generated strong returns, as they did for 1-year figures (12%), they still had to outperform a relatively high benchmark of 11.7%, leading to a low value-added figure of 0.3%.

A look at PSERS through this lens reveals different insights. The fund appears to perform well in the value-added category, but both the returns generated across time and the benchmarks it had to beat were low relative to the rest of the group. For example, its value-added figure of 3.7% in the 1-year mark beat the peer group average of 1.8%; however, it did so in part because its benchmark return was 6.39%, which was the lowest in the peer group for that year.

This perspective helps illustrate that SERS has high benchmark returns relative to the peer group and while it saw relatively strong performance in the 1-year time frame, it performed poorly in generating returns and “value added” in the long-term when compared to the group. For PSERS, the data shows that the fund was a low performer when compared to the rest of the peer group. This cannot be easily observed when looking only at PSERS' ability to generate value, in part because the fund's benchmarks are relatively low when compared to the rest of the peer group. Thus, even when the fund generates lower total portfolio returns, its “value added” performance may seem stronger simply because of the low returns of its benchmarks.

Performance and Discount Rates

Another important lens through which to assess the performance of SERS, PSERS, and funds in the peer group is how their returns compare against their individual discount rates. After all, this indicates the extent to which these funds are generating the returns required to help them meet their liabilities.

- As Table 2.14 illustrates, funds within the peer group generated returns above their discount rates across 1-year and 5-year returns. For the 10-year returns, however, all funds underperformed their discount rates.

Table 2.14 Peer Group Discount Rate vs. Total Portfolio Returns (2017)

Peers	FY17 Discount Rate	Total Portfolio Returns (2017)		
		1Y	5Y	10Y
Arizona SRS	7.50%	13.90%	9.60%	5.60%
Georgia Teachers	7.50%	12.50%	9.40%	6.10%
Illinois Teachers	7.50%	12.60%	9.20%	4.80%
Iowa PERS	7.00%	11.70%	8.65%	5.89%
LA County ERS	7.38%	12.70%	9.00%	5.20%
Oregon PERS	7.20%	12.00%	9.19%	5.37%
Pennsylvania PSERS	7.25%	10.14%	7.35%	3.80%
Pennsylvania SERS	7.25%	12.00%	7.90%	3.90%
South Dakota RS	6.50%	13.81%	10.97%	6.14%
Virginia RS	7.00%	12.10%	9.10%	4.90%
New Mexico Educational	7.25%	12.00%	8.70%	5.20%

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Asset Class Performance

A look at performance at the asset class level reveals more about the overall performance of SERS and PSERS in relation to the peer group.

Equity Performance

We begin with equity, as this is an asset class that all funds in the peer group invest in. At the group level, equity had high average investment returns and benchmarks across the 1-year, 3-year, 5-year, and 10-year time horizons. In fact, although equity generated high returns for most funds across the time period, the figures for “value added” are relatively low (peer group average of 0.8%, -0.4%, 0.2%, and -0.56%) given the relatively strong performance of benchmarks. Thus, we can observe that the benchmarks selected across the peer group are appropriate measures to guide strong performance in this asset class.

Table 2.15 Equity Returns, Benchmarks and Value Added

		Equity			
		1Y	3Y	5Y	10Y
Returns	PSERS	21.30%	8.12%	12.56%	5.20%
	SERS	20.40%	5.40%	11.40%	3.20%
	Peer Group Average	19.98%	6.37%	11.98%	4.91%
Benchmarks	PSERS	19.91%	7.79%	12.92%	5.59%
	SERS	19.00%	4.90%	10.70%	3.90%
	Peer Group Average	19.15%	6.41%	11.78%	5.41%
Value Added	PSERS	1.39%	0.32%	-0.36%	-0.39%
	SERS	1.40%	0.50%	0.70%	-0.70%
	Peer Group Average	0.83%	-0.04%	0.20%	-0.56%

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

On equity returns, PSERS had strong performance and beat the peer group average across all years. SERS had strong performance in 1-year figures, but underperformed in the 3-year, 5-year, and 10-year categories. The equity benchmark returns of SERS and PSERS were in line with the peer group average across the time period. PSERS' benchmark returns were higher across all time frames, while SERS' were lower across all years. In terms of “value added,” PSERS only beat the peer group average in the 1-year and 3-year time frames, while SERS beat the peer group average for all except the 10-year time frame.

These figures indicate that PSERS had a relatively strong performance in this asset class as both its returns and benchmarks outperformed the peer group and its low figures for “value added” were consistent with results across the peer group. SERS' performance in this asset class was not as strong as PSERS', with lower returns and benchmark returns across most years and value-added figures that outperformed the peer group average given the relatively lower performance of its benchmark. It is important to note that PSERS has a lower allocation to this asset class than SERS.

Fixed Income

While all peers invest in Fixed Income, this asset class saw an overall lower performance across the peer group. The average returns and benchmark returns were lower than equity, but its value-added figures were higher. However, no funds recorded losses (negative returns) in equity, while both Georgia Teachers and South Dakota RS experienced losses of -1% and -0.39%, respectively, in the 1-year period.

PSERS' and SERS' performance in this asset class is similar to their performance in equity. PSERS outperformed the peer group average in both returns and benchmark returns, while SERS only outperformed the peer group average in returns for 1-year, and its benchmarks performed worse than the peer group average across all years. In terms of “value added,” however, PSERS had better performance than in equity, outperforming

the peer group average across all years. SERS, on the other hand, only beat the peer group value added average for its 1-year figures. Thus, similar to equity, PSERS had overall strong performance in fixed income, while SERS saw positive but lower returns when compared to the peer group.

Table 2.16 Fixed Income, Returns, Benchmarks and Value Added

		1Y	3Y	5Y	10Y
Returns	PSERS	5.22%	4.51%	5.17%	7.36%
	SERS	2.70%	1.90%	3.10%	5.00%
	Peer Group Average	2.69%	3.11%	3.60%	5.70%
Benchmarks	PSERS	3.09%	2.69%	2.83%	6.10%
	SERS	-0.30%	2.50%	2.20%	4.50%
	Peer Group Average	0.58%	2.46%	2.40%	4.76%
Value Added	PSERS	2.13%	1.82%	2.34%	1.26%
	SERS	3.00%	-0.60%	0.90%	0.50%
	Peer Group Average	2.10%	0.65%	1.20%	0.96%

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Private Equity

All funds except for Georgia Teachers invest in private equity. Returns for private equity were relatively high across the peer group (peer group average of 1-year 15.8%; 3-year 8.8%; 5-year 12.4%; and 10-year 8.9%). While no funds recorded losses, value added was relatively low or negative given high returns for most peer benchmarks. Both PSERS and SERS had returns lower than the peer group average across all years. However, SERS' returns were much more in line with the peer group average, while PSERS significantly underperformed across a few years (*e.g.*, 3-year PSERS 3.1% vs. peer group 8.8%). Looking at benchmarks, however, we can observe that SERS and PSERS are on opposite spectrums. On one hand, PSERS has very low benchmark performance when compared to the peer group (*e.g.*, 5-year PSERS 3.9% vs. peer group 13%), while SERS' benchmarks significantly outperform the peer group average across all years. This combination creates a misleading picture where PSERS appears to be a strong performer in this category due to a value added higher than the peer group average, although this is due to their comparatively low benchmark performance. The opposite is true for SERS, as it appears to be a low performer given negative value-added figures, when in fact it has strong returns, but the high performance of its benchmarks brings its value-added figures down.

Table 2.17 Private Equity Returns, Benchmarks, and Value Added

		Private Equity			
		1Y	3Y	5Y	10Y
Returns	PSERS	12.04%	3.16%	8.51%	5.97%
	SERS	11.10%	7.20%	9.20%	8.40%
	Peer Group Average	15.83%	8.80%	12.45%	8.96%
Benchmarks	PSERS	3.05%	0.55%	3.96%	3.61%
	SERS	21.60%	13.00%	16.60%	10.80%
	Peer Group Average	17.44%	9.77%	13.33%	9.14%
Value Added	PSERS	8.99%	2.61%	4.55%	2.36%
	SERS	-10.50%	-5.80%	-7.40%	-2.40%
	Peer Group Average	-1.61%	-0.97%	-0.88%	-0.19%

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Hedge Funds

With the exception of Georgia Teachers and South Dakota, all other funds invested in hedge funds. Overall returns and benchmarks for this asset class were relatively lower than other asset classes (lower than equity and private equity and more in line with fixed income). The trend on returns fluctuated over time, with a drop in average returns between 1 year and 3 years, followed by a slight increase in average returns to the 5-year mark, and followed by a modest decrease into the 10-year figures. SERS was the only fund that recorded losses of -1.1% in their 3-year returns. At the same time, value-added figures were low and negative across various peers and years given the relatively higher performance of benchmark returns to portfolio returns.

Comparatively, SERS and PSERS did not see strong performance in this asset class. Looking at returns, PSERS exceeded the peer group average in the short-term (1-year and 3-year), but underperformed in the long-term (5-year and 10-year). In terms of benchmarks, PSERS' benchmark returns underperformed the peer group across all years, while SERS' benchmarks outperformed the peer group with the exception of its 3-year figures. As a result, PSERS' ability to generate value added appears to be better than SERS' given its assessment against lower performing benchmarks. SERS' value-added figures should be qualified considering that its benchmarks are, for the most part, higher than PSERS and the peer group average.

Table 2.18 Hedge Funds Returns, Benchmarks, and Value Added

		Hedge Funds			
		1Y	3Y	5Y	10Y
Returns	PSERS	8.09%	2.61%	2.06%	2.51%
	SERS	6.40%	-1.10%	2.80%	2.00%
	Peer Group Average	7.90%	0.78%	4.96%	4.22%
Benchmarks	PSERS	5.17%	3.72%	2.73%	3.34%
	SERS	9.40%	1.80%	6.90%	5.40%
	Peer Group Average	7.90%	3.92%	6.49%	4.77%
Value Added	PSERS	2.92%	-1.11%	-0.67%	-0.83%
	SERS	-3.00%	-2.90%	-4.10%	-3.40%
	Peer Group Average	-0.01%	-3.14%	-1.53%	-0.56%

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Commodities

Commodities also represents a relatively low-performing asset class for the peer group, with low returns, benchmark returns, and value added. SERS and five other peers did not invest in this asset class; therefore, the peer group figures for this category represent figures from only 6 funds (n=6).

As the data illustrates, various funds recorded losses, including Arizona, LA county, and PSERS (across all years). The peer group average shows a mix of losses and small gains (between 1.4% and 2.0%) across the time frame. PSERS' benchmarks performed even lower than its returns, with significant losses across all years and a peak of -10.4% in its 3-year figures when compared to the peer group average of -4.0%.

Table 2.19 Commodities Returns, Benchmarks, and Value Added

		Commodities			
		1Y	3Y	5Y	10Y
Returns	PSERS	-3.48%	-8.02%	-4.62%	-3.42%
	SERS	-	-	-	-
	Peer Group Average	2.08%	-4.57%	1.43%	-1.67%
Benchmarks	PSERS	-6.41%	-10.45%	-6.49%	-5.08%
	SERS	-	-	-	-
	Peer Group Average	-0.22%	-4.03%	-1.31%	-1.63%
Value Added	PSERS	2.93%	2.43%	1.87%	1.66%
	SERS	-	-	-	-
	Peer Group Average	2.30%	-0.54%	2.74%	-0.05%

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Real Estate

With the exception of Georgia Teachers and Iowa PERS, all other funds in the peer group invested in Real Estate. For this asset class, return, benchmark return, and value added figures were generally positive across time. Although no peers recorded loss, all funds experienced significant declines in returns in the long-term, particularly between 5-year and 10-year figures. This was likely influenced by the effects of the Great Recession in 2008-2009 that covers the 10-year time frame.

The performance of SERS and PSERS in this asset class is consistent but disparate. When looking at returns, PSERS figures are very close to the peer group average, with the exception of the 10-year figures, where it significantly underperformed against the peer group (0.6% vs. 3.9%). SERS underperformed across all years, with the exception of long-term 10-year returns, where its performance was mostly in line with the peer group (2.1% vs. 3.9%).

In terms of benchmarks, PSERS' benchmark performance was lower than the peer group average across all years. In contrast, SERS' benchmark performance was higher than the peer group average for all years except the 10-year figures. When looking at PSERS' value added, we can see positive results except for the 10-year figures, which is in line with the peer group average. For SERS, value-added figures are low due to overall low returns, given that its benchmarks are only slightly higher than the peer group average.

Table 2.20 Real Estate Returns, Benchmarks, and Value Added

Real Estate		1Y	3Y	5Y	10Y
Returns	PSERS	8.38%	10.36%	11.18%	0.66%
	SERS	1.20%	6.50%	8.40%	2.10%
	Peer Group Average	8.64%	10.74%	11.64%	3.96%
Benchmarks	PSERS	2.92%	7.38%	8.59%	5.20%
	SERS	6.40%	10.20%	10.90%	4.50%
	Peer Group Average	5.69%	9.81%	10.38%	5.90%
Value Added	PSERS	5.46%	2.98%	2.59%	-4.54%
	SERS	-5.20%	-3.70%	-2.50%	-2.40%
	Peer Group Average	2.95%	0.93%	1.26%	-1.94%

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Insight Validation

Our assessment was performed against a specific group of funds that were selected because of their similar characteristics and due to data availability. To ensure consistency in our findings and validate that the funds selected were not predisposed towards producing a specific outcome, the research team looked at a wider data set from the PPD database and explored findings from other reports. Our findings were confirmed in that

the performance ranking of PSERS and SERS is quite similar against broader peer groups.

A broader assessment was performed leveraging PPD data. The research team began by downloading the 2017 PPD database and filtering funds that are over \$10B, report net figures, and have June 30th as their fiscal year end date (with the exception of SERS, as has already been previously described). The research team then removed funds with gaps across the spreadsheet to ensure a consistent comparison across the group and arrived at a list of 52 peer funds.

- With this new data set, when looking at 1-year, 3-year, 5-year, and 10-year investment returns of funds, we find similar results to our previous assessment. As illustrated in Table 2.21 and Table 2.22 below, SERS and PSERS rank towards the bottom of the list in terms of their ability to generate investment returns in the 1-year, 3-year, 5-year, and 10-year time frame.

Table 2.21 SERS and PSERS Absolute Investment Return Performance vs. 52 Peer Fund List

	Overall Rank (Absolute Investment Returns)			
	1 Year	3 Year	5 Year	10 Year
SERS	40/52	45/52	45/52	49/52
PSERS	48/52	43/52	49/52	50/52

Source: Authors' analysis and Public Plans Database (2018)

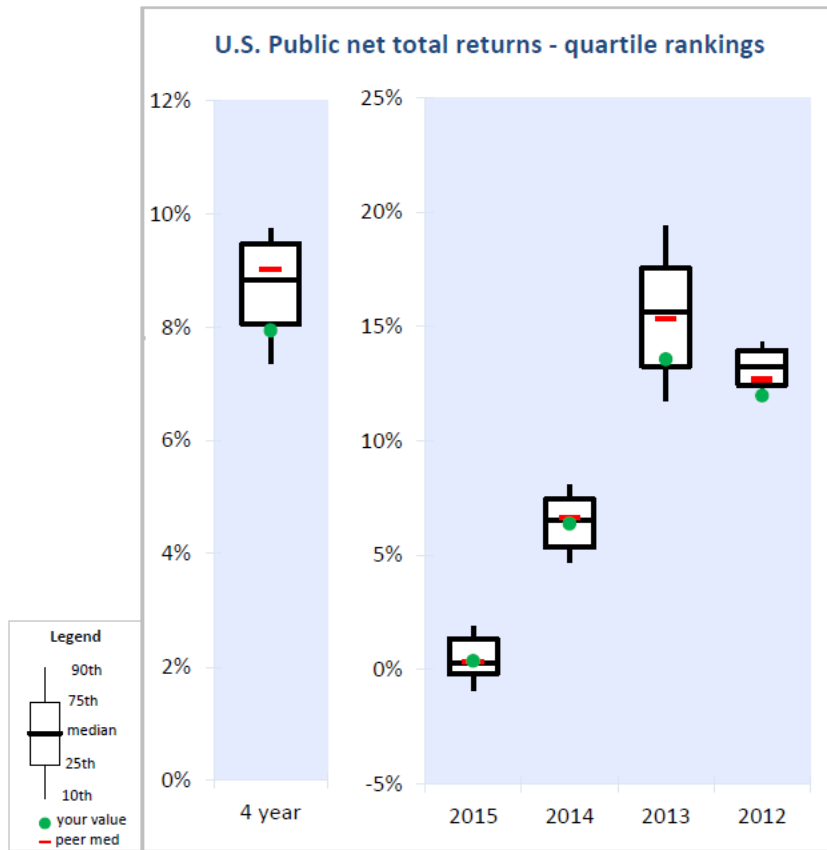
Table 2.22 Fund List (52) Filtered by 10-Year Investment Return Performance (High to Low)

PlanName	fy	fye	MktAssets_net	InvestmentReturn_1yr	InvestmentReturn_3yr	InvestmentReturn_5yr	InvestmentReturn_10yr
Oklahoma Teachers	2017	6/30/2017	\$15,637,797.29	15.28%	5.35%	11.01%	6.87%
Ohio Teachers	2017	6/30/2017	\$71,118,707.00	14.29%	6.74%	10.06%	6.80%
Kentucky Teachers	2017	6/30/2017	\$18,707,699.03	15.37%	6.27%	10.09%	6.29%
Minnesota GERP	2017	6/30/2017	\$20,100,579.00	15.10%	6.30%	10.20%	6.20%
Minnesota State Employees	2017	6/30/2017	\$11,223,065.00	15.10%	6.30%	10.20%	6.20%
Minnesota Teachers	2017	6/30/2017	\$21,258,090.43	15.10%	6.30%	10.20%	6.20%
Georgia ERS	2017	6/30/2017	\$13,098,299.00	12.40%	5.80%	9.50%	6.20%
South Dakota RS	2017	6/30/2017	\$11,644,038.60	13.81%	5.95%	10.97%	6.14%
Georgia Teachers	2017	6/30/2017	\$71,340,972.00	12.50%	5.80%	9.40%	6.10%
Arkansas Teachers	2017	6/30/2017	\$16,284,808.24	16.10%	6.70%	10.60%	6.03%
Nevada Regular Employees	2017	6/30/2017	\$30,034,611.00	11.90%	6.10%	9.60%	6.00%
Iowa PERS	2017	6/30/2017	\$30,779,116.33	11.70%	5.86%	8.65%	5.89%
TN State and Teachers	2017	6/30/2017	\$23,019,615.00	11.42%	5.78%	8.70%	5.87%
Louisiana Teachers	2017	6/30/2017	\$19,513,345.68	16.50%	6.90%	10.90%	5.80%
New York City ERS	2017	6/30/2017	\$61,316,782.00	12.99%	6.01%	9.37%	5.65%
Louisiana SERS	2017	6/30/2017	\$11,753,275.85	15.80%	4.70%	9.00%	5.60%
Arizona SRS	2017	6/30/2017	\$36,202,756.00	13.90%	5.70%	9.60%	5.60%
New York State Teachers	2017	6/30/2017	\$115,468,360.00	12.50%	6.60%	10.20%	5.60%
Mississippi PERS	2017	6/30/2017	\$26,543,097.00	14.96%	6.34%	10.08%	5.59%
New York City Fire	2017	6/30/2017	\$12,089,896.00	12.82%	5.73%	9.36%	5.58%
New York City Teachers	2017	6/30/2017	\$50,095,723.00	12.89%	5.80%	9.29%	5.57%
Missouri Teachers	2017	6/30/2017	\$37,280,246.06	12.50%	6.20%	9.50%	5.50%
Washington LEOFF Plan 2	2017	6/30/2017	\$11,776,198.00	13.44%	6.91%	9.95%	5.47%
Washington PERS 2/3	2017	6/30/2017	\$35,001,233.00	13.44%	6.91%	9.95%	5.47%
Washington Teachers Plan	2017	6/30/2017	\$12,524,207.00	13.44%	6.91%	9.95%	5.47%
Florida RS	2017	6/30/2017	\$154,053,262.97	13.77%	5.85%	9.51%	5.46%
San Francisco City & County	2017	6/30/2017	\$22,410,350.00	13.81%	6.19%	9.98%	5.40%
Illinois Universities	2017	6/30/2017	\$18,484,819.58	12.20%	5.00%	9.00%	5.40%
Oregon PERS	2017	6/30/2017	\$66,371,703.25	11.92%	5.72%	9.19%	5.37%
Idaho PERS	2017	6/30/2017	\$15,335,945.86	12.70%	5.80%	8.60%	5.30%
LA County ERS	2017	6/30/2017	\$52,743,651.00	12.70%	5.80%	9.00%	5.20%
New Mexico Educational	2017	6/30/2017	\$12,509,355.91	12.00%	6.10%	8.70%	5.20%
Massachusetts SRS	2017	6/30/2017	\$26,282,232.00	13.24%	6.36%	9.79%	5.10%
Massachusetts Teachers	2017	6/30/2017	\$27,138,609.00	13.24%	6.36%	9.79%	5.10%
Connecticut Teachers	2017	6/30/2017	\$17,134,326.00	14.38%	5.63%	8.80%	4.97%
California Teachers	2017	6/30/2017	\$210,289,900.00	13.44%	6.32%	10.05%	4.95%
Maine State and Teacher	2017	6/30/2017	\$10,893,305.47	12.50%	4.90%	8.40%	4.90%
Virginia RS	2017	6/30/2017	\$70,159,680.00	12.10%	6.20%	9.10%	4.90%
Connecticut SERS	2017	6/30/2017	\$11,929,236.42	14.32%	5.63%	8.80%	4.87%
Illinois Teachers	2017	6/30/2017	\$49,375,664.52	12.60%	5.40%	9.20%	4.80%
Illinois SERS	2017	6/30/2017	\$16,530,179.79	12.30%	5.30%	9.40%	4.60%
Ohio School Employees	2017	6/30/2017	\$13,438,843.28	13.20%	6.00%	9.60%	4.50%
South Carolina RS	2017	6/30/2017	\$25,732,829.00	11.88%	4.23%	7.50%	4.48%
San Diego County	2017	6/30/2017	\$11,397,064.76	12.00%	4.90%	7.10%	4.40%
California PERF	2017	6/30/2017	\$326,498,998.00	11.20%	4.60%	8.80%	4.40%
Maryland PERS	2017	6/30/2017	\$16,540,665.00	10.00%	4.60%	7.60%	4.20%
Maryland Teachers	2017	6/30/2017	\$29,731,192.00	10.00%	4.60%	7.60%	4.20%
New Mexico PERA	2017	6/30/2017	\$14,798,917.91	11.10%	4.39%	8.53%	4.08%
Pennsylvania SERS	2017	6/30/2017	\$29,405,042.00	12.00%	4.70%	7.90%	3.90%
Pennsylvania PSERS	2017	6/30/2017	\$53,155,336.00	10.14%	4.76%	7.35%	3.80%
Indiana PERF	2017	6/30/2017	\$14,644,671.00	8.00%	3.00%	5.70%	2.90%
Indiana Teachers	2017	6/30/2017	\$11,069,670.00	8.00%	3.00%	5.70%	2.90%

Source: Authors' analysis and Public Plans Database (2018)

Our findings are also confirmed by the plan's consultant reports for peer performance, which show consistently below-median performance for SERS and PSERS. For example, a 2016 CEM Benchmarking report for SERS illustrates that the fund's 4-year net total return of 7.9% is below a U.S. Public median of 8.8% and a peer median of 9.0%.^{lvii} It also states that the fund's 4-year policy return of 8% is below the U.S. Public median of 8.6% and peer median of 8.7%.^{lviii}

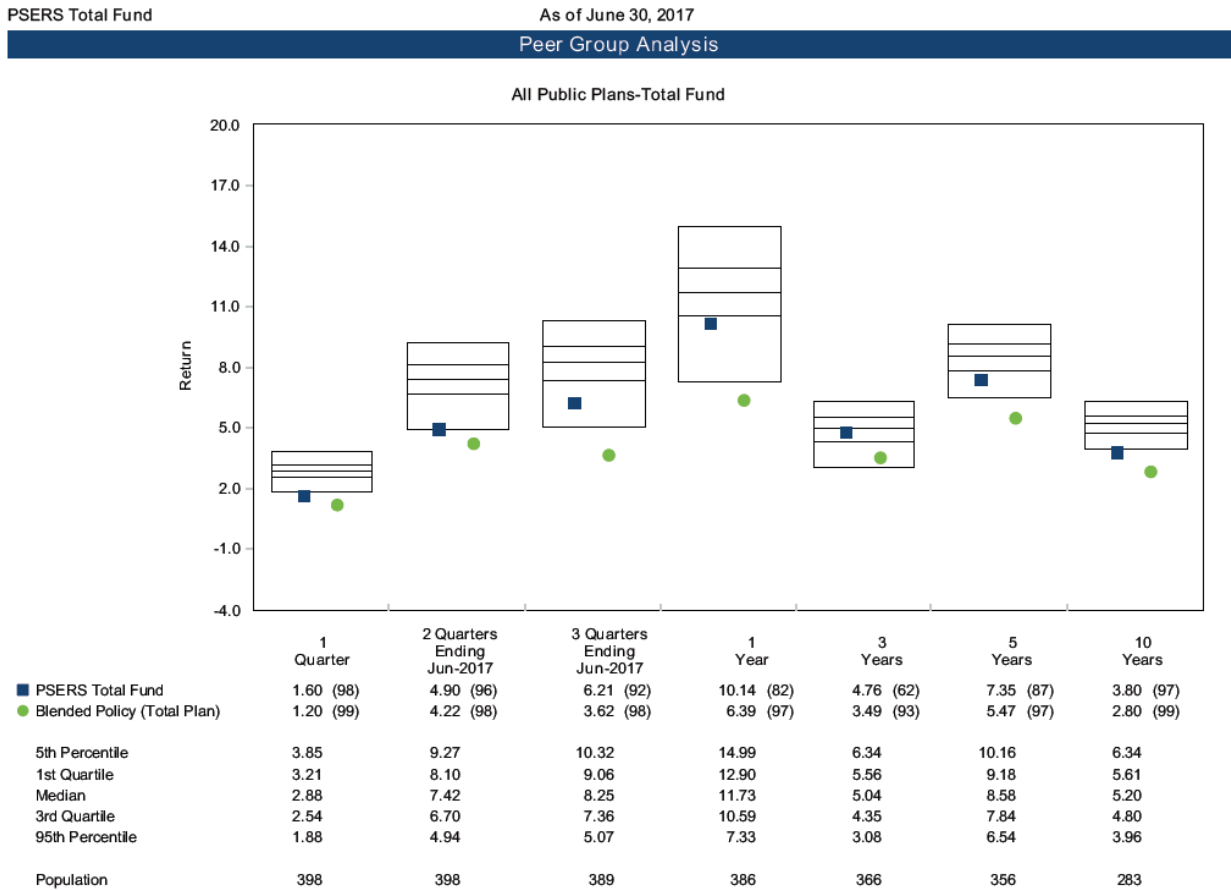
Figure 2.19 SERS 4 Year Net Total Return Comparison



Source: CEM Report – SERS Investment Cost Effectiveness Analysis 2015

Similar results can be observed in a quarterly investment review of PSERS performed by Aon Hewitt Retirement and Investing for second quarter 2017 results. In a peer group assessment of total fund performance in 2017, PSERS’ total fund results consistently perform towards the lower end of the spectrum for 1-year, 3-year, 5-year, and 10-year return results.^{lix}

Figure 2.20 PSERS Total Fund Analysis vs. peer group (Aon)



Source: Aon PSERS Total Fund Assessment Second Quarter 2017 Review

This would suggest that PSERS and SERS have consistently performed lower than most U.S. pension plans, irrespective of peer groupings or time periods, in the last 20 years.

2.7.2 Investment Performance Synthesis

From an absolute returns perspective, the peer group experienced a decline in long-term performance for the period of 2008-2017. While funds experienced strong short-term total portfolio 1-year returns in 2017, none of the funds exceeded their discount rate based on 10-year annualized figures. However, when isolating for the financial crisis embedded within the 10-year period, and focusing on 5-year returns, the data illustrates that all funds exceeded their discount rate in the medium term.

The relative performance of SERS and PSERS against the peer group changes depending on the measure being assessed, which is why this set of chapters looks at returns, value added, and benchmarks holistically.

From a total portfolio returns perspective, the data shows that both SERS and PSERS underperformed the peer group in the 2008-2017 period. On one hand, PSERS had the

lowest total portfolio returns among the peer group for 1-year, 5-year, and 10-year return figures. On the other hand, while SERS outperformed the peer group average at the 1-year mark, it was the second lowest performer (after PSERS) for 5-year and 10-year returns.

A look at value-added figures reveals opposite results. Based on value-added data, PSERS appears to be a strong performer, beating the peer group average across all time horizons. Meanwhile, SERS appears to be a low-performing fund against the peer group for all years. These value-added results, however, can only be assessed considering the relative performance of the funds' benchmarks. After all, as discussed above, investors can use benchmarks to disguise underperformance by selecting benchmarks that generally produce lower returns, and investors who pick more rigorous benchmarks should not be punished for doing so.

By incorporating benchmark performance into the analysis, one can observe another reversal of performance for SERS and PSERS. From a peer group lens, and similar to absolute returns, the total portfolio benchmark returns generally outperformed the funds' discount rates in the short term (1 year) but underperformed in the long term based on 10-year benchmark returns. Isolating for the financial crisis, from a 5-year total portfolio benchmark return lens, all peer group benchmarks exceeded their discount rate, with the exception of Georgia Teachers and PSERS. For Georgia Teachers, this is inherent to the fact that the fund selected CPI as their benchmark to follow inflation. For PSERS, however, this is an illustration of the systemic underperformance of its benchmarks relative to those of the peer group.

When assessed against peer group benchmark returns, PSERS' benchmark underperformance holds true. In fact, PSERS' total portfolio benchmark returns experienced the lowest performance amongst the peer group. In contrast, SERS' total portfolio benchmark returns exceed the peer group average across all time horizons.

In summary, from a holistic perspective that considers returns, value added, and benchmarks, the data reveals that both SERS and PSERS underperform when assessed against the peer group. While PSERS had positive value-added figures, a look at its benchmark performance reveals that these value-added figures are relatively high because the benchmarks they are measured against are relatively low compared to the peer group. In terms of absolute returns, PSERS is the lowest-performing fund in the peer group across all time periods. Data on SERS' performance reveals that overall, the fund has performed relatively better in the short term than it has in the long term. This is true not only for its absolute returns, where SERS underperformed the peer group average in the 5-year and 10-year marks and was the second-lowest performer after PSERS, but also for its total portfolio benchmark returns, which underperformed the fund's discount rate in the 10-year time horizon. SERS' relatively low performance in value added should be assessed against the fact that it has higher benchmark returns than most funds in the peer group.

To better understand the causes behind the performance of SERS and PSERS, one must once again look at their asset allocation strategy and their effectiveness of executing against it. SERS' and PSERS' low funded status and their cash flow requirements must be considered when assessing their relative performance. Their requirements for cash and liquidity, due to significant underfunding, have been crucial in shaping their asset allocation. Yet, both funds have responded differently to these constraints. SERS made a strategic choice to focus on equity and fixed income. Meanwhile, PSERS has decreased its dependency on equity markets while increasing its exposure to alternative asset classes. The difference in these asset allocation strategies, as well as their execution against them, reveals much about the funds' performance over the 2008-2017 period.

Beginning with SERS, one can observe that the fund has opted to focus on equity and fixed income as major pillars of their asset allocation strategy. By 2017, these two asset classes made up a cumulative 66% of their portfolio, compared to 47% in 2008. After an initial divestment from equities through 2010, their focus on equities has allowed them to capture the value derived from the "longest bull run in history," where the S&P 500 has quadrupled from its 2009 low of 666.^{lx} However, SERS' ability to generate returns in this asset class is relatively lower when compared to the peer group.

As the data presented illustrates, SERS' equity returns were above the peer group average in the short-term (1-year), but it underperformed in the medium- and long-term (3-year, 5-year, and 10-year). The same is true for fixed income, where SERS outperformed the peer group average for 1-year returns but underperformed across other time horizons.

The analysis shows that SERS faces an execution challenge. The fund has followed an asset allocation strategy that has allowed them to capture market value as equity values have risen across time, but when compared to the peer group, equity and fixed income, their "big bets" have produced lower returns than other funds in the peer group.

PSERS' strategy of diversifying their portfolio and investing in "all asset classes available to it . . . [including] risk parity and absolute return"^{lxi} may be contributing to their relative underperformance over long time periods. To begin with, it should be noted that PSERS is a relatively strong performer in fixed income – its largest asset class – as it beat the peer group average across all time periods covered. However, a challenge faced by PSERS' asset allocation strategy can be observed in their sustained divestment out of equities. The fund's initial allocation for equity at the beginning of the period was 52% and it began to decrease at the onset of the global financial crisis, like most other funds. However, PSERS did not rebalance its equity allocation. In fact, other than a minor increase between 2014 (21%) and 2015 (24%), equity allocations continued to decline across the time period. In 2017, PSERS was the only fund that did not have equity as its largest asset class. The fund was not able to fully extract value from the recovery in equities post-2010 by not rebalancing to its previous policy target, as SERS and other funds did. Moreover, the fund has chosen to focus on alternative asset classes, where it has not produced relatively higher returns than a balanced mix of listed market indices. For example, PSERS is the fund with the largest allocation towards commodities across the peer group (10% in 2017) and it doubled its allocation from 5% in 2008; yet, it has

experienced losses across all time periods covered (-3.48% 1Y; -8.02% 3Y; -4.62% 5Y; -3.42% 10Y). Although positive on an absolute basis, a similar relative underperformance can be observed for private equity, where PSERS has increased its allocation from 14% in 2008 to 20% in 2017. In this case, PSERS' returns were below the peer group average across all time periods. Despite the positive returns, the fact that PSERS underperforms other funds in asset classes where it has chosen to focus on and allocate high percentages of its portfolio, points to both strategy and execution challenges for that fund.

As the data shows, PSERS outperforms in fixed income, the asset class that represents its largest portfolio allocation. However, it is not a relatively strong performer in other illiquid asset classes that it has chosen to focus on as part of its diversification strategy away from equity. Lower return expectations for investment grade bonds in a rising interest rate environment could further limit their portfolio's return in excess of inflation with higher duration fixed income allocation. Moreover, its large and sustained divestment from equity has meant that it has not captured the benefits of the longest bull market in history, and could limit future potential portfolio return in excess of inflation. Adopted strategic asset allocation using reasonable return expectations can have consistency implications for the pension plan's discount rate.

2.7.3 Risk Adjusted Performance

As discussed earlier, it is critical to analyze the returns achieved on a risk-adjusted basis – that is, to measure the investment return relative to the amount of risk the investment has been exposed to. We aligned our analysis with each plan's respective fiscal year given availability of annual returns, thus analysis periods below overlap, but don't begin and end on the same date. We have calculated both Sharpe Ratios and Information Ratios on return data obtained from publicly available sources of the respective websites of SERS and PSERS beginning in 1988 – about 30 years. This includes various measures required to calculate the performance ratios including risk, returns, and value added relative to various multi-asset class benchmarks we developed using public market indices to construct appropriate balanced asset allocations. Unfortunately, data was not available for the peer group for longer timeframes as was available for absolute performance. The risk-adjusted performance analysis focuses solely on the two plans themselves.

As highlighted above, data for performance analysis or security prices can be difficult because of limitations caused by small sample size due to less than desirable data frequency or shorter time periods. Generally, performance statistics such as Sharpe and Information Ratios should be evaluated over at least an investment or business cycle, including the most recent trough in Q1-2009. Furthermore, if there is a lot of variation in the strategic policy mix, statistical results may not be as significant.

Private market investments also introduce uncertainties, including infrequent and limited mark-to-market pricing, which should not be mistaken for greater diversification effects or lower risk than is reasonable to assume for smaller company or illiquid securities. Actual fund risk may be understated given long lags between updating fair value prices, the uncertainty of pricing non-marketable securities in private equity, private debt, real

estate, infrastructure, and even hedge funds. Limited frequency of fair value pricing of private market funds creates a lower risk illusion for the total fund return simply by observing only quarterly returns, let alone annual returns. The greater the exposure to private market funds, the more likely that observed total fund return risk is understated.

Benchmarks Used for Information Ratios

In order to calculate risk-adjusted performance, we constructed various multi-asset benchmark portfolios using simple public total return indices. These benchmarks compounded monthly data to provide annual returns compatible with annual plan returns. We used 30 years of data to develop a comparable history with large enough sample size to provide significant calculations.

There are three main multi-asset benchmarks that we used to compare the plans against. These benchmarks were intended to provide simple public market index representations of the funds' policy asset allocation. By using a simple representative public market index we can get a better understanding of behavior of risk over the period to check, assuming there is an alignment to the objective of the fund. This allows us to understand whether changes in the risk-adjusted ratio are due to market volatility or whether they are specific to fund selection or investment decision-making.

The first benchmark was made up of a simple U.S.-based balanced portfolio – 60% equity, 30% bonds, 5% real estate, and 5% cash.

The second is a global balanced portfolio with 60% equity and 40% fixed income that includes typical sub-allocations to different indices, relatively consistent with an optimal mean-variance allocation.

The third benchmark is a global mix of public indices that is similar to the most recent policy allocation of the respective exposures in the case of PSERS. For SERS, we included a simple 60% Global Equity (MSCI World) and 37% JPM Global Bonds (3% Cash), as the global balanced portfolio is relatively similar to their current allocation.

The final benchmark is a quasi-LDI benchmark. This allocation has a slightly longer duration bond-heavy mix with an allocation to commodities versus PSERS given their allocation to commodities.

The asset allocation weights are provided below for each of the benchmarks used for comparison. Global Balanced and US 60/30/5/5 are slightly different due to different beginning and ending periods (Dec. 2017 vs. June 2018 for PSERS) from differences in their respective fiscal year-end.

Table 2.23: Asset class weights for Benchmarks used in analysis

SERS	S&P500	R2000	MSWorld	EAFE+Can	EmgMkt	NAREIT	CRB	T30Y	T10Y	HIYLD	AggBND	SHTBND	JPM-GBND	JPM-GBxUS	T-Bill
Global Bal	36.00	9.00		9.00	6.00	5.00				7.00	15.75	5.25		3.50	3.50
60/40 Global			60.00										37.00		3.00
Quasi-LDI	12.00	9.00		6.00	3.00	10.00		6.00	12.00	18.00	24.00	0.00		12.00	-12.00
PSERS	S&P500	R2000		EAFE+Can	EmgMkt	NAREIT	CRB	T30Y	T10Y	HIYLD	AggBND	SHTBND		JPM-GBxUS	T-Bill
Global Bal	36.00	9.00		9.00	6.00	5.00				7.00	15.75	7.00		3.50	1.75
PSERS Global	21.00	5.25		5.25	3.50	15.00				12.50	30.00	0.00		5.00	2.50
Quasi-LDI	12.00	9.00		6.00	3.00	10.00	15.00	9.00	9.00	11.25	18.00	0.00		9.00	-11.25

Source: Author

Because the reporting periods for both plans are different, we carried out separate calculations of the respective multi-asset index benchmarks created for comparison. Both plans have asset allocations that have varied tremendously over the last 30 years, with a significant decline in equity exposure for PSERS following the Financial Crisis in 2008.

The index benchmarks are representative of passive investments that have been challenging strategies for the average investor or multi-asset fund to beat, but it is noteworthy that index tracking funds necessarily underperform their indices by at least the related fees and transaction costs over longer horizons, even if management fees are less than 5-10 basis points.

Performance – PSERS

The following table summarizes the calculated risk-adjusted performance measures for PSERS:

Table 2.24: PSERS Risk Adjusted Performance Results

<u>PSERS</u>	<u>Retn%</u>	<u>Balanced Benchmarks</u>				<u>T-Bill</u>
		<u>US 60/30/5/5</u>	<u>Global Bal</u>	<u>PSERS Global</u>	<u>Quasi-LDI</u>	
30yr Return	8.43%	8.50%	8.14%	7.95%	7.43%	2.92%
Risk	10.21	9.48	9.01	7.34	7.14	2.59
Sharpe Ratio	0.54	0.59	0.58	0.69	0.63	
Information Ratio vs.		-0.01	0.07	0.09	0.16	
10yr Return	5.03%	7.76%	6.79%	6.70%	5.85%	0.31%
Risk	12.86	10.20	11.27	9.92	10.40	0.42
Sharpe Ratio	0.37	0.73	0.57	0.64	0.53	
Information Ratio vs.		-0.81	-0.50	-0.35	-0.15	
5yr Return	7.62%	9.29%	7.73%	6.97%	5.62%	0.42%
Risk	5.55	4.72	6.28	4.20	5.32	0.56
Sharpe Ratio	1.30	1.88	1.17	1.56	0.98	
Information Ratio vs.		-0.97	-0.07	0.21	0.46	

Source: Author

As mentioned, the fiscal year end for PSERS is June 30th and so the beginning and end-points for PSERS results in different asset class and benchmark returns, although significantly overlapping. The returns data was obtained from the plan's website through June 30, 2018. For PSERS, only gross returns were recorded prior to 2002, and so an assumed expense ratio of 0.25%, consistent with historical average difference between

net and gross returns, was applied to make the data consistent with net returns over the full period.

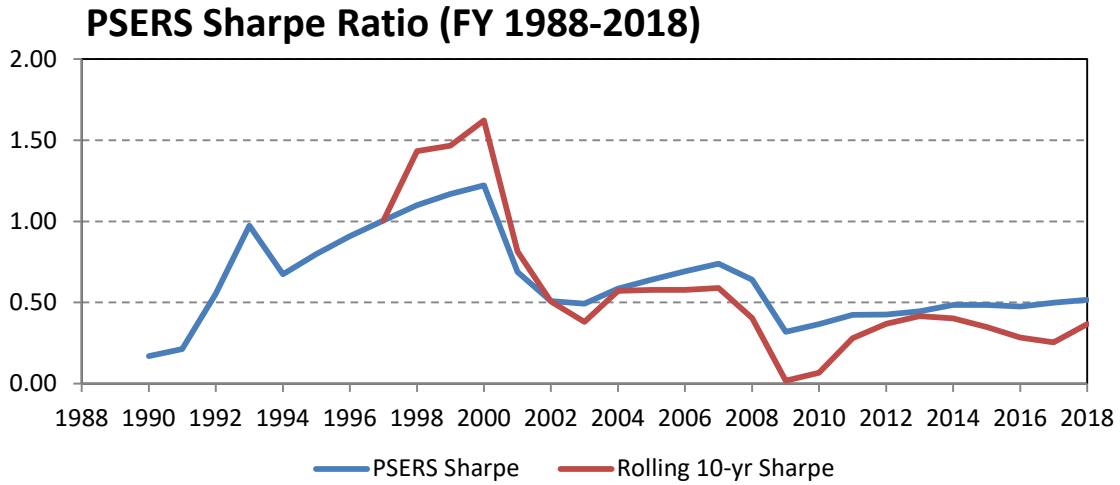
The asset allocation of the global balanced strategies of SERS and PSERS are different to reflect the unique characteristics of each plan's unique investment strategy. PSERS' equity allocation is closer to 40% with longer duration fixed income, and includes commodities. SERS has an equity policy allocation of 60%, but the fund recently maintained exposure closer to 65%.

The 30-year PSERS Sharpe ratio is slightly lower than all the alternative balanced benchmarks, but the 10-year Sharpe ratio is 2/3rds of the global balanced portfolio, reflecting more than a 2:1 ratio of risk to return in excess of the risk-free rate despite a higher-than-average exposure to bonds, including leverage.

10-year negative information ratio vs. US 60/30/5/5 and Global Balanced portfolios, for example, reflects that PSERS has significantly and consistently underperformed various simple multi-asset index portfolios. This is particularly troubling given the last decade through June 2018 provided the best possible capital market return regime of falling interest rates and quantitative easing (exceptional demand for Treasuries), resulting in a flattening yield curve that benefited long duration or leveraged fixed income strategies. Given the Treasury yield curve should eventually normalize as interest rates risk further, coinciding with reducing the Fed's balance sheet, the coming years may be particularly challenging for LDI and risk parity strategies favoring long duration bonds, just as we have observed during periods of rising bond yields historically. Leveraging bond exposure can be particularly treacherous in a rising interest rate environment as short-term refinancing costs can rise faster than long duration coupon yields. This negative cash flow scenario contributed to driving Orange County into bankruptcy with just 150% leverage on a \$7.5 billion portfolio.

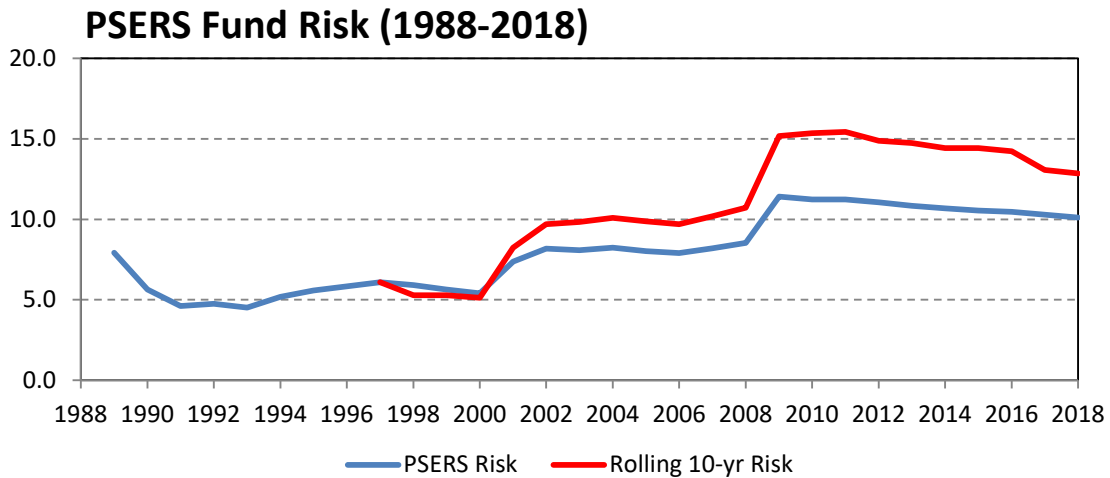
The chart below shows the historical Sharpe Ratio for PSERS as well as the rolling 10-year Sharpe ratio value. Similar measures for the overall Fund risk of the plan are shown also below.

Figure 2.21: PSERS Historical Sharpe Ratio



Source: Author

Figure 2.22: PSERS Fund Risk



Source: Author

The charts show that the Sharpe Ratio of the PSERS portfolio over the first half of the period was much higher than the second half of the period as total fund risk has nearly doubled. Information ratios relative to these benchmarks are not statistically different from 0, which are not surprising given the Sharpe Ratios are similar.

Performance – SERS

The following table illustrates the calculated risk-adjusted performance of SERS:

Table 2.25: SERS Risk Adjusted Performance Results

SERS	Retn %	Balanced Benchmarks				T-Bill
		US 60/30/5/5	Global Bal	60/40 Global	Quasi-LDI	
30yr Return	8.98%	9.38%	9.33%	7.53%	7.89%	3.09%
Risk	11.44	11.12	11.83	10.53	9.01	2.56
Sharpe Ratio	0.51	0.49	0.47	0.30	0.33	
Information Ratio vs.		-0.08	-0.07	0.27	0.16	
10yr Return	4.06%	7.08%	6.56%	5.24%	6.01%	0.33%
Risk	12.72	12.19	14.23	11.31	11.11	0.49
Sharpe Ratio	0.29	0.55	0.44	0.43	0.51	
Information Ratio vs.		-0.85	-0.45	-0.25	-0.29	
5yr Return	8.27%	10.75%	9.46%	7.60%	6.48%	0.26%
Risk	5.99	6.72	7.34	7.52	4.96	0.36
Sharpe Ratio	1.34	1.56	1.25	0.98	1.25	
Information Ratio vs.		-0.96	-0.58	0.37	0.63	

Source: Author

The fiscal year for SERS ends on December 31st with the data here being included until December 31, 2017.

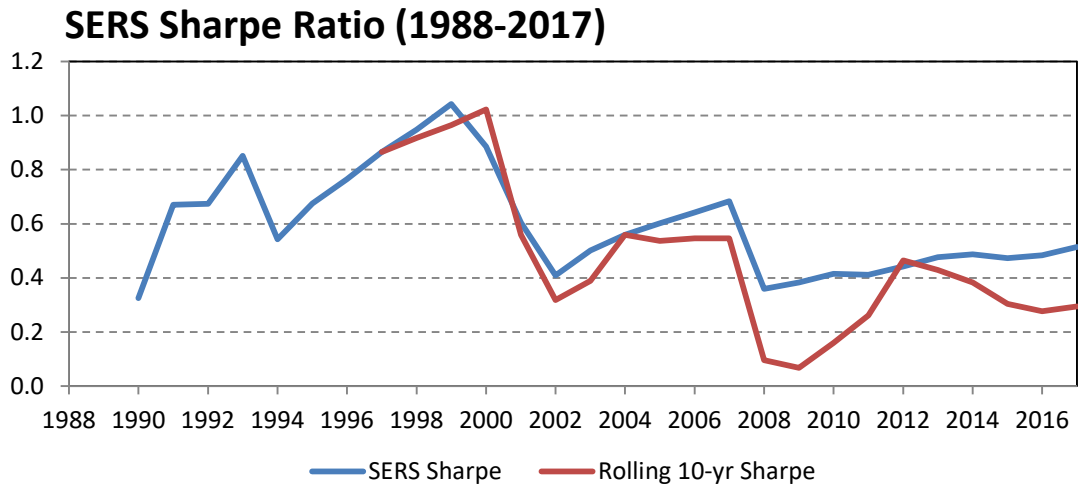
The 30-year SERS Sharpe ratio is similar to the alternative U.S. and global balanced benchmarks constructed, but the 10-year Sharpe ratio is materially less than the global balanced portfolio. A meaningfully lower Sharpe ratio for 10 years intuitively coincides with a meaningfully negative information ratio versus various passive alternative strategies, although not incorporating management fees or transaction costs.

Calculations for simple comparative U.S. and global 60/40 balanced benchmarks suggest there are liquid global balanced benchmarks that would have provided meaningfully better performance with greater consistency, particularly over the last 10- or even 5-year periods than the SERS' net return.

The negative 10-year information ratio versus both US 60/30/5/5 and Global Balanced benchmark portfolios further reflects that SERS valued added underperformed other alternative policy mixes on a risk adjusted basis.

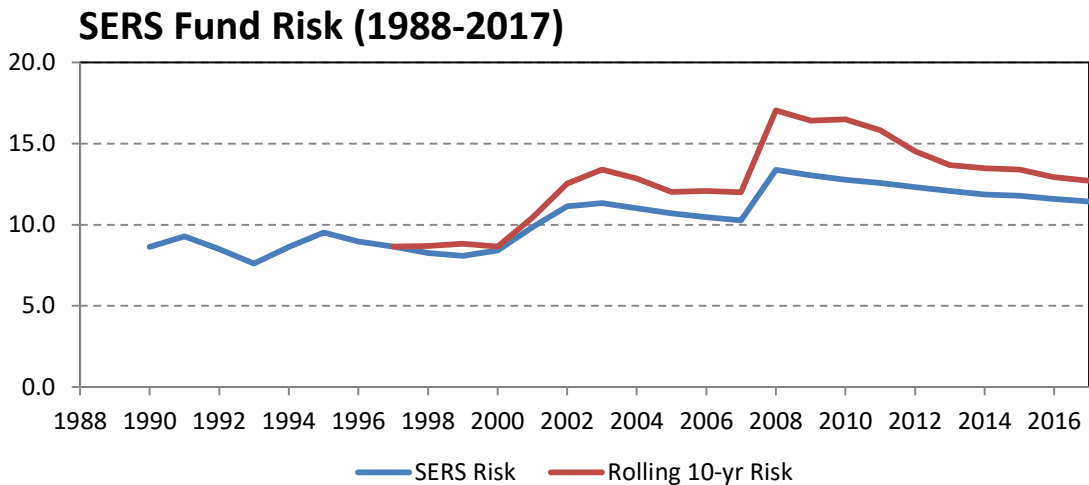
The following charts indicate the Sharpe Ratio and Fund Risk for SERS over the time period examined. Values are provided for the fund over the entire period as well as a rolling ten-year value.

Figure 2.23: SERS Historical Sharpe Ratio



Source: Author

Figure 2.24: SERS Historical Fund Risk



Source: Author

Similar to PSERS, the charts show that the Sharpe Ratio over the first half of the period was much higher than the second half of the period while total fund risk increased.

2.8 Summary of Asset Allocation and Performance Analysis

In summary, the analysis documented in this section reveals some key insights and findings about the two PA pension plans.

Firstly, the absolute performance analysis would suggest that both the PA plans have underperformed when compared against the peer group used in this set of chapters. This underperformance was confirmed when assessing the funds against a wider universe of funds in the Center for Retirement Research Public Pension Database. Furthermore, the risk-adjusted performance analysis of the two funds indicates very low Sharpe ratios over the 10- and 30-year time periods. The information ratio calculations show that both funds have underperformed against simple balanced public index portfolios over the 10- and 30-year periods. We note that using longer time horizons for risk-adjusted returns is important in order to provide a more accurate value of risk that takes into account a full cycle. Smaller time horizons can provide misleading values for risk that don't take into account market corrections.

The overall fund risk of the two plans increased over longer horizons and remains at high levels, despite recent market volatility decreasing across equities, bonds, and currencies.

The performance results of the two funds provide evidence that the current asset allocation strategies employed by the funds might need to be addressed. Specifically for PSERS, the significant use of leverage to extend duration in fixed income is a cause for concern, particularly if short-term refinancing costs rise faster than long duration yield. The high allocation to fixed income may restrict the fund's ability to earn returns closer to its expected discount rate return (if real bond returns decrease as the Fed normalizes monetary policy). The high return expectations for commodities might also be cause for concern in attempting to achieve returns close to the discount rate of the fund.

For both funds the allocations to illiquid asset classes should be addressed. The risk-adjusted performance against simple balanced public indices highlights the current approach to illiquid asset classes may not be very effective and has increased risk. Illiquid investments should offer a risk premium or identifiable inefficiency, but purchase price matters and stretched valuation plus high fund fees appear to exceed available risk premiums. The combination of illiquidity, lack of transparency, and fund lock-ups preclude efficient rebalancing of a drifting asset allocation mix from cash flows and relative asset class returns.

Many asset owners assume the risk of private markets is unreasonably low and correlation is near zero or even negative. If alternative investments are too costly to manage for certain pension funds or risk premiums diminish with capacity constraints, then no amount of diversification can overcome the headwinds versus public market exposures. Moreover, if fair values are derived from observing public market changes in valuation, then correlations and volatility are much higher than assumed, particularly if mark-to-market prices are infrequent and uncertain. Any benefit to portfolio diversification can be overwhelmed by an asset class that is riskier or more correlated with stocks and bonds than assumed.

Our assessments here based on publicly available information (most notably from the negative information ratios calculated against simple balanced public indices) would

suggest that both plans would have been better off with less complex strategies than have been used.

Our findings from Section 2 are summarized as follows:

- PSERS' asset allocation strategies significantly deviated from the peer group over the ten-year time period (2007-2017), specifically with regards to its low public equity allocation in favor of fixed income, hedge funds, private equity, commodities, and its use of leverage in the portfolio.
- SERS' asset allocation strategies tended to be in line with that of the peer group.
- The absolute performance of the PA plans has been poor.
- PSERS and SERS were the worst and second worst performers, respectively, on an absolute returns basis when compared against our peer group over the 5- and 10- year period.
- Both funds have consistently performed below the median in the wider U.S. public pension plan universe and consultant peer groupings over the last 10 years.
- The risk-adjusted performance analysis shows that PSERS and SERS have Sharpe ratios 2/3rds of a simple global balanced index portfolio over a ten-year period, reflecting more than a 2:1 ratio of risk to return in excess of the risk-free rate.
- The information ratio calculations show that both funds have underperformed against simple balanced public index portfolios on a risk-adjusted basis over the 10- and 30-year periods.
- The preliminary analysis here indicates that the use of leverage by PSERS should be addressed and that both funds' allocations to illiquid asset classes such as private equity should be revisited and reevaluated.

Section 3: Cost-Saving Options and Recommendations

In this chapter, we present non-exhaustive possible cost-saving pathways for the two plans. We specifically present a framework to highlight the drivers of cost-saving that institutional investors have utilized. There are a number of factors that need to be considered before some of these strategies can be adopted, which means that not all of the below will be appropriate for the PA plans. In particular, we highlight the importance of governance for pension funds and how the quality of governance structures can impact the cost-saving strategies a plan adopts. The final part of this section outlines cost-saving recommendations put forward for the plans.

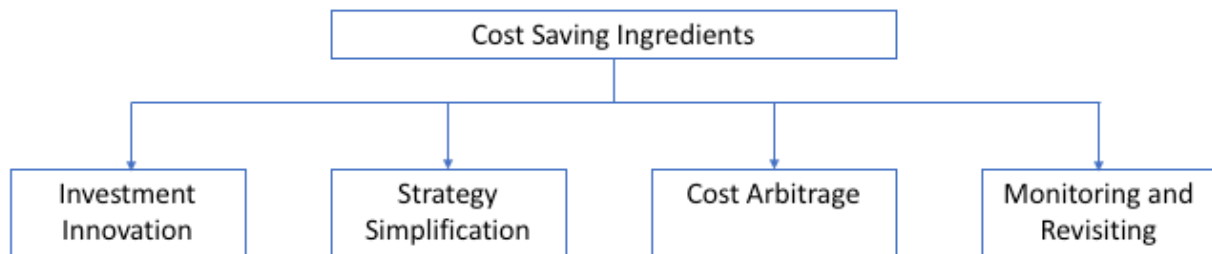
3.1 Cost-Saving Pathways

A growing number of institutional investors are becoming aware of the high costs associated with their investment products and, as a result, they are developing new methods to access certain strategies. It is important to note that we do not recommend any cost-saving pathways that compromise long-term investment returns. Instead, the motivation to explore these options comes from the recognition that direct, indirect, and often hidden costs and charges can limit the upside of an investment strategy, while reinforcing negative returns on the downside of market returns. Cost-saving strategies

should also consider any changes in risk or volatility that might be associated with a change in strategy.

We believe that there are some key ingredients that help to build a menu of cost-saving options for institutional investors. These ingredients provide the conceptual framework for how investors can approach cost-saving opportunities. As highlighted throughout this set of chapters, the local context and unique characteristics of funds may prohibit certain initiatives from being adopted. In this section we highlight the framework for saving costs and the wider tool kit available to investors before examining what is most appropriate in the PA context. The following figure represents the different ingredients of the key cost-saving pathways available to institutional investors:

Figure: 3.1 Cost-Saving Ingredients



Source: Author

These cost-saving ingredients can be explained as follows:

- 1) Investment Innovation: Changing the supply and demand of capital by doing things that others are not (*e.g.*, seeding new managers).
- 2) Strategy Simplification: Complexity generally comes with cost, which means you can remove complexity and cut fees (*e.g.*, indexing). Note that this can imply a change in exposures in some, but not all cases.
- 3) Cost Arbitrage: Looking for similar risk factors in different markets at lower cost (*e.g.*, hedge funds to smart beta).
- 4) Monitoring and Revisiting: Taking what you have in the portfolio and getting a better deal (*e.g.*, renegotiation).

From the principles above, there are a number of initiatives that investors have started to employ to help them run more cost-effective portfolios without compromising returns. When considering which path to take for achieving cost-savings, it is important to understand the comparative advantages and weaknesses of a fund and design the strategy accordingly.

We note that this is a simplified framework to help understand the potential paths that could be taken, and their costs and benefits. It is not intended to be a rigid set of categories for cost-saving strategies to fall under, and we acknowledge that there are certain options that could fall under more than one of these headings.

Investment Innovation

Innovation is rare in asset owner organizations for a number of reasons related to the structural setup of many of the funds. The prudent person rule can lead to herding behavior by funds with many reluctant to do anything different than what their peers are doing. For many investors, having a monopoly of assets can lead to the mindset of “guaranteed survival.” This is backed up by the fact that funds with greater funding ratios usually run lower-risk portfolios. Many professionals working at institutional investors are poorly compensated relative to private sector investment professionals, leading them to focus on career risk rather than investment risk. There is thus a lack of incentives and capabilities for innovation to occur. Poor governance within plans and overly bureaucratic systems can stifle organizations’ ability to innovate and act opportunistically. The over-reliance on consultants and financial services firms can bring misaligned advice that stifles innovation. While there are structural challenges for certain organizations, we have observed amongst the best performing funds that innovation is a key ingredient for the adoption and implementation of certain cost-saving investment strategies. Some of these strategies include:

- Seeding new managers
- Entering into new forms of collaboration with peers and partners
- Using different corporate structures, such as platform companies (e.g., REOCs)
- Utilizing new technologies

Seeding new managers, entering new forms of collaboration with peers and partners, and using different corporate structures, such as platform companies, represent some of the new ways that investors are accessing attractive investment opportunities. A core driver behind this innovation has been a dissatisfaction with the performance and service provided by their intermediaries, which has fueled the desire to form new more aligned partnerships. As will be discussed in an example below, seeding new investment managers or teams can lead to significant cost-savings in management fees and carried interest. Investors in these examples are in a better position to set the terms and conditions of the de novo funds setup. These managers can be more motivated for success than existing managers, because doing well is a matter of survival. Data has shown that new funds in certain asset classes outperform existing funds.^{lxii}

Collaboration is about consciously and strategically forming new partnerships with peer organizations to help build organizational capacity and subsequently gain more alignment on investments. By developing trusted relationships with other pension funds and asset owners, investors are able to learn from the respective idiosyncrasies and comparative advantages and through these relationships build their own capabilities, which reduce their reliance on intermediaries and subsequently reduce costs. Collaboration can lead to co-investment opportunities with these aligned partners where management fees are significantly reduced or eliminated altogether.^{lxiii}

Platform companies are a further extension of seeding, where new corporate structures, such as LLC’s or joint ventures, are used to access opportunities in a more aligned

fashion with proven trusted partners. Investors have formed platform companies and joint ventures for investments in real estate, infrastructure and agriculture, where the partner may have domain experience in construction, development, or management of assets.

Technology is the medium through which organizations transfer and communicate decision-critical information to decision-makers, such as the board and/or investment committee. These systems can serve to empower professionals and streamline investment processes, including risk management. Whereas data and information systems are typically counted as costs to any organization and, at times, discounted accordingly, effective and timely information systems can reinforce an organization's comparative advantages, build or reinforce the legitimacy of an investment team and its board, and thereby distinguish an asset owner investor from other competing organizations. New technologies have been developed, for example, for better monitoring the performance of investment managers using data science and machine learning techniques.^{lxiv}

Case Study: Seeding new private equity managers

Innovation for cost-saving opportunities has been particularly important in the private market asset classes specifically in private equity, where costs are usually a lot higher than in other asset classes. The Limited Partnership Agreement (LPA) used as the most common vehicle for accessing private market investments has come under scrutiny because of overly complicated waterfalls, hidden costs through transaction fees and board monitoring fees, and general opacity of underlying investments. The Private Equity model has arguably become more focused on fees and asset gathering rather than investing – General Partners (GPs) of funds have been employing the cyclical strategy of raising a fund then deploying it quickly, raising an even larger fund and so on, leading to an increase in assets under management. Returns from private equity have become more dependent on financial engineering and leverage rather than operational and top line improvements in portfolio companies. The use of leverage could be used to pay distributions and artificially boost fund IRRs but leave underlying portfolio companies with a lot of debt. GPs could easily move on to raising successive funds without actually creating value. GPs often would sell their best companies early to return capital and boost returns in order to raise successive funds. In recent years, GPs have underwritten deals with lower returns in order to get Funds invested.

The alignment of interest within private equity between limited partners and GPs has been greatly reduced and investors have started to realize that PE returns, often driven by extensive leverage, are not likely to generate sufficient return to justify the risk. Despite the possibility underlying private equity being attractive, accessing the asset class via typical PE fund terms is increasingly unattractive. This has led to innovation occurring amongst certain funds to invest in private equity more on the terms of asset owners. Investors, either alone or with other LPs, have 'seeded' or launched de novo PE firms to achieve improved alignment and better returns. Seeding essentially is the process of forming new PE funds with an exclusive relationship that enables better cost economics for the investor.

When seeding new PE firms, a key objective has been to create a structure that ensures wins and losses are shared proportionally and commensurately with the risks being assumed by the various parties. In a seeding arrangement, LPs are able to ensure that GPs invest their own money into the opportunities and make sizable commitments to the initiative. This enables LPs to achieve lower fees and more governance oversight.

The following illustrative example from a pension fund outside of the USA shows that considerable cost-savings can be achieved from seeding:

Table 4.1 Seeded Fund Fee Reduction Example

	Fees	Carry
Seeded Funds (70% of portfolio)	0.875%	11.81%
Traditional Funds (30% of funds portfolio)	1.74%	20%
Weighted average funds portfolio	1.13%	14.22%
Co-investments and Direct Investments (44% of portfolio)	0%	0%
Weighted average total PE Portfolio	0.63%	7.93%

Source: Author

The above figures were for a private equity portfolio of \$14 billion. The total portfolio 5-year return (IRR) net-of-all-fees was 19.43% (as of March 31, 2014). The funds' 5-year net IRR was 15.6%, while the co-investments and direct investments achieved a 5-year net IRR of 28.8%. Co-investments and direct investments incur no fees at all and are most likely to generate better net performance than the traditional fund route. This may not always be the case, as illustrated by Fang et al. 2014, who showed that while direct investments outperformed fund investments, co-investments alongside fund managers underperformed fund investments due to adverse selection by fund managers. This is partly due to the fact that managers do not earn management fees and performance fees on co-investment deals, and so are not motivated to bring the best deals to co-investments. Despite this, other studies have shown that the highest-cost implementation styles for private equity have the worst net returns, and that the full costs are materially underreported in the financial statements of many funds.^{lxv}

Despite the advantages of direct and co-investments as well as seeding de novo funds, these strategies can be resource intensive and do require a certain skill set, experience, and network to implement successfully. As will be discussed at length in latter sections, there are certain prerequisites before any fund should consider these strategies. The purpose of providing these examples, however, is to illustrate how cost-savings can be achieved through innovation within asset owner organizations. Seeding private equity managers as an interim step towards direct and co-investing can be seen as an example of this innovation, not only for saving costs in asset classes that utilize limited partnership agreements such as private equity, infrastructure, real estate, and hedge funds, but to help build organizational capacity.

Strategy Simplification

The complexity of finance was most notably exposed in the financial crisis of 2008-2009 following the subprime mortgage meltdown. A key contributing factor to the crisis was arguably the complexity of the derivative products that were developed from relatively simple, albeit subprime, mortgages.

Investment management and finance were not always this complex. Traditionally, finance was a highly personal industry based on mutual and local understanding. Bankers often put themselves at the center of local communities, providing a service that was well understood and important. Investors focused on their knowledge of specific assets and opportunities. They understood exactly what they were investing in and had a deep appreciation of the actual function of the businesses in their portfolio and what was driving returns. While effective, this model of finance was difficult to scale to the masses. And in an era marked by a lack of capital, policymakers and financiers agreed that the productization of finance was needed in order to transform the financial services industry into something that could be more easily accessed by all.

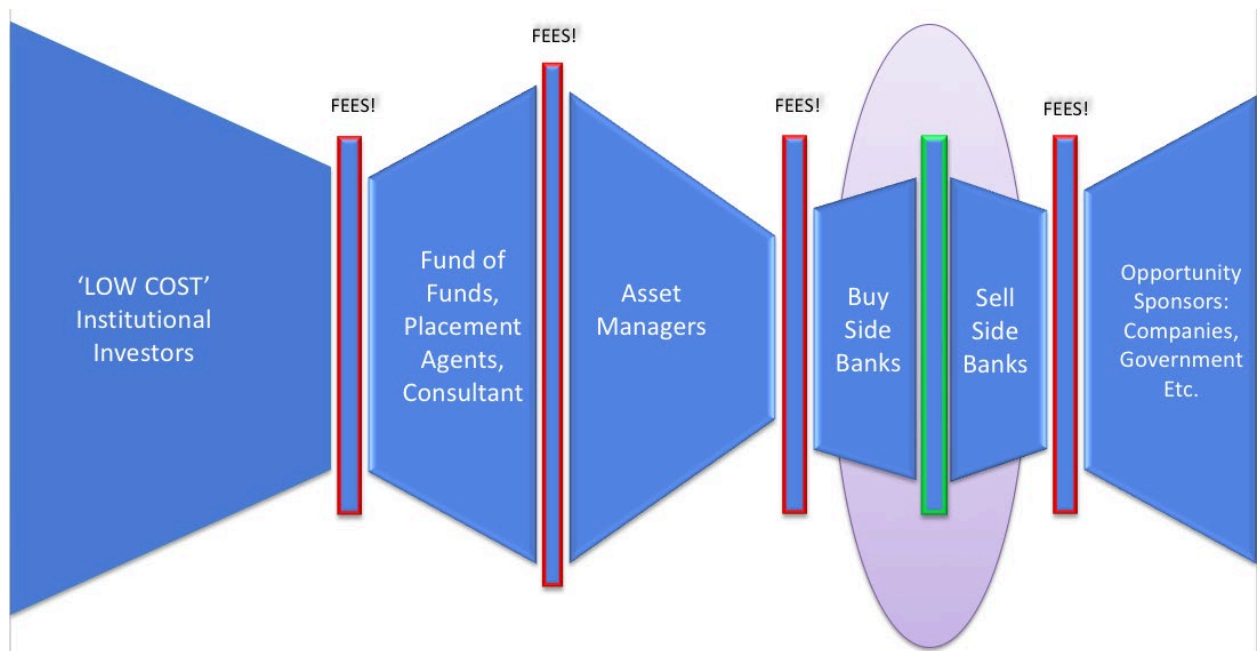
Finance thus transitioned from an inherently local product rooted in communities of banks and investors to a global product overseen by global firms in financial centers.^{lxvi} The very notion of selling financial “products” (as opposed to investing in companies or assets) underscores the de-localization that began to take place. Financial products became abstractions of “real” assets and companies. The products often tranced and stripped the underlying assets of local or idiosyncratic characteristics in order that they could be sold to investors on exchanges with the help of rating agencies and a plethora of intermediaries. Today, financial products are “packaged” and sold to investors looking to satisfy a specific return need, often with very little understanding of the ingredients that are meant to deliver those returns.

Given the operating and governance constraints asset owners such as pension funds exhibit, it can be challenging to break down the amount of complexity associated with the expanding array of financial products and services on offer. Many investors do not understand the fees, costs, risks and thus incentives being accepted either explicitly or implicitly in financial products. Furthermore, it is very hard to get ahead of the innovations in terms of knowledge. In fact, perversely, financial education and literacy has been linked to increasing levels of obfuscation and intended disorientation by financial service providers intent on maintaining their knowledge gap.^{lxvii}

On the back of poor performance in more expensive, complex strategies, there has been a recent shift by investors towards cheaper, simpler strategies. The financial crisis highlighted that complexity does not necessarily bring better returns and that there may be risks that are not apparent or easy to understand. With simple index equity funds, it is relatively straightforward: if the market goes up, then the index is likely to go up, notwithstanding the interim volatility of index movements. With complicated hedge fund strategies or other private market investments, it can be very difficult to understand clearly how investors make their money. There are a variety of other risks, such as

illiquidity, that need to be accounted for. The more complicated the product, the less transparent the risks. Measures of performance and risk profiles associated with any product can be and have been found to be manipulated in order to lure investors. The following figure highlights how complexity through intermediation has led to multiple layers of abstraction between investors and the opportunities they invest in (particularly in private markets):

Figure 3.2: The Costs of Financial Intermediation in Private Markets

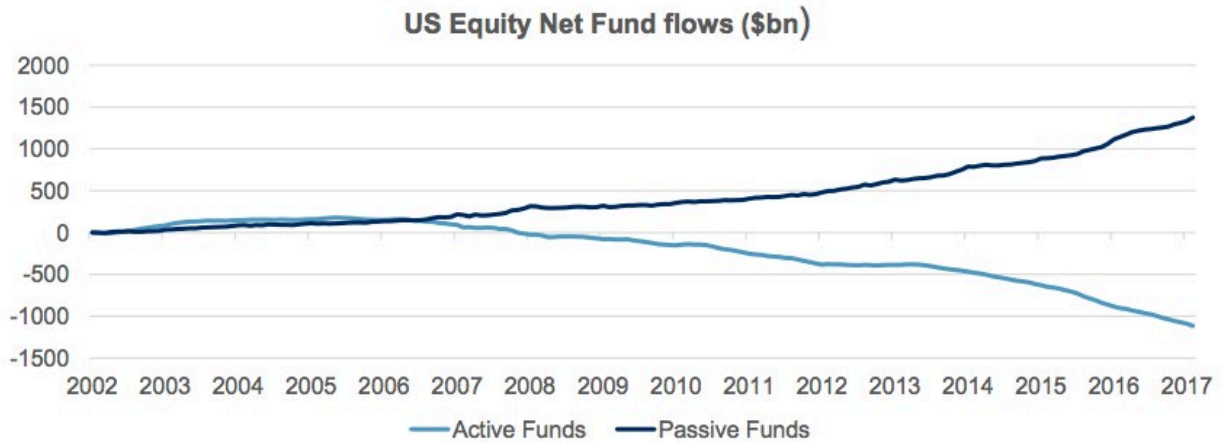


Source: Author

Investing in simpler products tends to be significantly less expensive than investing in more complex strategies. Financial product providers understand their complex strategies far better than the investors investing in them. This asymmetric information between investors and sellers of products creates a situation where investors may pay more for products than they are really worth. The more complex the information about a product, the more an unsophisticated investor may be willing to pay for it. Research shows that unsophisticated consumers can be strategically exploited by financial product producers.^{lxviii}

The shift towards cheaper, simpler strategies has been most noticeable over the last decade in the public equity markets through a movement by investors away from active management towards indexing. Standard & Poor's Dow Jones Indices have conducted extensive research on the topic of active vs. passive through the SPIVA® scorecard, which compares actively managed funds against their appropriate benchmarks on a semi-annual basis. The following figure shows the divergence in asset flows of U.S. Equity funds between active and index funds:

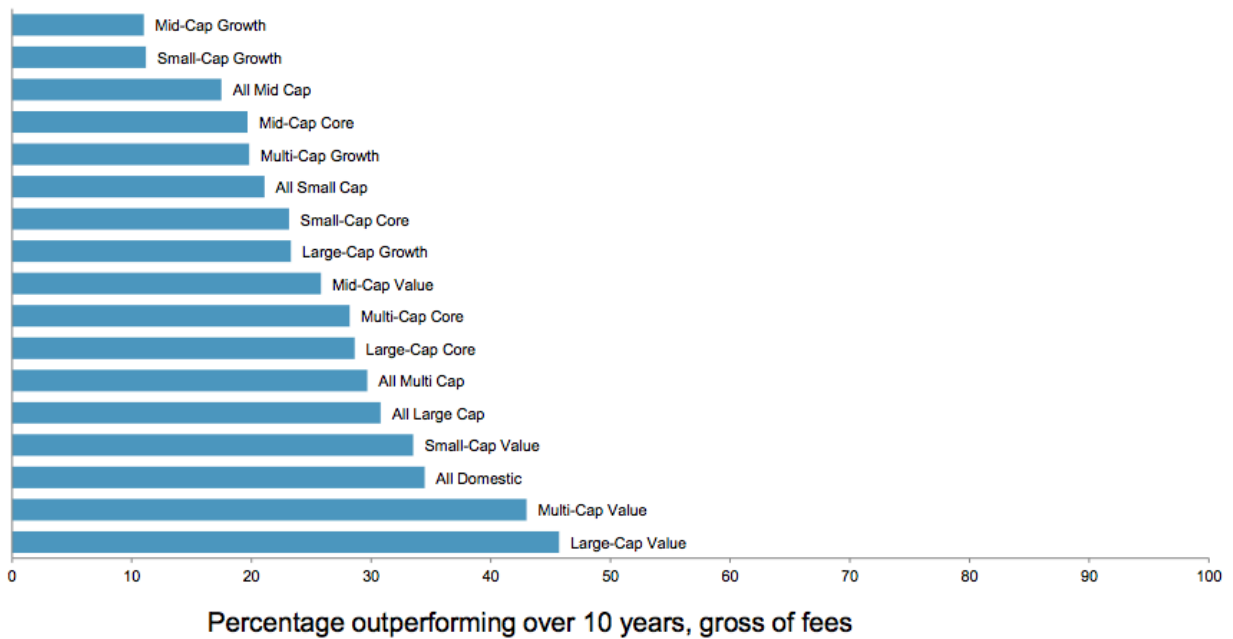
Figure 3.3: Divergence in Asset Flows Between Active and Index



Source: S&P Dow Jones Indices LLC, Morningstar.

Furthermore, the S&P Dow Jones research has found that most institutional equity managers, across all categories, underperform their benchmarks gross of fees:

Figure 3.4: Performance of Institutional Equity Managers



Source: S&P Dow Jones Indices LLC, eVestment Alliance.

From the SPIVA® scorecards that have been produced since 2001, there are some broad conclusions that can be drawn from the data collected. The first is that actively managed funds have historically tended to underperform their benchmarks over short- and long-term periods regardless of country or region. Secondly, of the actively managed funds in a category that have outperformed the benchmark over a time period, the majority have usually failed to outperform over multiple periods.

Despite the poor performance of actively managed funds, the costs are significantly higher. When looking at the specific strategies offered to investors, (according to investment consultant Willis Towers Watson), the range of fees for active long-only strategies is usually 0.2-1%. Smart beta costs may be as little as 0.15-0.2% with the more basic end at 0.1%. A smart beta strategy may have 1000 stocks, while more sophisticated quantitatively managed strategies may have 200 stocks and charge 0.25-0.3%. Active managers would charge 0.4-0.6% for a developed global equity strategy, while 0.05-0.1% would be added on top for emerging market exposure.

The rise of indexing has already saved and will continue to save asset owners billions of dollars in management fees, without requiring that they accept a concomitant reduction in investment performance. What investors do have to realize, however, is that there may be a change in risk exposure as a result of shifting strategies, such as from active to indexing. By moving to indices, there may be an increase in short-term volatility. Investors would thus need to withstand temptation to act in the short term and ensure decision-making is commensurate with long-term performance. Complex active products can have benefits to address the volatility of general market indices. Investors would need to fully understand the implications of giving up these benefits.

In summary, investors are becoming increasingly aware that they have been paying “active” prices for products that are only partly active in nature and would likely achieve greater value for money by switching to a cheaper index fund. Because information is now more readily available, technology has improved, and markets are more efficient, the active managers who exploited their “knowledge gap” without innovating their methodologies have started to come under a lot of fire. Institutional investors are more easily able to understand exactly what they are investing in, and as a result, more accurately pay for the sources of their return.

Cost Arbitrage

Cost arbitrage, as the name suggests, involves investing in opportunities with similar risk and return characteristics, but at a lower cost. There are two main areas of cost arbitrage that we highlight here. The first aspect is related to the risk factor or total fund approach to asset allocation, where having a risk approach can lead to more efficiently accessing investment opportunities. Cost arbitrage can also come in the form of disintermediation by investing in assets through internal management, which can be a lot cheaper than using external service providers.

Total Portfolio/Risk Factor Approach

The risk factor approach to selecting investments, in comparison to the traditional strategic asset allocation approach, has risen in prominence since the financial crisis. The traditional asset allocation approach is based on an optimal allocation to each broad asset class using a mean-variance optimization process. The simple balanced asset allocation

model consisting of stocks and bonds has evolved to also include broader investment types such as real estate, commodities, natural resources, and other private investments.

However, during the financial crisis of 2008-2009, supposedly uncorrelated investments in a portfolio moved in sync, raising fundamental questions about whether diversified portfolios based on asset class categories actually were diversified. The key insight behind risk factor investing is that investors should seek to understand which risk factors they are prepared to take to achieve a given return objective. The financial crisis demonstrated that financial product and asset class labels are often misleading. We now know that asset class diversification did not matter nearly as much as factor risk diversification. Assets are bundles of factor risks and investors need to understand the factor risks behind the assets. These risk factors can then be exposed to the portfolio via the sophisticated implementation of assets or products. Some risk factors themselves are asset classes, while other dynamic factors cut across asset class boundaries.^{lxix}

When taking a risk factor approach, and having a “risk budget” to work from, this enables investors to choose products that provide a risk exposure that might be cheaper to alternatives. This is in contrast to the traditional asset allocation model where investors need to fill allocations to each asset class “bucket” that have been set by the portfolio construction or strategic asset allocation calculation. When filling asset class “buckets,” investors do not place as much of an emphasis on the costs of filling the allocation. By taking a total portfolio or risk approach, investors can focus on the efficient allocation to risks and avoid the pressure, for example, to buy or dispose of illiquid investments at non-preferable times.

The total portfolio view has been adopted by a number of leading pension funds and sovereign funds around the world instead of the typical strategic asset allocation model. The Canadian Pension Plan Investment Board and New Zealand Superannuation Fund are examples that use the total portfolio approach. These funds have a reference portfolio set by their respective Boards, usually made up of a simple, low-cost and index portfolio that contains traditional asset classes. An overall active “risk budget” approved by the Board is then provided to the investment staff. A risk allocation process is then used to allocate active risk consistently over different investment opportunities. The approach essentially diversifies the portfolio at the level of risk and return streams, rather than at the level of specific asset classes. Investment staff must continuously assess the level of risk exposures and expected returns on a net basis. Such an approach makes investment staff a lot more conscious about the true substance of the portfolio and the costs associated with those exposures.

The cost arbitrage from taking a risk factor approach is related to the discussion of active vs. indexing above. A number of active management strategies have historically used these risk factors to inform their approach. However, investors are now able to access these factors through lower-cost index strategies, such as Smart Beta indices. Many of the historically active management strategies are being redeveloped with technological advances so that they can be offered in a lower-cost product that still achieves the same level of active risk (Smart Beta). Smart Beta combines the benefits of active management

with the reduced expenses of indexing. Factor-based investing has emerged as a third method of managing money, alongside passive management based on cap-weighted indices and more fundamental active management approaches.

Internal Management

The second form of cost arbitrage refers to replacing external service providers for a certain investment opportunity with an internal team that has the ability to invest in similar assets at a much lower cost. The costs of using external service providers can be substantial and as highlighted above, include the management fees paid to investment consultants and external asset managers, performance fees, carried interest, and rebates which are directly subtracted from the returns and are not incorporated into cost figures. There are also other agency costs with external management because the asset owner and the fund manager may have different utilities or risk aversions, incentives, horizons, skills, information sets, or interests.

As a result, there is a growing trend among large institutional investors to reduce the agency problems present in the investment management industry, by insourcing more of their investment operations. The cost-savings from internal management will vary depending on the type of asset that is being internally managed. Scale and governance of the institutional investor organization are crucial considerations for the internal management decision. Internal investment management has generally been restricted to investors larger than \$25 billion, but this is also subject to the governance structure of the fund in question. Generally speaking, private market investments are more resource intensive and thus more challenging to internally manage than public assets. Understanding an organization’s unique characteristics and comparative advantages is central to the decision to internally manage investments.

Notwithstanding the above considerations, the cost-savings potential from internal management can be significant. This can be seen in a simplified example of an institutional investor with a \$10 billion portfolio for infrastructure:

Table 3.2: Internal vs. External Management for \$10bn Infrastructure Portfolio

External Manager	Internal Management
1% management fee	40 member team
10% carried interest	Average \$1m/team member
10% return	10% return
\$200m /annum	\$40m /annum

Source: Author

From the above table, and using conservative assumptions for the fee terms and conditions for an external manager vs. expensive assumptions for building a 40-member

internal team at a cost of \$1 million per team member, there are still significant cost-savings to the fund on an annual basis.

As discussed above and as will be elaborated in detail further below, there are significant resource requirements that need to be considered before deciding to do internal management. These include being able to attract the right talent, having the right systems and processes in place, and crucially, having the right governance structures in place.

Monitoring and Renegotiation

At times, the easiest and most practical method of reducing costs is to better monitor existing asset managers and then renegotiate the contracts with managers already in the portfolio. The principal agency issues between asset owners and managers have been well documented in this set of chapters and elsewhere. We use the term re-intermediation, as opposed to dis-intermediation, to define how asset owners should be renegotiating and managing their external manager relationships for more alignment.

Re-intermediation is concerned with asset owners reengaging with their managers to achieve more alignment in the governance and contractual relationships created.^{lxx} For too long we have seen asset managers set the terms for pension funds and other investors to participate in their products. The power asymmetry in this principal-agent relationship has been skewed too far in favor of asset managers. We note that asset managers deploy significant resources to assist them in their negotiations with asset owners to ensure that they get the best deal for themselves. Asset owners need to be aware of the various tactics that certain asset managers may use and ensure that they are well informed when entering into (re)negotiations.

When looking across a portfolio, there are areas that might be easier than others to achieve immediate cost-savings for investors. In public markets, where there is more liquidity and capital is not locked up for multiple years, cost-savings through negotiations can be immediately effective. In private market asset classes, because of the longer time horizon, it may be more difficult to extract cost-savings in the short term. Private market investments, however, are typically the most expensive asset classes and therefore can be a source of significant savings once the impact of renegotiations and/or terminations are implemented.

With private market asset classes, the amount of fees paid through management fees and carried interest can be substantial. Research has shown that pension funds with the highest-cost implementation styles in private equity have the worst net returns.^{lxxi} Furthermore, private equity costs in particular are underreported in a number of funds. Carried interest is often not reported as a fee, nor are various other expenses and offsets such as consulting fees and monitoring fees. The amount of costs unreported in private equity has been estimated to be on average 2.33% annually.^{lxxii} A key component of monitoring asset managers is thus to fully understand the costs associated with investments. Only that which is measured can be monitored and managed.

Effective monitoring must ensure that misappropriations in expenses and valuations are examined and corrected for. Through the SEC’s “Spreading Sunshine in Private Equity” operation, violations of law or material weaknesses for expenses were found in over 50% of cases. A list of the SEC fines for private investment firms for their wrongdoing is included in the appendix.

We highlight below some key cost and transparency guidelines that investors should adhere to in order to effectively monitor and renegotiate current asset managers:

- First, it is important for investors to ensure that they have regular access to all information to adequately compute and compare costs, and to establish procedures to do so.
- Investors should compensate their managers through management and incentive fees only. Any other direct or indirect compensation or benefits, received by a manager or its affiliates resulting from the investment, must be credited back to the investor. Research, market data, and travel costs need to be borne by the manager, and brokerage must be “unbundled” from these costs. All expenses, including operating expenses, must be transparently reported.
- Investors need to establish appropriate benchmarks to evaluate managers’ performance. Incentive fees should only be accrued for true long-term performance over those benchmarks (consistent alpha) and where positive. managers should be incentivized to take appropriate risks by limiting fees through use of tools such as hurdles, caps, and high watermarks, and avoiding use of catch-up clauses.
- Investors should invest through the vehicles, structures, and share classes that minimize total costs over the lifetime of the investment and should receive benefits from both the economies of scale and the status that its investment brings. Investors should demand discounts when allocations are of a significant size.
- Investors should establish that transactions are executed efficiently, taking into account state of the market and order timing, while minimizing the costs and, as discussed above, they should identify the next-best alternative to the current investment (*e.g.*, indexed, internally managed, alternative manager, etc.). Investors should prohibit undue special treatment of individual Managers, which inhibits the objective of full transparency.

The following table summarizes the different cost-saving drivers and associated strategies that can be implemented by institutional investors:

Table 3.3: Summary of Cost-Saving Drivers, Strategies and Considerations

Cost Saving Driver	Example Strategy	Key Considerations
Investment Innovation	Seeding New Managers, Platform Companies, New Collaborations, New Technologies	Governance
Strategy Simplification	Active to Passive, Private to Public	Risk Exposure, Volatility
Cost Arbitrage	Risk Factor Approach – cheaper products for same risk exposures (Smart Beta), Internalize Investment Management	Governance, Strategy
Monitoring and Renegotiation	Better monitoring of current managers and renegotiation of better terms with current external managers	Private markets will take longer than public markets

Source: Author

As can be seen from the above table, there are a number of factors that need to be considered with the different cost-saving strategies that are available. There are certain strategies that will not be appropriate for a particular fund, because of the associated considerations and the specific characteristics of the fund. A crucial consideration that is particularly apparent for investment innovation and cost arbitrage is *governance*. In the following sections, we provide a discussion of the importance of governance and indicate why some of the cost strategies might not be appropriate for the PA pension plans because of the governance requirement.

3.2 Governance Considerations for Cost-Saving Opportunities

A number of the strategies for cutting costs are contingent on having the right governance and organizational capabilities in place. Specifically, seeding new managers in private markets, insourcing across various asset classes, and re-intermediating external managers through co-investments, funds-of-one and separate IMAs, all require sophistication in governance in order to achieve the desired outcomes.

Governance is a key ingredient for the long-term success of any institutional investor, as it is the mechanism that can mobilize the resources of the institution to realize its objectives. Research suggests the impact of good governance may be as much as 100–300 basis points per year.^{lxxiii} The independence of the organization, its resources and systems, and the ability to identify areas of opportunity as well as challenges are all crucial elements of governance that can dramatically impact the success of any of the above cost-saving strategies, whether internalizing investment management, seeding new managers, or re-intermediating external managers for more alignment.

“Governance Budget”

Before embarking on any of these cost-saving pathways, institutional investors should first assess their governance capabilities to determine whether a given investment strategy is commensurate with its organizational capabilities and oversight. Similar to using a “risk budget” to guide portfolio construction and investment decision-making,

institutional investors should use a “governance budget”¹ to guide the process of investing, the development of the organization, and the guidance of management^{lxxiv}.

Developing a “governance budget” first requires cataloging the resources and assets that drive sustainable returns, such as the talent and skills of portfolio managers; the processes and protocols of decision-making; and the information processing tools that support judgments. It is the board that has the ultimate control over resourcing decisions and that controls the strategic levers of success. A fund’s “governance budget”, which ultimately refers to the resources available to build and economize the investment operations, is thus a crucial determinant of an investor’s capacity to innovate and has clear relevance to certain cost-saving pathways.

Governance budgets are comprised of three ingredients: 1) The amount of time that a fund’s board can apply to a given investment problem; 2) The level of expertise that can be called upon at the level of the board; and 3) The commitment of the board, which refers to its effectiveness at getting things done; this is the dynamic capabilities of the board (e.g., real time meetings versus calendar time meetings). We can look at each of these as being scarce resources that can be drawn down as a fund engages in more innovative or risky behavior. Thinking about “governance budgets,” then, should become just as important as thinking about asset allocation or manager selection, especially for those funds interested in innovating and internally managing assets.

Pension Investment Boards vs. Administrative Boards

In order to achieve the level of governance required, based on our examination of institutional investors around the country and world, we think it prudent to first examine the nomination procedures of boards. We have found that one of the most important factors driving the success or failure of an institutional investor over the long run are the procedures used to nominate board members to oversee the investment staff. In the ideal, these procedures should prioritize commercial, financial, and entrepreneurial expertise over political or stakeholder affiliations. Political and stakeholder affiliations are important for an administrative board, but are not appropriate as the only requirements for an investment board. The origins of these funds may be political, but their theater of operations is quite clearly commercial. It is important to find board members who can align with the operating environment and not just represent the plan’s origin.

On top of a proven track record within the investment, business, or related space, three desired qualities should guide board member selection: demonstrable numeric skills, a capacity for logical thinking, and an ability to think about risk in the probability domain. Collegiality is important, but from our research, it was often noted that shared competencies combined with peer recognition for experience and ability tended to enhance collective decision-making, whereas disparate and unmatched abilities tend to be a drag on board decision-making.^{lxxv} This issue is under-recognized, with many institutions assuming that commitment, training, and experience can overcome

¹ Please note that the Governance Budget does not refer to the amount of compensation given to the Board Members.

deficiencies. Our research on best practice investors has shown that these competencies are not easy to instill, and so, as highlighted, the selection of board and staff becomes a critical function.

As a result, some of the most effective institutional investors we have looked at are those that have formed a standing sub-committee of the board with responsibility for monitoring board performance and its relationships with senior staff and the myriad of consultants and service providers who populate the industry. That is, leading organizations have sought to identify best-practice forms of governance and mechanisms of accountability. For example, leading funds we have studied are conscious of the costs for decision-making of a large board, recognizing that many members (normally more than nine) tend to fracture collegiality^{lxxvi} and add a degree of heterogeneity in board member competence that undercuts competent decision-making.^{lxxvii}

Good Governance and the Pyramid of Success

Any fund considering a policy to move assets in-house or adopt the more resource-intensive cost-saving pathways outlined above, should first check to ensure that their governance budget aligns with the new strategy and “risk budget.” If the levels of governance required exist, then the fund can equip the organization to successfully implement the given strategy. Lower “governance budget” arrangements are consistent with less complicated or sophisticated arrangements. If this is not the case, we expect some difficulties with such funds’ implementation of complex arrangements. The importance of governance is best highlighted in the following figure, which shows that good governance is the crucial foundation for the long-term success of institutional investor organization, particularly for the consideration of adding complexity and innovation such as in-sourcing, seeding, or re-intermediating.

Figure 3.5: Foundation for Institutional Investor Innovation for Cost-Saving Pathways



Source: Clark and Monk (2012)

As indicated, good governance forms the base of the pyramid for innovating successfully in institutional investor organizations.^{lxxviii} Without this crucial foundation, the effectiveness of certain cost saving pathways will be compromised. It is interesting to note that delegation and segregation of authority is the 8th characteristic on the pyramid and should only be instituted once the seven other criteria beneath it in the pyramid have been fulfilled. For a detailed explanation of each layer, please refer to Clark and Monk (2012). It is inappropriate to suggest that the board has delegated all investment expertise to staff. Delegations should occur once the appropriate processes and protocols are in place, as depicted by the above pyramid.

3.3 The Governance of PA Pension Plans

Although we attempted to conduct a governance analysis of the two Pennsylvania pension plans, we were not given full access to do so. Despite this, based on publicly available information and the information obtained through our limited access, there are certain key fundamental governance characteristics of each fund that do not align with our best practice framework outlined above. Our governance assessment and subsequent recommendations would need to be confirmed through a full assessment.

PA PSERS

In terms of composition, the 15-member Board of PSERS includes three ex-officio members, two members appointed by the Governor, six elected members, one from among the system’s non-certified members, one from among the system’s annuitants, and one from among school board members in PA, two members from the Senate, and two members from the House of Representatives. The PA PSERS Board appears to be a representative board, which is common practice for an administrative unit. Such a board

size and composition, however, is at the larger end of the spectrum among U.S. public pension funds and would not be considered a best-practice *investment* board.

The challenge here lies with the responsibilities given to the Board for the investment operations of the fund. A key component of the mission of the PSERS Board is to “prudently invest in the assets of the System.” It appears very difficult for the Board, which is constituted primarily on a member or politically representative basis, to adequately carry out the investment oversight for which the Board has responsibility.

While education programs and policies are in place for Board members at PSERS, in our research, it is unclear how many members utilize the optional provisions for specific investment and financial education, questioning the effectiveness of these programs to upskill members. Crucially, however, there also does not appear to be any Board member evaluation programs, which should look to appraise performance of Board members on an annual basis.

The PSERS Investment Policy statement, which outlines the guidelines for the management of the assets by or on behalf of the Board, states that:

The Board, through the Investment Committee with the assistance of Staff, contracts with External Portfolio Managers and Investment Consultants, monitors the performance of investments; ensures funds are invested in accordance with Board policies; studies, recommends, and implements policy and operational procedures that will enhance the investment program of the System; and ensures that proper internal controls are developed to safeguard the assets of the System.

Such an undertaking requires significant experience and understanding of financial markets and the field of institutional investment. If there is an over-reliance on staff and investment consultants to provide guidance, then the board may not be carrying out its fiduciary responsibility to provide adequate oversight correctly.

Furthermore, in our experience of working with funds locally and internationally, the PSERS’ investment strategies employed would be considered at the more complex or innovative end of the spectrum. While the Investment Policy Statement does an adequate job of explaining the guidelines around some of the more complex strategies adopted, such as internal management, and the use of derivatives, it is unclear that the appropriate oversight is in place to be able to monitor, assess, and scrutinize actions in these areas. The more complex the strategies employed, the greater the requirement on the governance of the organization. It would appear that there is a mismatch between the inherent complexity associated with the PSERS Investment Policy Statement and the governance structure in place to oversee the strategies contained in the Policies. In other words, the “governance budget” does not align with the “risk budget” of the pension fund’s investment function.

On top of this, no compensation is provided for Board members, which, while this is not irregular amongst U.S.-based pension funds, is inconsistent with best performing

government funds internationally. In our research, it has been found that a modest level of compensation combined with commitment to the goals and objectives of government-sponsored pension funds is sufficient to attract appropriately qualified individuals.

Upon initial examination (subject to further full analysis), it would appear that, specifically, the requisite financial expertise for monitoring PSERS' innovative strategies might be lacking. Delegation for (complex) investment strategies to investment staff should only happen when they can be accompanied with adequate oversight. As stated above, lower "governance budgets" should be associated with low-risk and unsophisticated arrangements.

PA SERS

The Board of SERS comprises 11 members, which while still being large, is closer to the median size pension board size of nine in the United States (NASRA). Five members are appointed by the Governor, one of whom must be a SERS retiree. Two members are appointed by the President Pro Tempore of the Pennsylvania Senate, and two members are appointed by the Speaker of the Pennsylvania House of Representatives. The independently elected Pennsylvania Treasurer and the Governor-appointed Secretary of Banking and Securities serve as ex-officio members. Five Board members must be active members of SERS, two of whom must have at least 10 years of service, and one must be an annuitant. As is the case with PSERS, the Board composition is primarily motivated by member and political representation, which is common for an administrative unit, but does not represent best practices for overseeing complex investment operations.

The large number of stakeholder representatives provides good member representation, but this could be at the detriment of adequate financial expertise. A deeper analysis of the Board composition would be required to determine whether members have the requisite skill sets and, in particular, the ability to think about risk in the probability domain.

It appears that SERS has undergone a governance upheaval in the last few years due in part to certain events that had taken place. These events included the departure of a long-time chairman of the board after more than 20 years of service, enactment of Retirement Code changes, extensive staffing turnover in key positions, and inquiries into allegations of misconduct by a former CIO. It would appear that steps have been taken to improve the governance and operations of SERS in the last few years.

As part of Section 5901 (f) of the retirement code, each member of the SERS Board is required to obtain eight hours of training in investment strategies, actuarial cost analysis and retirement portfolio management on an annual basis. This indicates a step in the right direction towards having the necessary expertise on the Board. We note that eight hours of training is not comparable to the multiple years (in some cases greater than 10) of specific investment experience requested by other pension investment boards.

As is the case with PSERS, there does appear to be a large reliance on the investment staff and consultants for carrying out the investment function of the organization. As

stated in the SERS Statement of Investment Policy: *“In order to administer the System and carry out its investment obligations, the Board relies heavily on both staff and external contractors.”*

We agree that some delegation of authority is important for effective investment organizations; however, if the gap in expertise is too large between the board and the investment staff, this would suggest that the “governance budget” is not equipped to take on too much risk in the investment operations. Furthermore, academic research has shown that while investment consultants can provide expertise in certain areas, the value add they bring, in particular to the selection of fund managers, is questionable.^{lxxix}

The general investment consultant works for both the investment staff and the board. In certain cases, we have found that it is important for the board to be able to draw upon expertise that is independent of the general investment consultant to adequately provide oversight. Provisions are included in the SERS Statement of Investment Policy for the Board to utilize its own specialty consultants on emerging trends, which we believe is important for enabling oversight. While the provision is there, we are unsure whether this is utilized.

With regards to the monitoring of investment managers, within the investment policy for private equity, it is stated that: “Each partnership agreement shall be negotiated such that SERS receives competitive terms and conditions. SERS’ leverage to negotiate terms may be reduced when it commits relatively modest capital or if the Firm’s offering is heavily oversubscribed.”

While the statement indicates that competitive terms will be negotiated, it does not provide any insight into what competitive terms or alignment might be. Furthermore, there is no policy on how expenses and costs (over and above management fees and carried interest) should be treated in private equity arrangements. It appears in the second half of the statement that SERS is happy to invest in funds even if they cannot achieve “competitive” terms. While the rationale might be accurate for not getting “competitive” returns, it is debatable if it would be prudent to invest in these funds if that was the case. The poor performance of private equity for SERS against their benchmarks would indicate that there might be certain funds underperforming, while still drawing excessive fees.

As of December 31, 2017, SERS had commitments in over 350 private equity funds and over 50 real estate funds. The SERS Private Equity Investment Policy document states that: “Each Manager will provide SERS’ Investment Office with quarterly unaudited reports (or semi-annual reports if customarily produced by the Manager) and annual audited reports in sufficient detail to allow SERS’ Investment Office staff to assess the performance of each Private Equity investment.” Furthermore, it is stated that “Semi-annually, the Private Equity consultant will submit to the Board a Private Equity performance report.”

Given the volume of private equity funds in the portfolio, the burden placed on the investment staff and Board to accurately monitor the performance of the managers and asset class seems extremely stretched and overly demanding. Private asset classes are typically more risky because of the unique capital market and illiquidity factors attached to them and inherently require greater oversight and governance. In this case it would appear that further complexity is added through the volume of funds invested in. For an asset class that is typically the most expensive, it does not appear that the governance of SERS matches the riskiness or demands required to adequately monitor the assets in this portfolio.

Generally, it would appear that SERS' governance is moving towards better practice. The size of the Board and size of the Investment Committee, the processes for evaluating board performance/contributions, along with the specific expertise of members to carry out their function, are areas that could be looked into further. Crucially, it is unclear whether the Board is equipped to accurately monitor the fund's statement of investment policies.

Summary

There are certain governance challenges within both PA plans that prevent our recommending some of the cost-saving pathways described above. At the heart of the issue is the fact that the respective boards of the two plans are constituted primarily of member and political representation, which is common in administrative units, but is not appropriate for the governance of investment organizations. As indicated, the "governance budget" of an investment organization (which stems from the expertise and nomination procedures of the Board), should align with the "risk budget" of the fund's investment operations.

In the case of both funds, it would appear that the investment staff has implemented complex strategies, as indicated by the Investment Policy Statement, which the respective boards are ill-equipped to monitor. This is with specific regard to the internal management, the use of derivatives, and private market asset classes by PSERS, and the monitoring of managers in private market asset classes by SERS.

It is interesting to note that the U.S. public sector plans that have been able to carry out innovative strategies like internal management with success, have a separate investment board compared with their administrative (representative) board or have explicit requirements of investment or financial expertise. Some of these funds include South Dakota, Wisconsin and Florida. The emphasis on investment and finance expertise is evidenced in the respective pieces of legislation that the pension funds are enacted upon:

For South Dakota: "The members of the State Investment Council shall be qualified by training and experience in the field of investment or finance."

For the State of Wisconsin Investment Board: "four members shall have had at least 10 years' experience in making investments."

Florida has a separate investment advisory council appointed by the Board of Trustees consisting of 9 members.

The above investment boards are appointed based on specific investment experience and are tasked with facilitating a business environment. Crucially, investment boards help to maintain a nonpolitical environment and to focus the fund on long-term performance.

We observe that the governance structures of the PA pension boards are far from the structure and expertise of other U.S. public pension fund boards that have carried out innovative strategies such as internal management. As mentioned earlier, these assertions are based on a preliminary analysis of the governance functions of each of the funds using primarily publicly available information. A full governance analysis was not permitted by the plans and would be required to confirm the above insights.

3.4 Cost-Saving Recommendations

Based on our abbreviated analysis, we believe that there are certain cost-saving strategies that are not appropriate for the PA plans because they do not appear to have the governance required to adequately monitor them. There are elements of the current portfolios that suggest there is already a level of complexity present that is not commensurate with the level of governance for the two funds. For PSERS, this refers to their internal management, use of derivatives, and allocations to illiquid asset classes. For SERS, this refers to their very large number of commitments in the private equity and real estate asset classes.

Based on the brief and incomplete analysis conducted here, we believe that it is not appropriate for both funds to currently go down the route of internal management and innovation through seeding to save costs. While both of these strategies have significant potential to save costs for the plans, there would need to be major overhauls in the governance structures of the funds and the culture between staff, consultants, and the board in order for the strategies to be successful and not compromise performance in any way. The governance overhaul required would likely mean getting legislative changes to the nomination procedures of both Boards, or alternatively, forming a separate investment board that works complementarily to the current Boards. Such changes would take time to implement and are outside the scope of this project. This would require further analysis to confirm and suggest specific recommendations for potential amendments. Our cost-saving recommendations are thus based on the public information and limited access that was granted to us to do our analysis.

Given the menu of options available to investors for cost-saving strategies, and based on our analysis through this set of chapters, we believe the most appropriate cost-saving strategies to the plans currently include:

1. Renegotiation and Monitoring of Current Mandates

Without changing the asset allocation and risk levels of the current portfolio, renegotiations should take place along best practice guidelines. Quite often a deeper analysis of the current mandates can highlight inefficiencies, such as economies of scale, suboptimal investment vehicles, and mismatches between pricing and best practice. As a result, by identifying and reducing investment expenses paid to external parties, the funds have the potential to capture risk-free returns. The idea is to transform the funds from being price takers to price makers as much as possible and reinstate their position as the principal disciplining their agents. Renegotiation of current mandates is subject to obtaining the necessary data to do a thorough analysis. Unfortunately, we have not been given access to do a full analysis of all external mandates for the two plans. We have been able to access a certain amount of information on the public equity mandates of the two plans. Details of this analysis are presented in the next section along with the calculations of potential cost-savings for the plans.

2. Strategy Simplification

A move to simpler strategies such as from active to indexing and from private to public could be considered and investigated further. This may not only reduce costs but help bring the “governance budget” of the plans in line with the level of complexity contained within it.

Our rationale for recommending strategy simplification as a cost-saving option is based not only upon our preliminary governance analysis but also upon the asset allocation and performance analysis carried out in the previous section.

In particular, we noticed that the exposure of both plans to alternative, illiquid asset classes like private equity does not appear to have served them well. Investing in these asset classes can be difficult. As discussed in Section 2, alternative investments gained in popularity rapidly in the 2000s promising to improve portfolio risk diversification and exploit the unique risk premiums and inefficiencies of private markets. These investments should offer a risk premium or identifiable inefficiency, but purchase price and manager selection matters significantly.

If alternative investments are too costly and complex to manage or risk premiums diminish with capacity constraints, then no amount of diversification can overcome the headwinds versus public market exposures. Moreover, if fair values are derived from observing public market changes in valuation, then correlations and volatility are much higher than assumed, particularly if mark-to-market prices are infrequent and uncertain. Any benefit to portfolio diversification can be overwhelmed by an asset class that is riskier or more correlated with stocks and bonds than assumed. Disappointing performance, high costs, and lack of transparency have provided an indication that reducing private equity and hedge fund holdings should be considered.

As mentioned, our assertions for a simplification of strategy and reduction of illiquid alternative asset class exposure to reduce costs are based upon an incomplete analysis of predominantly publicly available information on the plans. Deeper consideration would

need to be given to the active risk associated with these changes as well as the extra short-term volatility that might come with moving to indices in place of certain private strategies. These recommendations are thus subject to doing a full analysis of the entire portfolio of the pension plans, including analyzing the contracts and performance of illiquid asset classes such as private equity (where success is highly dependent on security selection and manager selection).

Our findings from Section 3 are summarized as follows:

- There are a number of cost-saving strategies that could potentially help save the PA plans large amounts of capital, including internal management, seeding, strategy simplification, renegotiations.
- Certain strategies (i.e., internal management, seeding) are not appropriate for the PA plans because the plans currently do not appear to have the requisite governance structures and culture in place for the strategies to be successful.
- The PA plans would need to address (through possible legislative changes) the board expertise available for oversight and the culture between the board and investment staff before considering the full suite of cost-saving strategies.
- Our immediate cost-saving recommendations for the PA plans focus on strategy simplification and current mandate renegotiations. Strategy simplification would need to consider, however, potential changes in risk exposures and volatility increases.
- Our recommendations are not exhaustive and are based on limited data access. These recommendations do not preclude the PPM AIRC putting forward additional or alternative actions.

Section 4: Cost-Saving Analysis on Current PA Pension Mandates

As discussed in the previous section, we believe that one of the more appropriate areas of cost-savings is to analyze the plans' existing mandates and where applicable seek to renegotiate better terms with managers where cost-savings can be accrued. This section thus provides detailed analysis on aspects of the current portfolios of the two PA plans, including specific calculations for how \$1.5 billion of cost-savings can be achieved by the plans.

As mentioned earlier, we were not granted full access to the information needed to perform an in-depth analysis across the entire portfolios of SERS and PSERS. The analysis here has thus focused on public equity mandates, where we have been given more, albeit still not sufficient, information. We were able to obtain the contracts of PSERS with their public equity managers; however, SERS provided the contracts redacted, and so crucial information on costs from these arrangements could not be observed.

4.1 Methodology and Approach

The fee and cost analysis aims to provide a snapshot of the cost structure of each of the mandates into which the funds have invested. In order to create this snapshot, we assembled detailed information on various cost components of the holdings. In normal circumstances, this information would be taken from monthly statements, invoices, custodial reports to legal documentation, manager-completed questionnaires, and trading histories. This granular information is then consolidated and reviewed against the best practices that we have observed in the industry and our in own experience.

For the analysis carried out here, we evaluated the fee terms and conditions in the contracts for public equity managers for PSERS. This included data from investment management agreements, consultant reports, performance reports, self-assessment, and publicly available data. For SERS, the terms and conditions were redacted in the contracts supplied to us, and so only consultant reports, performance reports, self-assessment and publicly available data were used, providing an incomplete picture of the total costs of SERS' mandates. Wherever we had to assume incentive fees or carry, such running costs were calculated on the basis of 3-year rolling returns, or since inception if the investment was younger than 3 years.

We first provide an overview of the cost stack for the plans, which shows the composition of different costs that make up the total cost of ownership (base fees, performance fees, transaction costs, and other operating expenses). This is then shown together with the dollar return relative to the benchmark and hurdle. We also show in the overview the gross returns of each mandate of the plans, which can then be compared against the total cost of ownership for each mandate to understand the cost per alpha of each manager.

Following the overview, we provide detailed analysis on each of the mandates for the plans, examining the specific terms and comparing them against best practice for possible renegotiations and where cost-savings can be identified.

While we do not have detailed information on the private equity mandates for the plans, we provide an estimation of where and how the cost-savings for the plans could be achieved from this asset class.

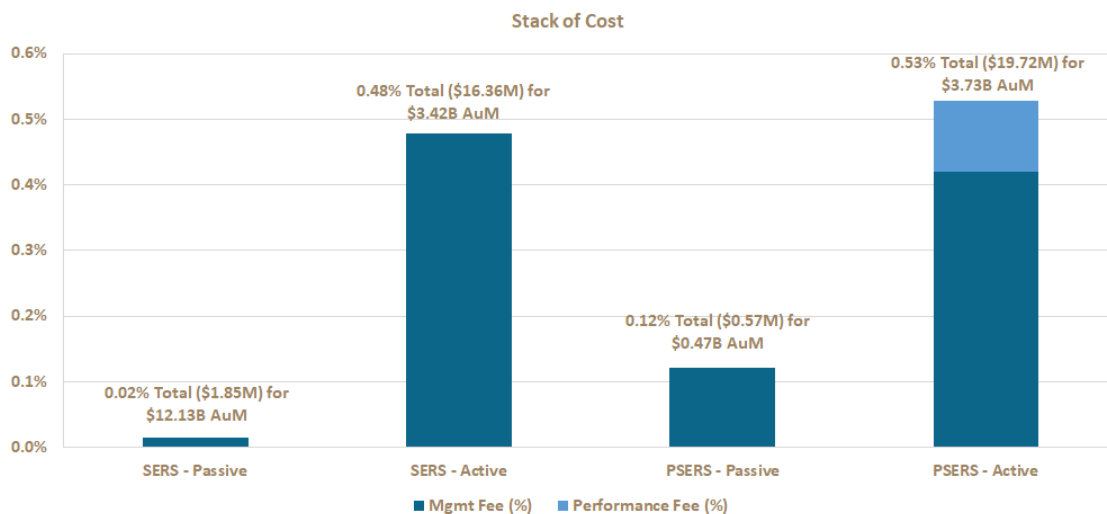
The data on performance used at the time of producing this report is as per the end of June 2018.

4.2 Overview of Analysis

Overview - Cost Stack

The cost stack shows the total cost of ownership for public equity mandates split between passive and active stacks respectively for SERS and PSERS. Only external public equity mandates are included here. Each stack represents aggregate base/fixed fees along with any performance related fees, where applicable. These are understated, as we do not have actual contracted fee schedules from SERS, or details about operating expenses from any of the managers for either SERS or PSERS. Consequently, this review does not include other components that usually make up the Total Cost of Ownership (viz., Holding Costs, Transaction Costs, Other Operating Expenses and 2nd Tier Fund Costs).

Figure 4.1 Cost Stack for PSERS and SERS Public Equity Mandates



Source: Author

Overview - Cost of Ownership

The following table shows a breakdown of the aggregate cost of ownership in dollars. As stated earlier, the total cost of ownership comprises the base/fixed fees, any performance fees, and known transaction costs, custody and other operating expenses, and costs associated with investing in other funds. We also show the dollar return relative to the benchmark and the hurdle (if the performance fee is contracted; otherwise, it is the same as the benchmark). Annualized returns over the previous 3-years have been used for this analysis.

Table 4.1 Aggregate Cost of Ownership

* Data in \$	Manager	AUM	Mgmt Fee	Operating Expenses incl. Custody	Transaction Costs	Performance Fees	2nd Tier Costs	Total Cost of Ownership	Total Return	Outperformance Over Hurdle	Outperformance Over Benchmark
SERS	SERS Active Mandate 1	476,000,000	2,332,400	-	-	-	-	2,332,400	26,180,000	-17,075,348	-17,075,348
	SERS Passive Mandate 1	5,570,000,000	557,000	-	-	-	-	557,000	651,690,000	3,704,579	3,704,579
	SERS Active Mandate 2	680,000,000	3,128,000	-	-	-	-	3,128,000	148,920,000	6,899,828	6,899,828
	SERS Passive Mandate 2	336,000,000	67,200	-	-	-	-	67,200	54,432,000	-39,856	-39,856
	SERS Passive Mandate 3	615,000,000	123,000	-	-	-	-	123,000	68,880,000	-244,741	-244,741
	SERS Passive Mandate 4	4,926,000,000	492,600	-	-	-	-	492,600	354,672,000	25,436,815	25,436,815
	SERS Active Mandate 3	604,000,000	4,107,200	-	-	-	-	4,107,200	36,240,000	-16,743,704	-16,743,704
	SERS Active Mandate 4	913,000,000	3,560,700	-	-	-	-	3,560,700	109,560,000	38,381,356	38,381,356
	SERS Passive Mandate 5	681,000,000	612,900	-	-	-	-	612,900	53,799,000	-1,442,292	-1,442,292
	SERS Active Mandate 5	320,000,000	1,280,000	-	-	-	-	1,280,000	24,000,000	7,364,470	7,364,470
	SERS Active Mandate 6	99,000,000	643,500	-	-	-	-	643,500	4,752,000	2,871,289	2,871,289
	SERS Active Mandate 7	326,000,000	1,304,000	-	-	-	-	1,304,000	35,208,000	18,260,554	18,260,554
	Aggregate		15,546,000,000	18,208,500	-	-	-	-	18,208,500	1,568,333,000	67,372,949
As % of AUM			0.12%	0.00%	0.00%	0.00%	0.00%	0.12%	10.1%	0.4%	0.4%
PSERS	PSERS Active Mandate 1	322,730,000	1,452,285	-	-	330,730	-	1,783,015	10,295,087	2,775,206	2,775,206
	PSERS Passive Mandate 1	466,888,000	566,888	-	-	-	-	566,888	38,191,438	12,560,796	12,560,796
	PSERS Active Mandate 2	1,167,411,300	2,648,673	-	-	3,324,488	-	5,973,161	102,265,230	44,204,777	49,107,905
	PSERS Active Mandate 3	1,116,851,500	3,650,555	-	-	-	-	3,650,555	68,127,942	15,208,911	15,208,911
	PSERS Active Mandate 4	231,242,400	1,549,324	-	-	413,291	-	1,962,615	13,365,811	3,615,780	3,615,780
	PSERS Active Mandate 5	270,150,600	1,135,452	-	-	-	-	1,135,452	33,714,795	13,397,943	13,397,943
	PSERS Active Mandate 6	305,593,900	2,584,751	-	-	-	-	2,584,751	30,712,187	9,030,128	9,030,128
	PSERS Active Mandate 7	219,274,500	1,904,196	-	-	-	-	1,904,196	25,984,028	10,475,925	10,475,925
	PSERS Active Mandate 8	98,247,300	725,231	-	-	-	-	725,231	7,309,599	233,141	233,141
	PSERS Active Mandate 9	158,500	1,268	-	-	-	-	1,268	9,558	-1,761	-1,761
Aggregate		4,198,548,000	16,218,622	-	-	4,068,510	-	20,287,132	329,975,674	111,500,846	116,403,974
As % of AUM			0.39%	0.00%	0.00%	0.10%	0.00%	0.48%	7.9%	2.7%	2.8%

Source: Author

Overview - Share of Costs

The following table shows a breakdown of the aggregate cost of ownership as a percentage of AuM. As stated earlier, the total cost of ownership comprises the base/fixed fees, any performance fees, and known transaction costs, custody and other operating expenses, and costs associated with investing in other funds. We have also shown for each of SERS' and PSERS' mandates, their share in total costs and performance.

Table 4.2: Aggregate Cost of Ownership as a Percentage of AuM

	Manager	Share of AUM	Mgmt Fee	Operating Expenses incl. Custody	Transaction Cost	Performance Fees	2nd Tier Costs	Total Cost of Ownership	Share of Cost	Share of Performance
SERS	SERS Active Mandate 1	3.06%	0.49%	0.00%	0.00%	0.00%	0.00%	0.49%	12.8%	1.7%
	SERS Passive Mandate 1	35.83%	0.01%	0.00%	0.00%	0.00%	0.00%	0.01%	3.1%	41.6%
	SERS Active Mandate 2	4.37%	0.46%	0.00%	0.00%	0.00%	0.00%	0.46%	17.2%	9.5%
	SERS Passive Mandate 2	2.16%	0.02%	0.00%	0.00%	0.00%	0.00%	0.02%	0.4%	3.5%
	SERS Passive Mandate 3	3.96%	0.02%	0.00%	0.00%	0.00%	0.00%	0.02%	0.7%	4.4%
	SERS Passive Mandate 4	31.69%	0.01%	0.00%	0.00%	0.00%	0.00%	0.01%	2.7%	22.6%
	SERS Active Mandate 3	3.89%	0.68%	0.00%	0.00%	0.00%	0.00%	0.68%	22.6%	2.3%
	SERS Active Mandate 4	5.87%	0.39%	0.00%	0.00%	0.00%	0.00%	0.39%	19.6%	7.0%
	SERS Passive Mandate 5	4.38%	0.09%	0.00%	0.00%	0.00%	0.00%	0.09%	3.4%	3.4%
	SERS Active Mandate 5	2.06%	0.40%	0.00%	0.00%	0.00%	0.00%	0.40%	7.0%	1.5%
	SERS Active Mandate 6	0.64%	0.65%	0.00%	0.00%	0.00%	0.00%	0.65%	3.5%	0.3%
SERS Active Mandate 7	2.10%	0.40%	0.00%	0.00%	0.00%	0.00%	0.40%	7.2%	2.2%	
	Aggregate	100.00%	0.12%	0.00%	0.00%	0.00%	0.00%	0.12%	100.00%	100.00%
PSERS	PSERS Active Mandate 1	7.69%	0.45%	0.00%	0.00%	0.10%	0.00%	0.55%	8.8%	3.1%
	PSERS Passive Mandate 1	11.12%	0.12%	0.00%	0.00%	0.00%	0.00%	0.12%	2.8%	11.6%
	PSERS Active Mandate 2	27.81%	0.23%	0.00%	0.00%	0.28%	0.00%	0.51%	29.4%	31.0%
	PSERS Active Mandate 3	26.60%	0.33%	0.00%	0.00%	0.00%	0.00%	0.33%	18.0%	20.6%
	PSERS Active Mandate 4	5.51%	0.67%	0.00%	0.00%	0.18%	0.00%	0.85%	9.7%	4.1%
	PSERS Active Mandate 5	6.43%	0.42%	0.00%	0.00%	0.00%	0.00%	0.42%	5.6%	10.2%
	PSERS Active Mandate 6	7.28%	0.85%	0.00%	0.00%	0.00%	0.00%	0.85%	12.7%	9.3%
	PSERS Active Mandate 7	5.22%	0.87%	0.00%	0.00%	0.00%	0.00%	0.87%	9.4%	7.9%
	PSERS Active Mandate 8	2.34%	0.74%	0.00%	0.00%	0.00%	0.00%	0.74%	3.6%	2.2%
	PSERS Active Mandate 9	0.00%	0.80%	0.00%	0.00%	0.00%	0.00%	0.80%	0.0%	0.0%
	Aggregate	100.00%	0.39%	0.00%	0.00%	0.10%	0.00%	0.48%	100.00%	100.00%

Source: Author

Overview - Benchmarks for Active Mandates

The following table compares the gross returns (net returns + fees) of each mandate to their benchmark's return. Alpha refers to the outperformance above benchmark return. We have noted that the benchmarks for SERS' active mandates are more varied than PSERS' active mandates. If PSERS is actively seeking to switch to performance fee based schedules, then a more granular choice of benchmarks would be appropriate. PSERS' generally lower benchmarks are consistent with the findings in Section 2 of this report (set of chapters).

Table 4.3: Cost of Ownership and Alpha

	Manager	Share of AuM	Total Cost of Ownership	Gross Return	Benchmark	Benchmark Return	Alpha	As Of Date
SERS	SERS Active Mandate 1	13.93%	0.49%	5.99%	Russell Mid Cap Index	9.58%	-3.59%	30-Jun-18
	SERS Active Mandate 2	19.89%	0.46%	22.36%	Russell 2000 Grth Index	21.35%	1.01%	30-Jun-18
	SERS Active Mandate 3	17.67%	0.68%	6.68%	MSCI Wrld Ex US Sm Cap Index (Net)	9.45%	-2.77%	30-Jun-18
	SERS Active Mandate 4	26.71%	0.39%	12.39%	MSCI World Index (Net)	8.19%	4.20%	30-Jun-18
	SERS Active Mandate 5	9.36%	0.40%	7.90%	MSCI Emg Mkts Index (Net)	5.60%	2.30%	30-Jun-18
	SERS Active Mandate 6	2.90%	0.65%	5.45%	MSCI Emg Mkts Sm Cap index (Net)	2.55%	2.90%	30-Jun-18
	SERS Active Mandate 7	9.54%	0.40%	11.20%	MSCI Emg Mkts Index (Net)	5.60%	5.60%	30-Jun-18
	Aggregate (Active only)	100.00%	0.48%	11.74%		10.57%	1.17%	
	Manager	Share of AuM	Total Cost of Ownership	Gross Return	Benchmark	Benchmark Return	Alpha	As Of Date
PSERS	PSERS Active Mandate 1	8.65%	0.55%	3.74%	70% M1EFSC/15% M1EF/15% M1FEM	2.88%	0.86%	30-Jun-18
	PSERS Active Mandate 2	31.28%	0.51%	9.27%	MSCI AC World ex USA (Net)	5.07%	4.21%	30-Jun-18
	PSERS Active Mandate 3	29.93%	0.33%	6.43%	MSCI AC World ex USA (Net)	5.07%	1.36%	30-Jun-18
	PSERS Active Mandate 4	6.20%	0.85%	6.63%	MSCI AC World ex USA (Net)	5.07%	1.56%	30-Jun-18
	PSERS Active Mandate 5	7.24%	0.42%	12.90%	MSCI AC World ex USA Small Cap (Net)	7.94%	4.96%	30-Jun-18
	PSERS Active Mandate 6	8.19%	0.85%	10.90%	MSCI AC World ex USA Small Cap (Net)	7.94%	2.95%	30-Jun-18
	PSERS Active Mandate 7	5.88%	0.87%	12.72%	MSCI AC World ex USA Small Cap (Net)	7.94%	4.78%	30-Jun-18
	PSERS Active Mandate 8	2.63%	0.74%	8.18%	MSCI AC World ex USA Small Cap (Net)	7.94%	0.24%	30-Jun-18
	PSERS Active Mandate 9	0.00%	0.80%	6.83%	MSCI AC World ex USA Small Cap (Net)	7.94%	-1.11%	30-Jun-18
	Aggregate (Active only)	100.00%	0.53%	8.35%		5.56%	2.78%	

4.3 SERS Mandates

SERS - Fee Terms

Below is a summary of the terms, the type of mandate and the chosen benchmark for each of SERS' externally-managed public equity mandates.

Table 4.4: Summary of Terms – SERS

	Manager	AUM (\$M)	Management Fee Terms	Performance Fee Terms	Date Terms last agreed	Structure	Active/Passive	Benchmark
US Mid/Large Cap	SERS Active Mandate 1	476	49 bps†	n/a	Dec 01, 2009*	SMA	Active	Russell Mid Cap Index
US Mid/Large Cap	SERS Passive Mandate 1	5,570	<1 bp†	n/a		SMA	Passive	Russell 1000 Index
US Small Cap	SERS Active Mandate 2	680	46 bps†	n/a	Sept 01, 2009*	SMA	Active	Russell 2000 Grth Index
US Small Cap	SERS Passive Mandate 2	336	2 bps†	n/a	Nov 09, 2016*	SMA	Passive	Russell 2000 Index
US Small Cap	SERS Passive Mandate 3	615	2 bps†	n/a	Nov 09, 2016*	SMA	Passive	Russell 2000 Val Index
Non-US Developed	SERS Passive Mandate 4	4,926	<1 bp†	n/a		Fund	Passive	MSCI Wrld Ex US Index (USD) (Net)
Non-US Developed	SERS Active Mandate 3	604	68 bps†	n/a		SMA	Active	MSCI Wrld Ex US Sm Cap Index (Net)
Global Developed	SERS Active Mandate 4	913	39 bps†	n/a	Oct 07, 2010*	SMA	Active	MSCI World Index (Net)
EM Equity	SERS Passive Mandate 5	681	9 bps†	n/a		Fund	Passive	MSCI Emg Mkts Index (USD) (Net)
EM Equity	SERS Active Mandate 5	320	40 bps†	n/a		SMA	Active	MSCI Emg Mkts Index (Net)
EM Equity	SERS Active Mandate 6	99	65 bps†	n/a	Jun 17, 2013*	SMA	Active	MSCI Emg Mkts Sm Cap index (Net)
EM Equity	SERS Active Mandate 7	326	40 bps†	n/a	Dec 09, 2013*	SMA	Active	MSCI Emg Mkts Index (Net)
	Aggregate	15,546						

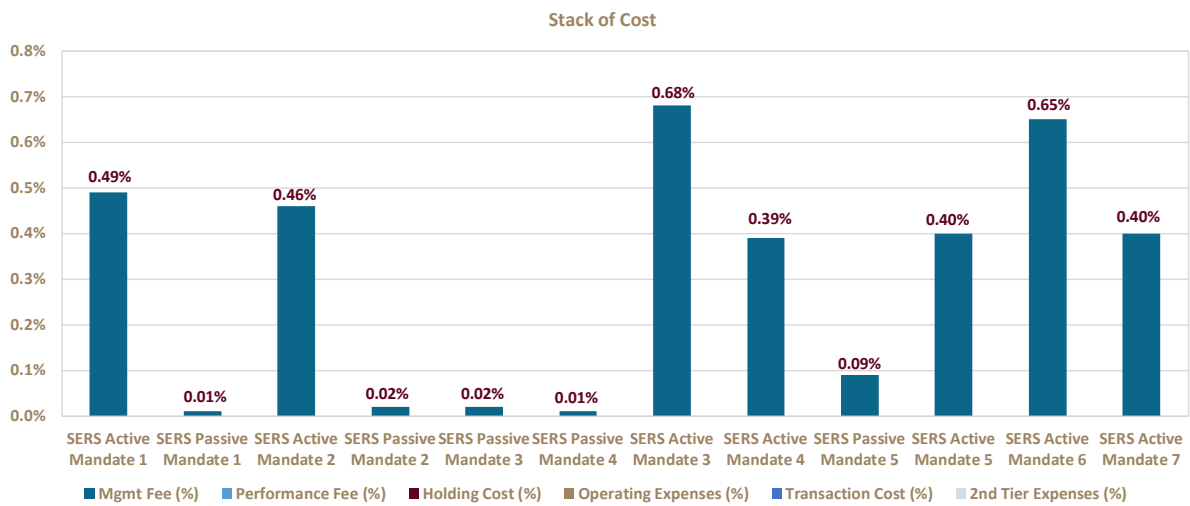
†: Exact contract details unavailable

*: Contract Terms Redacted

SERS - Cost Stack by Mandate

The following graph shows the division of costs between individual mandates. Since we have received only one fee number from the consultant report, it has been reported under the Management Fee heading as we do not have access to unredacted contracts to be able to state the performance fee. The limited information available during this review has not allowed us to go deeper into other cost components that make up SERS' Total Cost of Ownership (viz., holding costs, transaction costs, other operating expenses and 2nd tier fund costs).

Figure 4.2: Costs per Mandate



The data for the above graph is detailed in the below table.

Table 4.5: Costs per Mandate

Asset Class	AuM (\$M)	Total Costs (\$M)	Total Costs (bps)
SERS Active Mandate 1	476.0	2.33	49.0
SERS Passive Mandate 1	5,570.0	0.56	1.0
SERS Active Mandate 2	680.0	3.13	46.0
SERS Passive Mandate 2	336.0	0.07	2.0
SERS Passive Mandate 3	615.0	0.12	2.0
SERS Passive Mandate 4	4,926.0	0.49	1.0
SERS Active Mandate 3	604.0	4.11	68.0
SERS Active Mandate 4	913.0	3.56	39.0
SERS Passive Mandate 5	681.0	0.61	9.0
SERS Active Mandate 5	320.0	1.28	40.0
SERS Active Mandate 6	99.0	0.64	65.0
SERS Active Mandate 7	326.0	1.30	40.0
Total	15,546.0	18.21	11.7
Summary Stack of Costs	\$M	bps	
Fixed Fee	18.21	11.7	
Performance Fee	n/a	n/a	
Management Fee Total	18.21	11.7	
Transaction Costs	n/a	n/a	
Holding Costs	n/a	n/a	
Other OpEX	n/a	n/a	
Running Costs Total	n/a	n/a	
FoF / 2nd Tier Costs	n/a	n/a	
Total Cost of Ownership	18.21	11.7	

SERS - Ranking by Costs and Returns Retained by Managers

The following table is a comparison between the external public equity mandates of SERS. The quartiles are used to highlight the difference between the mandates based on historical returns and the costs that were incurred in achieving those returns.

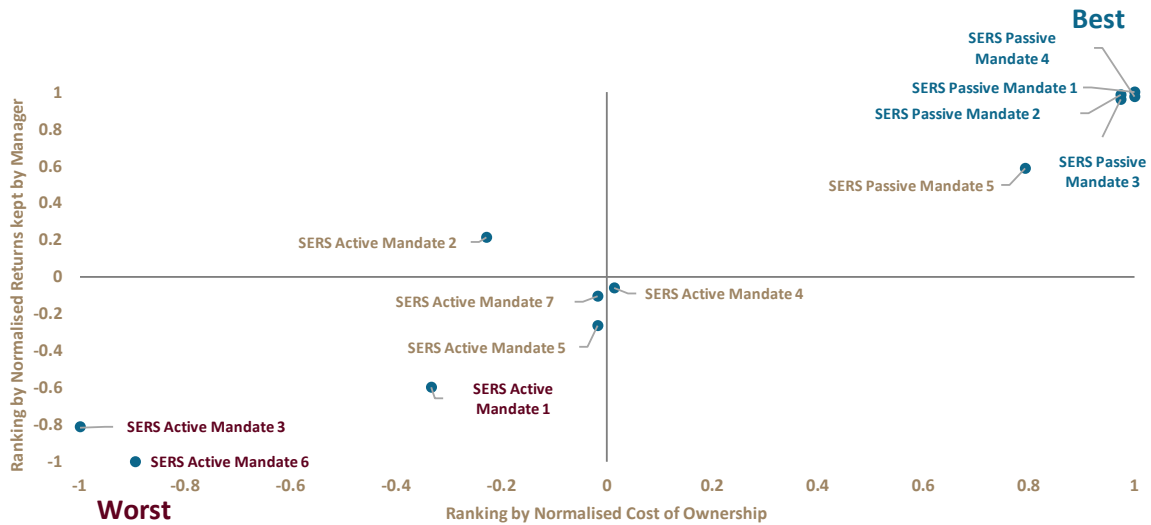
Table 4.6: Performance of Mandates by Quartile

	Manager	Total Cost of Ownership	Cost Quartile	Net Return	Gross Return	% Gross Return Retained by Manager	Retained Returns Quartile	Avg Rank Top Quartile	Avg Rank Bottom Quartile
SERS	SERS Active Mandate 1	0.49%	4	5.50%	5.99%	8.18%	4		☒
	SERS Passive Mandate 1	0.01%	1	11.70%	11.71%	0.09%	1	☑	
	SERS Active Mandate 2	0.46%	3	21.90%	22.36%	2.06%	2		
	SERS Passive Mandate 2	0.02%	1	16.20%	16.22%	0.12%	1	☑	
	SERS Passive Mandate 3	0.02%	1	11.20%	11.22%	0.18%	2	☑	
	SERS Passive Mandate 4	0.01%	1	7.20%	7.21%	0.14%	1	☑	
	SERS Active Mandate 3	0.68%	4	6.00%	6.68%	10.18%	4		☒
	SERS Active Mandate 4	0.39%	2	12.00%	12.39%	3.15%	3		
	SERS Passive Mandate 5	0.09%	2	7.90%	7.99%	1.13%	2		
	SERS Active Mandate 5	0.40%	3	7.50%	7.90%	5.06%	3		
	SERS Active Mandate 6	0.65%	4	4.80%	5.45%	11.93%	4		☒
	SERS Active Mandate 7	0.40%	3	10.80%	11.20%	3.57%	3		
	Aggregate	0.19%		9.61%	9.81%	1.99%			

- ☑ Top Value-Accruing Mandates
- ☒ Candidates for re-negotiation

In the following chart, we present a comparison of various SERS' mandates by total costs and gross returns. The data from the above table is normalized by dividing by the range (highest - lowest). As the chart shows, active mandates that cost more do not necessarily represent better value-for-money.

Figure 4.3: Cost of Ownership and Returns Retained by Manager



SERS - Findings

US Equity

Mandate, AuM, Benchmark	Findings
SERS Active Mandate 1 \$476M Russell Mid Cap Index	<ul style="list-style-type: none"> •0.49% (terms unclear) •Active Mandate •No visibility on contract details. •This is a candidate for review, contract 9 years old, recent returns (3Y ending June 2018) are poor. •This is expensive! SERS has a Small Cap mandate that is cheaper than this Mid Cap mandate. We think that this nearly-\$500M mandate should be about 25-30 bps, potentially saving \$1M in aggregate.
SERS Index Mandate 1 \$5,570M	<ul style="list-style-type: none"> •<1bp (terms unclear) •Index Mandate

Russell 1000 Index	<ul style="list-style-type: none"> •No visibility on contract details. •This mandate appears to be priced fairly.
SERS Active Mandate 2 \$680M Russell 2000 Growth Index	<ul style="list-style-type: none"> •0.46% (terms unclear) •Active Mandate •No visibility on contract details. •This mandate has return 1.01% above benchmark over previous 3 years. This implies that almost half of the gross alpha is being paid to the manager. •PSERS has a contract for similar mandate with this manager at a base fee of only 0.05% with 20% Perf Fee above hurdle of MSCI US Small Cap Growth Index. This is an attractive fee structure to compare to. •Although this mandate is priced better than the Mid Cap Value portfolio above (SERS Active Mandate 1), we think an active US Small Cap mandate of \$600-750M should be priced at about 25-30 bps.
SERS Index Mandate 2 \$336M Russell 2000 Core Index	<ul style="list-style-type: none"> •0.02% (terms unclear) •Index Mandate •No visibility on contract details. •This mandate appears to be priced fairly.
SERS Index Mandate 3 \$615M Russell 2000 Value Index	<ul style="list-style-type: none"> •0.02% (terms unclear) •Index Mandate •No visibility on contract details. •This mandate appears to be priced fairly.

International Equity - Developed World

Mandate, AuM, Benchmark	Findings
SERS Index Mandate 4 \$4,926M MSCI World ex-US Index	<ul style="list-style-type: none"> •<1bp fee (terms unclear) •Index Mandate •No visibility on contract details. •This mandate appears to be priced fairly.
SERS Active Mandate 3 \$604M MSCI World ex-US (Small Cap) Index	<ul style="list-style-type: none"> •0.68% (terms unclear) •Active Mandate •No visibility on contract details. •This mandate is very expensive for Developed World Small Cap. We think the fee should be 40-45 bps for AuM between \$300M-\$600M.
SERS Active Mandate 4	<ul style="list-style-type: none"> •0.39% fee (terms unclear)

\$913M MSCI World Index	<ul style="list-style-type: none"> •Active Mandate •No visibility on contract details. •We think 25-30 bps tiered fee rate is the fair price for Developed World mandates for \$1B AuM.
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International Equity - Emerging Markets

Mandate, AuM, Benchmark	Findings
SERS Index Mandate 5 \$681M MSCI Emerging Markets (All Cap) Index	<ul style="list-style-type: none"> •0.09% (terms unclear) •Index Mandate •No visibility on contract details. •Additional allocation appears to have been made to this mandate as the AuM was \$331M at the end of Dec. '17. •Similar products from competing managers are priced equivalently for allocations >\$100M. In light of recent additional allocation, we believe SERS has room to negotiate an improvement and will particularly benefit from switching to a tiered fee structure if and when they allocate more.
SERS Active Mandate 5 \$320M MSCI Emerging Markets (All Cap) Index	<ul style="list-style-type: none"> •0.40% fee (terms unclear) •Active Mandate •No visibility on contract details. •This appears to be priced fairly.
SERS Active Mandate 6 \$99M MSCI Emerging Markets (Small Cap) Index	<ul style="list-style-type: none"> •0.65% fee (terms unclear) •Active Mandate •No visibility on contract details.
SERS Active Mandate 7 \$326M MSCI Emerging Markets (All Cap) Index	<ul style="list-style-type: none"> •0.40% fee (terms unclear) •Active Mandate •No visibility on contract details. •This appears to be priced fairly.

Based on the findings above, our estimates for SERS' public equity cost-savings are shown in the following table:

Table 4.7: SERS Public Equity Cost-savings

Manager	AUM (\$M)	Total Fees	Potential Fees	Savings	Savings (\$M)
SERS Active Mandate 1	476	0.49%	0.28%	-0.22%	-1.02
SERS Passive Mandate 1	5,570	0.01%	0.01%	0.00%	0.00
SERS Active Mandate 2	680	0.46%	0.28%	-0.19%	-1.26
SERS Passive Mandate 2	336	0.02%	0.02%	0.00%	0.00
SERS Passive Mandate 3	615	0.02%	0.02%	0.00%	0.00
SERS Passive Mandate 4	4,926	0.01%	0.01%	0.00%	0.00
SERS Active Mandate 3	604	0.68%	0.43%	-0.26%	-1.54
SERS Active Mandate 4	913	0.39%	0.28%	-0.12%	-1.05
SERS Passive Mandate 5	681	0.09%	0.09%	0.00%	0.00
SERS Active Mandate 5	320	0.40%	0.40%	0.00%	0.00
SERS Active Mandate 6	99	0.65%	0.65%	0.00%	0.00
SERS Active Mandate 7	326	0.40%	0.40%	0.00%	0.00
Aggregate	15,546	0.12%	0.09%	-0.03%	-4.87

4.4 SERS Mandates Synthesis

Public Equity

- We have not been given unredacted contracts. Only one party’s interests are served by not being transparent on asset managers’ contractual details: that of the asset managers.
- From our experience, whenever clients are told that contractual terms are a trade secret of the manager, it’s an indication that these should be reviewed.
- Due to the lack of transparency on contractual language, it is difficult to make meaningful statements on full optimization potential.

From an RVK report we have taken the average per manager fees paid on public equity and have used them for our analysis:

- Index mandates seem generally fairly priced.
- One of the two active mandates in International Developed Equity, SERS active mandate 3, seems very expensive. We strongly advise the contractual language be reviewed in greater detail.

Private Equity

This chapter is not focused on private equity, as we were not allowed access to the necessary data, but we have learned that there are a large number of individual private equity investments in SERS’ portfolio. Such a large volume of small private equity investments is rather unusual from our experience and, by definition, difficult to manage / monitor.

Although the private equity allocation may be smaller than public market allocation, because the fees are higher on average, the smaller allocation to private equity may in fact cost more in total than the larger allocation to public equity.

Any decision, however, to sell private equity stakes in the secondary market should be considered very carefully. We note from experience, that this can be a very expensive exercise due to lower secondary market value.

4.5 PSERS Mandates

PSERS - Fee Terms

Below is a summary of the terms, the type of mandate and the chosen benchmark for each of PSERS' externally-managed public equity mandates.

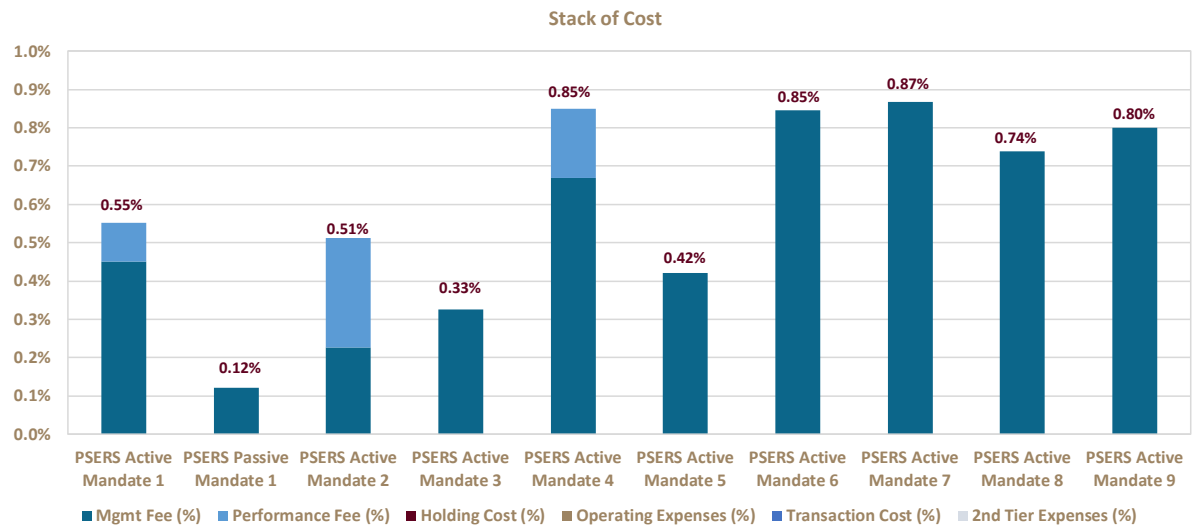
Table 4.8 Mandate Terms – PSERS

	Manager	AUM (\$M)	Management Fee Terms	Performance Fee Terms	Date Terms last agreed	Structure	Active/Passive	Benchmark
EM Small Cap	PSERS Active Mandate 1	323	45bps	25% of Perf over hurdle of 70% MSCI EM Small Cap 15% MSCI EM 15% MSCI Frontier EM	Jun 30, 2018	SMA	Active	Same as hurdle
EM - passive	PSERS Passive Mandate 1	467	14bps: If Total AuM < \$350M, 0.14% else: 14bps for first \$100M 12bps for \$100M < Assets < \$400M 10bps for Assets > \$400M		Oct 06, 2014	Fund	Passive	MSCI Emerging Markets Index (Net)
Intl (ex-US) Equity	PSERS Active Mandate 2	1,167	45bps for first \$100M 36bps for \$100M < Assets < \$350M 18bps for \$350M < Assets < \$1B 15.75bps for Assets > \$1B	8% of Perf over hurdle of MSCI ACWI ex-US + 0.42%	Apr 11, 2011 Hurdle was increased by a spread of 42bps on Apr 04, 2017	SMA	Active	MSCI AC World ex USA (Net)
Intl (ex-US) Equity	PSERS Active Mandate 3	1,117	55bps for first \$100M 35bps for \$100M < Assets < \$200M 30bps for Assets > \$200M		Mar 04, 2015 Fee was increased with same Tiers !!	SMA	Active	MSCI AC World ex USA (Net)
Intl (ex-US) Equity	PSERS Active Mandate 4	231	67bps	20% of Perf above Benchmark (unstated in contract)	Nov 01, 2014	SMA	Active	MSCI AC World ex USA (Net)
Non-US Small Cap	PSERS Active Mandate 5	270	60bps for first \$50M 50bps for \$50M < Assets < \$100M 40bps for \$100M < Assets < \$150M 35bps for \$150M < Assets < \$200M 30bps for Assets > \$200M		May 10, 2010	SMA	Active	MSCI AC World ex USA Small Cap (Net)
Non-US Small Cap	PSERS Active Mandate 6	306	1% for first \$40M 90bps for \$40M < Assets < \$100M 80bps for Assets > \$100M		Jun 04, 2015	SMA	Active	MSCI AC World ex USA Small Cap (Net)
Non-US Small Cap	PSERS Active Mandate 7	219	1% for first \$50M 90bps for \$50M < Assets < \$100M 80bps for Assets > \$100M		Jun 19, 2013	SMA	Active	MSCI AC World ex USA Small Cap (Net)
Non-US Small Cap	PSERS Active Mandate 8	98	85bps for first \$25M 70bps for \$25M < Assets < \$100M 60bps for \$100M < Assets < \$200M 50bps for Assets > \$200M		Jun 30, 2018	SMA	Active	MSCI AC World ex USA Small Cap (Net)
Non-US Small Cap	PSERS Active Mandate 9	0	0.80%		Oct 02, 2013	SMA	Active	MSCI AC World ex USA Small Cap (Net)
	Aggregate	4,199						

PSERS - Cost Stack by Mandate

The following graph shows the division of costs between individual mandates. The data only includes fixed management fee and performance fee (calculated on the basis of the past 3-years' returns). The limited information available during this review has not allowed us to go deeper into other cost components that make up PSERS' Total Cost of Ownership (viz., Holding Costs, Transaction Costs, Other Operating Expenses and 2nd Tier Fund Costs).

Figure 4.4: Cost Makeup per Mandate



The data for the previous graph is detailed in below table.

Table 4.9: Mandate Terms

Asset Class	AuM (\$M)	Total Costs (\$M)	Total Costs (bps)
PSERS Active Mandate 1	322.7	1.78	55.2
PSERS Passive Mandate 1	466.9	0.57	12.1
PSERS Active Mandate 2	1,167.4	5.97	51.2
PSERS Active Mandate 3	1,116.9	3.65	32.7
PSERS Active Mandate 4	231.2	1.96	84.9
PSERS Active Mandate 5	270.2	1.14	42.0
PSERS Active Mandate 6	305.6	2.58	84.6
PSERS Active Mandate 7	219.3	1.90	86.8
PSERS Active Mandate 8	98.2	0.73	73.8
PSERS Active Mandate 9	0.2	0.00	80.0
Total	4,198.5	20.29	48.3
Summary Stack of Costs			
	\$M	bps	
Fixed Fee	16.22	38.6	
Performance Fee	4.07	9.7	
Management Fee Total	20.29	48.3	
Transaction Costs	n/a	n/a	
Holding Costs	n/a	n/a	
Other OpEX	n/a	n/a	
Running Costs Total	n/a	n/a	
FoF / 2nd Tier Costs	n/a	n/a	
Total Cost of Ownership	20.29	48.3	

PSERS - Ranking by Costs and Returns Retained by Managers

The following table is a comparison between the external Public Equity mandates of PSERS. The quartiles are used to highlight the difference between the mandates based on historical returns and the costs that were incurred in achieving those returns.

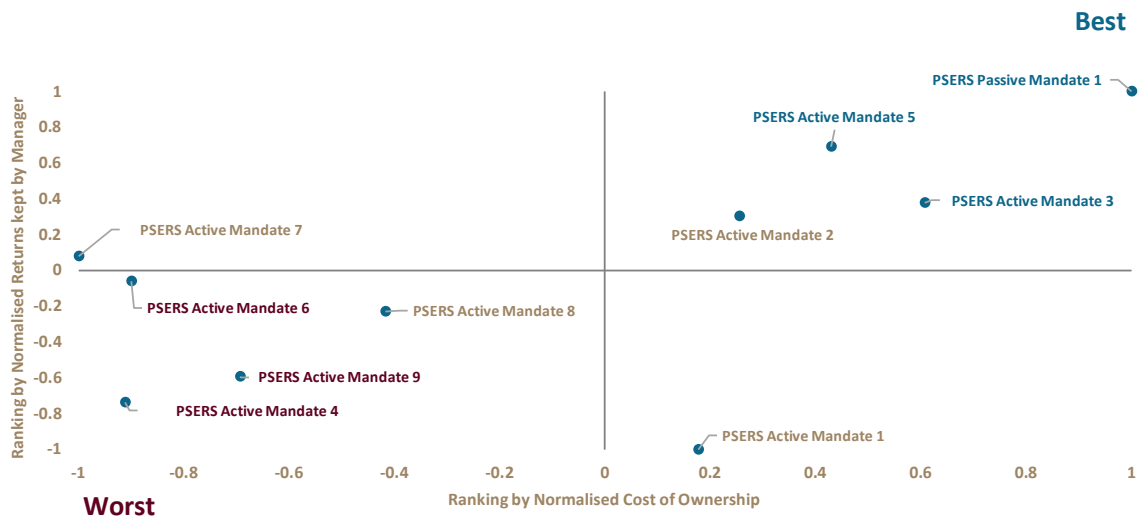
Table 4.10: Performance of Mandates by quartile

	Manager	Total Cost of Ownership	Cost Quartile	Net Return	Gross Return	% Gross Return Retained by Manager	Retained Returns Quartile	Avg Rank Top Quartile	Avg Rank Bottom Quartile
PSERS	PSERS Active Mandate 1	0.55%	2	3.19%	3.74%	14.76%	4		
	PSERS Passive Mandate 1	0.12%	1	8.18%	8.30%	1.46%	1	☑	
	PSERS Active Mandate 2	0.51%	2	8.76%	9.27%	5.52%	2		
	PSERS Active Mandate 3	0.33%	1	6.10%	6.43%	5.09%	1	☑	
	PSERS Active Mandate 4	0.85%	4	5.78%	6.63%	12.80%	4		☒
	PSERS Active Mandate 5	0.42%	1	12.48%	12.90%	3.26%	1	☑	
	PSERS Active Mandate 6	0.85%	4	10.05%	10.90%	7.76%	3		☒
	PSERS Active Mandate 7	0.87%	4	11.85%	12.72%	6.83%	2		
	PSERS Active Mandate 8	0.74%	3	7.44%	8.18%	9.03%	3		
	PSERS Active Mandate 9	0.80%	3	6.03%	6.83%	11.71%	4		☒
Aggregate		0.19%		9.61%	9.81%	1.99%			

☑ Top Value-Accruing Mandates
 ☒ Candidates for Renegotiation

In the following chart, we present a comparison of various PSERS’ mandates by total costs and gross returns. The data from the previous table is normalized by dividing by the range (highest - lowest). As the chart shows, and as was the case for SERS, active mandates that cost more do not necessarily represent better value-for-money.

Figure 4.5: Returns Retained vs Cost of Ownership



PSERS – Findings

International Equity - Emerging Markets

Mandate, AuM, Benchmark	Findings
<p>PSERS Active Mandate 1 \$323M MSCI EM (Small Cap) Index 70%, MSCI EM (All Cap) Index 15%, MSCI Frontier EM Index 15%</p>	<ul style="list-style-type: none"> •0.55% running costs (fee: 0.45% fixed + 25% Perf Fee above composite hurdle; projection 3y ending June 18) •Active Mandate •Recently switched from 0.90% flat fee to this performance fee schedule. As shown below, the new fee schedule would be expensive by a large margin in 5 out of the previous 9 years. Of particular interest would be 2011, where a -12.98% return under the old schedule would become -16.14% return under the new schedule. <p>Please use “Reference Table” below.*</p>
<p>PSERS Passive Mandate 1 \$467M MSCI Emerging Markets (All Cap) Index</p>	<ul style="list-style-type: none"> •0.124% tiered-rate •Passive Mandate •Small part of the internally managed \$3.2B ACWI ex-US portfolio that has been allocated to an external manager. •SERS are paying manager 9bps for the same product, which until Dec '17, had a smaller allocation than PSERS. •As an example, Vanguard (VEMIX) Institutional Plus share class is available for 9bps for investments > \$100M. Consequently, we think PSERS will benefit from using an improved tiered fee structure to benefit from scale for any allocation above \$100M.

*Reference Table:

PSERS Active Mandate 1			Old Fee Schedule		New Fee Schedule					
			Flat fee @		Fixed Fee @		Perf Fee @			
			0.90%		0.45%		25%			
Calendar Year	Net Ret (NR)	Bnchmrk Ret (BR)	Net Value Added (NR - BR)	Gross Return (GR)	Fixed Fee (FF)	Perf Fee (PF)	Total fee Payable TF = FF + PF	Net Ret w/ Perf Fee NNR = (GR - TF)	Net Value Added (NNR - BR)	Diff in Value Add
2017	35.73%	33.33%	2.40%	36.63%	0.45%	0.71%	1.16%	35.47%	2.14%	-0.26%
2016	-3.95%	4.03%	-7.98%	-3.05%	0.45%	0.00%	0.45%	-3.50%	-7.53%	0.45%
2015	-10.36%	-9.81%	-0.55%	-9.46%	0.45%	0.00%	0.45%	-9.91%	-0.10%	0.45%
2014	2.13%	1.49%	0.64%	3.03%	0.45%	0.27%	0.72%	2.31%	0.82%	0.18%
2013	1.87%	1.01%	0.86%	2.77%	0.45%	0.33%	0.78%	1.99%	0.98%	0.12%
2012	28.06%	22.60%	5.46%	28.96%	0.45%	1.48%	1.93%	27.03%	4.43%	-1.03%
2011	-12.98%	-26.96%	13.98%	-12.08%	0.45%	3.61%	4.06%	-16.14%	10.82%	-3.16%
2010	42.87%	27.47%	15.40%	43.77%	0.45%	3.96%	4.41%	39.36%	11.89%	-3.51%
2009	119.09%	114.32%	4.77%	119.99%	0.45%	1.31%	1.76%	118.24%	3.92%	-0.86%

International Equity - All-Country World, All Cap

Mandate, AuM, Benchmark	Findings
<p>PSERS Active Mandate 2 \$1,167M MSCI ACWI ex-US (All Cap) Index</p>	<ul style="list-style-type: none"> •0.51% running costs (fee: 23.4bps fixed + 8% Perf Fee over hurdle of MSCI ACWI ex-US +0.42%; projection 3y ending June '18) •Active Mandate •Although we think that Base Fee alone is a fair price to pay for this mandate, it has performed well over the last few years, especially as compared to PSERS Active Mandate 3, and it is fine to reward the manager for such out-performance. But we think that to discourage excessive risk-taking, the Performance Fee component should be capped.
<p>PSERS Active Mandate 3 \$1,117M MSCI ACWI ex-US (All Cap) Index</p>	<ul style="list-style-type: none"> •0.327% tiered-rate •Active Mandate •Top tier ends at \$200M at 30bps. We think additional tiers should be added at \$500M (~25bps), \$750M (~20bps) and \$1B (~15bps).
<p>PSERS Active Mandate New \$107M MSCI ACWI ex-US (All Cap) Index</p>	<ul style="list-style-type: none"> •New allocation of \$400 million at unknown fees, as only redacted contract is available. •Active Mandate •We have reviewed the investment recommendation by PSERS and Aksia, and noticed that the recommendation does not show any evidence of alternatives being considered as part of the process while negotiating fees with this manager. As noted separately in this report, this is despite PSERS answering “Yes” to our self-assessment question whether this sort of comparison was an intrinsic part of their investment process.
<p>PSERS Active Mandate 4 \$231M MSCI ACWI ex-US (All Cap) Index</p>	<ul style="list-style-type: none"> •0.85% running costs (fee: 0.67% fixed + 20% Perf Fee over Hurdle; projection 3y ending June '18) •Active Mandate •Worst performing in the last 3 years and most expensive out of the 3 MSCI ACWI (ex-US) All-Cap mandates by PSERS. High Performance fee despite having highest fixed fee out of the 3. We think this mandate should be negotiated to the fee level of PSERS Active Mandate 3.

International Equity - All Country, Small Cap

Mandate, AuM, Benchmark	Findings
PSERS Active Mandate 5 \$270M MSCI ACWI ex-US (Small Cap) Index	<ul style="list-style-type: none"> •0.42% tiered-rate •Active Mandate •Cheapest and best performing mandate out of the 5 in this asset-class.
PSERS Active Mandate 6 \$306M MSCI ACWI ex-US (Small Cap) Index	<ul style="list-style-type: none"> •0.85% tiered-rate •Active Mandate •This manager’s MSCI All Country mandate is more expensive than its MSCI Emerging Markets mandate, which is hard to explain. •There is no reason this mandate should be paid twice that of PSERS Active Mandate 5, especially with lower returns. We think that a tiered fee structure with an aggregate of 0.40% will be fair.
PSERS Active Mandate 7 \$219M MSCI ACWI ex-US (Small Cap) Index	<ul style="list-style-type: none"> •0.87% tiered-rate •Active Mandate •There is no reason this mandate should be paid twice that of PSERS Active Mandate 5, especially with lower returns. We think that a tiered fee structure with an aggregate of 0.40% will be fair.
PSERS Active Mandate 8 \$98M MSCI ACWI ex-US (Small Cap) Index	<ul style="list-style-type: none"> •0.74% tiered-rate •Active Mandate •Smallest of the mandates, which explains the higher price on tiered schedule. We think that a mandate of this size should be priced at 0.50%-0.60%.
PSERS Active Mandate 9 \$159K MSCI ACWI ex-US (Small Cap) Index	<ul style="list-style-type: none"> •0.80% fixed fee •Active Mandate •Absence of tiered structure means that any economies of scale are to the full benefit of the manager. But since this mandate appears to have been cut (AuM has dropped from \$156M in June '17), we will not make a recommendation.

Based on the findings above, our estimates for PSERS’ public equity cost-savings are summarized below:

Table 4.11: PSERS' public equity cost-savings

Manager	AUM (\$M)	Total Fees	Potential Fees	Savings	Savings (\$M)
PSERS Active Mandate 1	323	0.55%	0.55%	0.00%	0.00
PSERS Passive Mandate 1	467	0.12%	0.09%	-0.03%	-0.15
PSERS Active Mandate 2	1,167	0.51%	0.45%	-0.06%	-0.68
PSERS Active Mandate 3	1,117	0.33%	0.28%	-0.05%	-0.55
PSERS Active Mandate 4	231	0.85%	0.43%	-0.42%	-0.97
PSERS Active Mandate 5	270	0.42%	0.42%	0.00%	0.00
PSERS Active Mandate 6	306	0.85%	0.40%	-0.45%	-1.36
PSERS Active Mandate 7	219	0.87%	0.40%	-0.47%	-1.03
PSERS Active Mandate 8	98	0.74%	0.55%	-0.19%	-0.18
PSERS Active Mandate 9	0	0.80%	0.80%	0.00%	0.00
Aggregate	4,199	0.48%	0.37%	-0.12%	-4.92

4.6 PSERS - Synthesis

Public Equity

- Two managers capture too large a portion of the alpha generated.
 - PSERS Active Mandate 4 (38% in 2017, 3y rolling), and
 - PSERS Active Mandate 1 (45% in 2017, 3y rolling).
- International Small Cap mandates show large price differences, ranging from 44bps to 88bps (on similar sizes). Interesting side note: the cheapest is the best performer in recent years.
- 30% of mandates' fee schedules have not been revised in 5 years or longer.
- SERS is paying lower fees on the same PSERS Passive Mandate 1 product, despite SERS allocating smaller amount until recently.
- PSERS does not seem to have a sufficiently granular choice of benchmarks for their active managers. Although this helps in overall comparison, it could be problematic where performance fees are or have been introduced, as one needs to make sure the benchmark properly reflects the risk of the investment.

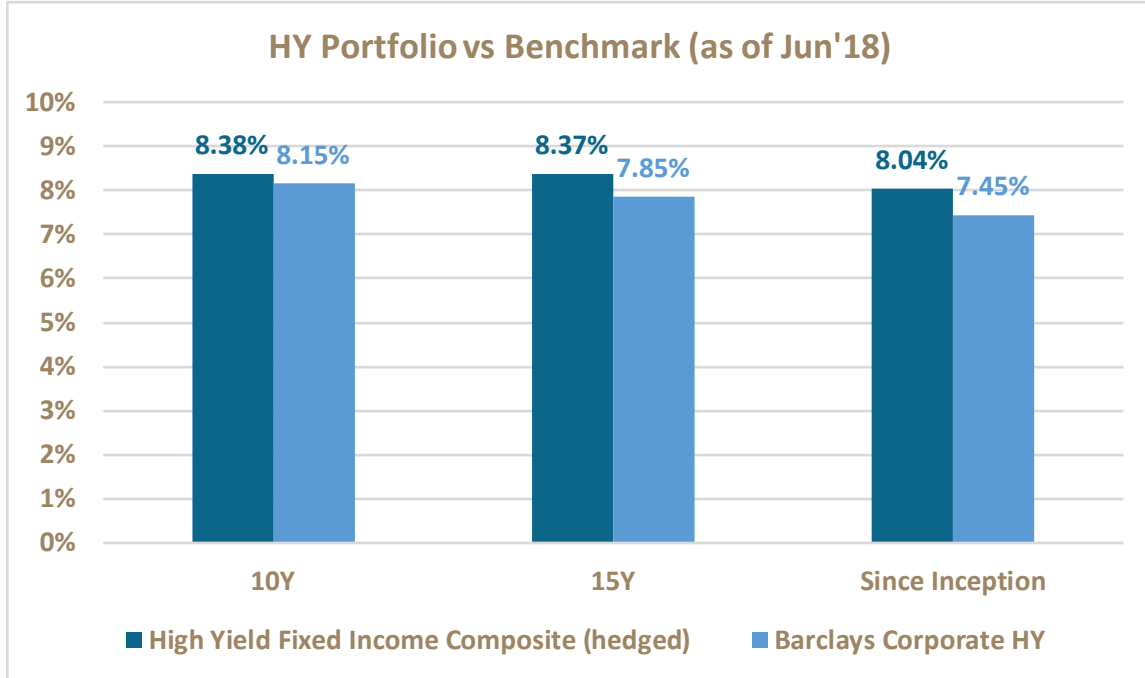
High Yield / Opportunistic

PSERS' investments of \$5.02B (as of June 2018) in this asset class are in, essentially, Private Debt Limited Partnerships. There are 41 external mandates classified under four subclasses of Mezzanine HY, Opportunistic HY, Real Asset HY and Senior Loans HY. All these investments are benchmarked against Barclays US Corp High Yield Index. The performance of each allocation within is wildly different, though. Over the previous 3 years, the performance of various LPs have ranged from -25.57% p.a. to +22.13% p.a. compared to benchmark performance of +5.53% p.a.

Long term performance has been similar to the benchmark. The 10-year net value add was +0.23% p.a. (= Portfolio net return of 8.38% p.a. - Benchmark return of 8.15% p.a.).

- Please note that in the previous reporting period, ending June 2017, over 10 years this number was actually negative -0.22% p.a.

Figure 4.6: High Yield Portfolio Performance vs Benchmark



Base Management Fee:

- As per the report published by PSERS: “*Response to PSERB Resolution 2017-41 Re: Management Fees – July 2018,*” the aggregate fees paid by PSERS is 1.14%.
- As per the presentation by PSERS: “*General Partner Ownership Interest (a.k.a. Carried Interest),*” dated Oct. 12, 2018; Net Management Fee for Private Credit in CY 2016 (AuM \$4.16B) and CY 2017 (AuM \$4.82B) were both 1.20% based on end-of-year AuM.

Carried Interest:

- As per the presentation “*General Partner Ownership Interest (a.k.a. Carried Interest),*” dated Oct. 12, 2018; Carried Interest for Private Credit in CY 2016 (AuM \$4.16B) was 1.76% and in CY 2017 (AuM \$4.82B) was 1.85% based of end-of-year AuM.

Assuming only the base management fee was paid, and it was a stable 1.14% historically, the following table shows that 83% of the entire alpha is being paid as base management fee to the asset managers.

Table 4.10: Cost per Alpha Calculation

10Y		
High Yield Composite Net Return (NR)		8.38%
Benchmark Return (BR)	(-)	8.15%
Net Alpha (NA)=NR+BR		0.23%
Base Management Fee (BF)	(+)	1.14%
Gross Alpha (GA)=NA+BF		1.37%
Share of Gross Alpha retained by Manager BF/GA		83%

Now, if we assume an additional carried interest of 1.20% (average of 2016 and 2017) was paid historically, then the following table shows that 93% of gross alpha was paid as fee (base management Fee + carried interest) to the asset managers (100% in previous 10-year period).

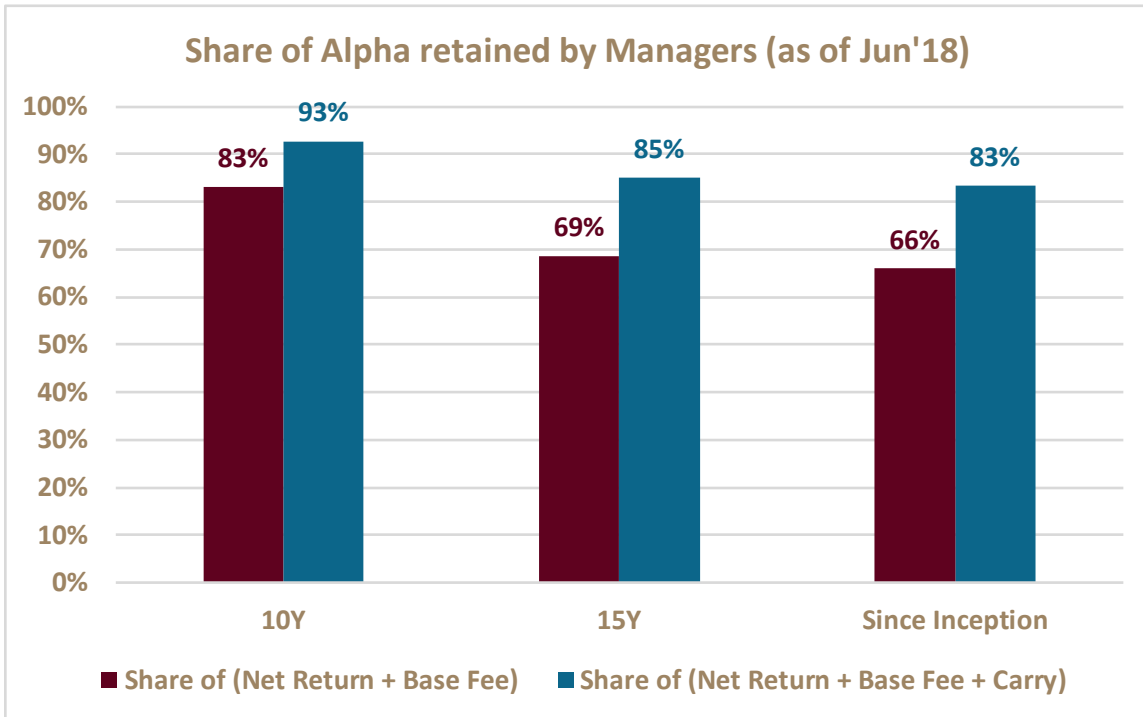
Table 4.11: Cost per Alpha Calculation

10Y		
High Yield Composite Net Return (NR)		8.38%
Benchmark Return (BR)	(-)	8.15%
Net Alpha (NA)=NR+BR		0.23%
Base Management Fee (BF)	(+)	1.14%
Carried Interest (CI)	(+)	1.80%
Gross Alpha (GA)=NA+BF+CI		3.17%
Share of Gross Alpha retained by Manager (BF+CI)/GA		93%

Both above estimates do not include the cost of an internal team that selects and manages these (currently, 41) allocations, and fund-level operating expenses.

The following graph shows this share of alpha that is paid out to the manager for various periods.

Figure 4.7: Share of Alpha retained by Managers



We have experience in successfully renegotiating multiple HY active mandates with fees of 25-30 bps (compared to the 114 bps paid here), contracted without any carried interest, for total assets that were less than a fifth of what PSERS has in its portfolio in this asset class. That represents savings of >84 bps (or \$42M) annually on base fees alone, or >264 bps (or \$132M) annually on total fees including carried interest.

While the performance record of PSERS’ investments in this asset class over 15 years was similar to long-term returns of the asset-class benchmark, it generated a significant multiple of the costs of an index replication of this benchmark. These index mandates would be more liquid, more transparent, have lower operating expenses, and incur negligible internal costs compared to private debt LPs.

4.7 Private Equity Cost-savings for SERS and PSERS

Without full access to the private equity investment details, it is difficult to make a very thorough statement. We can, however, share some observations and estimates based on our experience of renegotiating private equity mandates. Meaningful savings in private equity are best achieved upon time of reinvesting. The average life of private equity investments (not specific to PSERS/SERS) is around 10 years. We therefore assume that within the next five years, the average of the mandates will come to the end of their life cycle or reinvestment phase. Although the total private equity costs easily reach 700 bps and more, the fee components then have some room for negotiation (see below table as an excerpt) and account for roughly 300 bps p.a. From our experience, achieving savings

of 10% or more on the 300 bps is feasible upon reinvesting. Therefore, we would encourage the plans to set a fee savings target of 10% upon the next reinvesting phase.

Please note that the plans indicate base management fees of 163 (SERS) and 138 (PSERS) bps in their annual and consultant reports. We base our estimates on this incomplete information, given we were not granted access to more detailed Private Equity information.

Here are a few examples of areas in which these savings can be achieved:

- Don't pay on committed capital, only on invested (not applicable for VC)
 - Private equity managers often charge their fees based on the committed capital, which is often subject to negotiation and makes an enormous difference in absolute fees at the beginning of the investment.
- Ensure fee reductions during the investment phases
 - Do so by trying to understand GP's budget for running the fund and negotiate lowest per-investment phase management fees upon it.
- Cap monitoring, oversight and legal fees
 - These, like other fees, are often subject to negotiation.
- Negotiate carry terms carefully
 - The mechanics of how carry is calculated must not leave any room for interpretation and one needs to simulate potential carry fees carefully, based on different return scenarios.
- Distribution Waterfalls
 - Ensure full transparency is given on whether different waterfall calculations are being offered to other investors, such as American versus European.
- Re-calculate GP reported carry calculations
 - This could either be done by internal resources or using third party services, including software-based solutions.
- Make pitch materials part of the IMA
 - Marketing materials often suggest terms that later on disappear in the IMA's.
- Credit portfolio company income towards management fees
 - Also get clarity as to how "banking / advisory" fees with the portfolio get apportioned.
- Add language to prevent Zombie funds
 - Negotiate most favorable terms for the ability to remove the GP for non-performance.
- Invest the smallest amount possible and negotiate Sidecar / Co-investment access (as was already suggested by PSERS)
 - This has already been suggested by PSERS in their savings suggestions but is subject to internal capabilities and governance constraints.

4.8 Self-Assessment of the Plans

As part of our review, we asked the plans to participate in a self-assessment of their monitoring of external investment costs. Here is an excerpt of the answers provided. We would like to highlight those answers that indicate potential room for improvement and inherent cost-savings opportunities.

1. On a scale from 1-10, where do you think your management fees are placed in the market (1 being least competitive, 10 being most competitive)?

PSERS

SERS

10

10

Both plans justify this (self-assessed) ranking by the fact they have Most Favored Nation (MFN) clauses in place.

Full reply by PSERS:

We require all our investment management agreements to contain a most-favored nation clause ensuring that we get the best fee arrangement for the amount of assets committed or invested. We have worked with SERS' investment office professionals to combine our commitment levels where we can to get better economics for each of our funds which has provided some fees savings. We believe another area where some improvements could be made is driving a better alignment of interest, with lower base fees (which are guaranteed) and higher profit sharing fees which are only earned if the manager has good performance.

Full reply by SERS:

SERS' management agreements contain an MFN (Most Favored Nation) clause that ensures SERS receives the best fee arrangement for the amount of funds committed and/or invested as well as the timing of the investment. SERS has worked closely with PSERS in an effort to combine the commitment amounts of the two agencies and thereby obtain more favorable pricing of the fees paid.

Our Comment

We do not believe the plans merit a 10. Although there are many things that the Plans are doing very well, there are gaps that can and should be closed. Most Favored Nation (MFN) clauses are not a guarantee of best terms.

2. What is the average age of the fee schedules in your portfolio?

PSERS

SERS

Not tracked.

Not tracked.

Full reply by PSERS:

We don't track the average age of investment mandates by asset class. All limited partnership fee arrangements are negotiated at the beginning of the partnership and will continue for the life of the partnership (10-12 years for private equity and private real estate; 5-8 years for private credit). In hedge funds and separate accounts, we have recently re-negotiated numerous agreements.

Full reply by SERS:

SERS does not track the average age of its fee schedules by asset class. Private equity and private real estate closed-end commingled vehicle investments will generally last between 10-12 years. SERS renegotiates fees with these general partners with every new investment opportunity. Public market managers are revisited periodically and can usually be terminated at any time.

Our Comment

It is essential to review contractual terms on a regular basis; at the very least every 2-3 years. We therefore believe the plans should actively track the age of the agreements.

3. What is the average age of investment mandates in your portfolio?

PSERS

*"PSERS does not maintain this information."
(Full Reply)*

SERS

*"SERS does not track this information."
(Full Reply)*

Our Comment

Asset managers value long-term relationships; therefore, the longevity of a mandate should be taken into account upon recurring fee reviews. We believe the plans should actively track the age of their investments.

4. What percentage of your asset managers have confirmed in writing that they don't receive commissions, rebates, retrocessions and the like; associated with your investment?

PSERS

SERS

"PSERS does not maintain this information."
(Full Reply)

See Comment.*

*SERS has not directly answered the question; however, SERS indicates that this is addressed as part of their Due Diligence process.

Full reply by SERS:

As part of SERS due diligence process, SERS requires the investment manager to disclose if a placement agent or third-party marketer was used by the investment manager as part of the search process. SERS does not directly work with placement agents. If and when a general partner discloses its use of a placement agent, SERS requires that it contractually agrees that SERS' negotiated fee structure will not be altered in any way as a result of its participation. SERS requires fund sponsors to attest that no placement agent fees have been paid to attract or obtain approval for SERS' investment. For any investment under consideration, SERS discloses to the board the identity of any placement agent.

Our Comment

This is an area of potentially big conflicts of interest and should be monitored with great discipline. Most pension funds we work with have all asset managers confirm in writing whether or not they have received such benefits.

5. What percentage of your asset managers have confirmed in writing that they don't pay and have not paid any commissions, introduction fees or the likes associated with your investments?

PSERS

SERS

"PSERS does not maintain this information."
(Full Reply)

See comment.†

†SERS has not directly answered the question; however, SERS indicates that this is addressed as part of their Due Diligence process. SERS also mentions that they do not directly work with placement agents and requires the fund sponsors to attest that no placement agent fees have been paid to attract SERS' investment.

Full reply by SERS:

As part of SERS due diligence process, SERS Due Diligence Questionnaire includes comprehensive conflict of interest and related party questions which address compensation associated with referring, retaining, or increasing the level of business.

Our Comment

We believe it is crucial to have full transparency on where your fees are ending up. There have been many situations in the past where parties were inappropriately compensated for capital introduction; not being fully aware of such potential payments carries enormous reputational risk for the plan and the state.

6. Does your plan operate under a fee budget for investment managers?

PSERS

SERS

“No.” (Full Reply)

“No.” (Full Reply)

Our Comment

Those of our clients who operate under such a budget would still allow the budget to be exceeded by board approval, but signing checks to asset managers turns out to be a more conscious decision.

7. In negotiating investment costs, does the Plan have a process for determining the best alternative to the investment under consideration?

PSERS

SERS

“Yes.” (Full Reply)

“Yes, through SERS’ Strategic Investment Plan and asset allocation process.” (Full Reply)

Our Comment

We have not seen any evidence of how this is done (nor did we ask for it) but we do believe that in some cases, such as the HY allocation of PSERS, the process needs improvement.

8. Do your brokers, or those of your managers, make use of bundled brokerage?

PSERS

“Yes, in some cases.” (Full Reply)

SERS

Yes, several of them.

Full reply by SERS:

Yes, several investment managers have soft dollar arrangements in place to use a part of trading commissions to pay for permitted research services.

Our Comment

Bundled brokerage incentivizes the managers to churn the portfolio more than necessary, in order to generate soft dollars, such as, with Research. It is also never clear if such soft dollars are then used for the benefit of the client who created such budgets or not. For example, in Europe, with MiFID II regulation coming into force, bundled brokerage has been banned and has been considered illegal since the beginning of 2018.

9. Are you conducting regular transaction cost analyses on equities, fixed income and FX?

PSERS

No.

SERS

“Yes, on a quarterly basis.” (Full Reply)

Full reply by PSERS:

No; PSERS has used providers in the past and found they did not add valuable insights. As net of fee returns take into account trading costs, we are monitoring through the performance of the manager vs. their benchmark.

Our Comment

It is important to regularly perform transaction cost analysis, as it would highlight potential shortcomings in the implementation of a mandate, such as closet indexing, churning, market impact, etc.

10. What do you think is the single biggest hurdle (per asset class, if different) as to why asset management terms cannot be further improved?

PSERS

Overhead; capacity.

SERS

Capacity.

Full reply by PSERS:

Traditional asset classes: the two greatest impediments are the need for the active asset manager to have a minimum amount of fees to cover overhead of the business, especially during years where performance may be more challenged. Secondly, the generation of excess returns is not unlimited and the asset managers have to limit capacity to their product to protect this alpha generating ability. Products with limited capacity will generally command higher fees. Non-traditional asset classes: the single biggest hurdle in this area, which includes private equity and hedge funds, is supply/demand imbalances. There is a limited supply of institutional quality managers and significant demand for their services. For example, we've seen private equity fund raises where demand outstripped the fund size by 3x. Investors possess little if any negotiating power in these cases. Theoretically, a manager could increase its fund size by 3x and reduce its fee by 2/3 to accommodate all investor demand and not charge more in fees, but there are two reasons why managers do not do this. One, managers are incentivized to maximize performance and taking on too much money may make that impossible; and, two, managers generally commit significant sums of their own money into the funds and don't want performance to be watered down.

Full reply by SERS:

The top performing managers are in demand and do not need to lower their respective fees because, in many instances, they are already over-subscribed. By contrast, the lower performing managers are more inclined to lower their fees in order to attract capital.

Our Comment

Although we respect both arguments, we believe that the mentioned overhead is not applicable in the case of PSERS since all mandates are significant by size and create meaningful management fees for the managers. And even if it were not the case, a pension plan's duty is to its beneficiaries and it should not be providing support for inefficiencies of their service providers.

We understand that some strategies/managers indeed have capacity constraints. We would, however, also like to warn that this is the single most-used negotiating tactic by asset managers to avoid fee conversations, whether it is applicable or not.

11. What does the Plan estimate as its total annual investment costs of the portfolio and per asset class and when was this calculation last made?

PSERS	SERS
<i>“We don’t make such estimates.”</i>	\$130.4 million or 47.1 basis points (0.471%) in 2017.

Full reply by PSERS:

We don’t make such estimates. In 2017, 18% of our total external management fees were profit sharing fees which will vary significantly based on the success of the asset manager. However, we are in the process of reviewing all of our base management fees to look for potential savings.

Full reply by SERS:

Annually, SERS reports its fees by asset class in its supplemental budget books. SERS’ Manager Investment Expenses for calendar year 2017 was \$130.4 million or 47.1 basis points (0.471%) of the total fund assets. The Investment Office searches for those opportunities that provide the highest risk-adjusted return.

Our Comment

We must assume that PSERS misunderstood the question. If true, this is deeply concerning.

12. Do you have procurement guidelines for asset management services in place?

PSERS	SERS
<i>“No.” (Full Reply)</i>	Yes, to some degree.

Full reply by SERS:

The State Employees' Retirement Code establishes the Board's investment authority. The procurement of SERS' asset management services are governed by SERS Statement of Investment Policies and Strategic Investment Plan.

Our Comment

We believe it is important to have procurement guidelines in place, as they ensure a structured and replicable process whenever investment management agreements are signed. These guidelines also help the management in negotiations with asset managers, as certain “rules for investing” need to be adhered to by asset managers when the latter are trying to get into business with a plan and typically show more flexibility to meet the client's requirements.

4.9 Summary of Potential Cost-savings

Based on our analysis above, we provide details of a set of cost-savings that can be achieved for the two plans. We were asked to find savings opportunities to achieve actuarial savings of \$1.5 billion for each System compounded over 30 years under the assumption of a 7.25% annual return.

Our analysis is purely limited to best-practice procurement in order to achieve cost reductions while keeping the existing risk/return exposure. None of our recommendations should be interpreted as investment advice, as our analyses and recommendations are done under the assumption that asset allocation and manager selection remain unchanged, and do not preclude other or broader savings approaches.

We believe that both plans are able to meet the target, although due to the different size of the plans, achieving the target proves to be more difficult for the smaller of the two plans, SERS.

We outline below the actuarial savings for the two plans over a 30-year time horizon on their current investment strategies, taking into account 7.25% interest for both SERS and PSERS.

SERS Cost-Savings

Table 4.12: Summary of Cost-Savings – SERS

SERS		
Asset Class	Savings Potential, p.a.	Implementation
Public Equity	\$4.87 M	Assumed, immediate
Private Equity	\$12.18 M	Assumed, upon reinvestment
Other Asset Classes	<i>No view to date</i>	
Total (p.a.)	\$17.05 M	
Total 30 years (compounded) (@7.25% assumed return)	\$1.51 B	
	<i>Assuming 30 years for public equity = \$584 M Assuming 25 years for private equity = \$926 M</i>	

For SERS, we are confident that savings can be achieved but because we don't have unredacted contracts to base our view upon, there remains a level of uncertainty.

SERS appears to have many index mandates, which seem generally to be priced fairly.

There are four primary candidates for in-depth review and potential renegotiation:

- SERS Active Mandate 1: Agreement almost 9 years old; returns (3y ending June 2017) are poor.
- SERS Active Mandate 3: Very expensive for Developed World Small Cap.
- SERS Active Mandate 4: Agreement 8 years old.
- SERS Active Mandate 6: Agreement 5 years old.

We note that Most Favored Nation (MFN) clauses don't guarantee best terms and in fact, over time, they tend to serve the asset manager more than the asset owner.

Due to a lack of data on private equity for both plans, we are working under the following conservative assumptions, based on our experience:

- Negotiable fee components of 3.00% p.a. (whereas, total private equity costs are higher)
- Average life of private equity investment of 10 years, resulting in an average 5 years before reinvesting
- Achievable savings of 10% upon reinvesting of each private equity allocation

PSERS Cost-Savings

Table 4.13: Summary of Cost-Savings – PSERS

PSERS		
Asset Class	Savings Potential, p.a.	Implementation
Public Equity	\$4.91 M	firm, immediate
Private Equity	\$15.48 M	assumed, upon reinvestment
High Yield	\$42.50 M	firm, upon reinvestment
Other Asset Classes	<i>No view to date</i>	
Total (p.a.)	\$62.89 M	
Total 30 years (compounded) (@7.25% assumed return)	\$4.96 B	
	<i>Assuming 30 years for public equity = \$560 M</i> <i>Assuming 25 years for private equity = \$1.17 B</i> <i>Assuming 25 years for high yield = \$3.23 B</i>	

For PSERS, we have a high-conviction view of how savings can be achieved in public equity and high yield, as detailed in the set of chapters. For HY we have assumed an average life before reinvesting of 5 years, identical to private equity, although it is likely to be shorter.

Our analysis has shown, contrary to PSERS’ assertions, that more expensive mandates don’t guarantee better returns. The cheapest out of five mandates in “International All Cap Equities,” has enjoyed the best returns. This cheapest mandate is priced at 44 bps; the average of the other four is 81.75 bps.

There are several primary candidates for potential renegotiation:

- All of the five International Equities Small Cap mandates.
- PSERS Index Mandate 1: SERS pays lower fees for the same.
- PSERS Active Mandate 3: Absence of tiers above \$200M is not in line with best practice.
- PSERS Active Mandate 4: Worst performer in its category, despite highest fixed fee.

Due to a lack of data on private equity for both plans, we are working under the following conservative assumptions, based on our experience:

- Negotiable fee components of 3.00% p.a. (whereas total private equity costs are higher)
- Average life of private equity investment of 10 years, resulting in average 5 years before reinvesting
- Achievable savings of 10% upon reinvesting of each private equity allocation

4.10 Additional Savings

The above savings are based on an analysis carried out on limited data. We believe that if we had access to more data, including of all other asset classes and more granular information on certain mandates, further potential savings could be uncovered.

One area that should involve further exploration is the joining of certain mandates. We do believe the plans have room to cooperate more extensively when it comes to sharing investment mandates and negotiating packages where both plans' assets are added into one scale of fees.

Fee savings could occur from combining capital together which would enable the plans to slide into higher scale brackets, reducing combined fees. Because both plans are large, the additional benefits might not be too significant in the public equity space but should enable large benefits in private mandates, where co-investments might be offered on a more regular basis.

On top of achieving cost-savings from shared mandates, collaboration and consolidation of the two plans could lead to cost-savings through combining various operational processes such as sharing facilities, sharing HR services, IT services, consultants, and sharing due diligence. We understand that there may be certain legal and statutory challenges associated with combining some of these services. We also understand that there have been efforts made by the plans using external assistance to look at areas where collaboration and consolidation could occur between the two plans. Our general recommendation to the Commission would be to further investigate the possibilities of consolidation between the two plans. Where statutory and legal considerations allow, we would encourage initial efforts to collaborate on investment mandates to continue. Further analysis would be required (including learning from existing examples of consolidation) to understand the true benefits of such an effort.

Our findings from Section 4 are summarized as follows:

- On the current public equity mandates of SERS, we believe the plan can achieve \$4.87m savings per year while our cost-saving estimates on SERS' private equity portfolio are \$12.18m per year. This equates to \$1.51 billion over 30 years, assuming a 7.25% discount rate.

- On the current public equity mandates of PSERS, we believe the plan can achieve \$4.91m savings per year while our cost-saving estimates on PSERS' private equity portfolio are \$15.48m per year. Furthermore we believe there are \$42.5m of potential savings on PSERS' current high yield allocation. This equates to \$4.96 billion over 30 years assuming a 7.25% discount rate.
- We have a high conviction of these savings for PSERS on the public equity and high yield mandates. We are confident of the savings for SERS, although because the contracts provided by SERS were unredacted, there remains a level of uncertainty. The private equity savings are based on conservative assumptions and estimates as no private equity contracts were provided for this analysis.

Section 5: Conclusions

5.1 Conclusions and Recommendations

This set of chapters has been prepared to assist the work of the PPMAIRC, which has been tasked through Act 5 of the Pennsylvania General Assembly to study the investment management performance of the two largest plans in the Commonwealth of Pennsylvania, PSERS and SERS, and put forward recommendations for cost-savings. In this section, we summarize the findings from our analysis.

From our first key area of analysis on asset allocation and performance, we summarize our findings as follows:

- The 2017 asset allocation of SERS was relatively consistent with the peer group of our analysis, which consisted of 11 funds of similar size and funding ratios to the PA plans. The asset allocation of PSERS contained a number of irregularities compared with the peer group: namely, it had the lowest allocation to public equity, the highest allocation to fixed income and commodities, and one of the highest allocations to private equity and hedge funds. PSERS was the only fund to use leverage in their asset allocation.
- Over the ten-year time period examined, SERS has progressively increased its allocation to public equities, while PSERS has decreased its public equities allocation. PSERS has increased its hedge fund, commodities and fixed income allocations and maintained a relatively high private equity allocation.
- Excluding one fund that used the CPI, the total portfolio benchmark performance for PSERS was the lowest in the peer group across the 1-year, 3-year, 5-year and 10-year time horizons. The total portfolio benchmark performance of SERS, in contrast, was consistently above the average for the peer group across all time periods.
- The absolute performance of PSERS and SERS were the lowest in the peer group over ten years at 3.8 and 3.9%, respectively. In the wider universe of the Public Pension Database, PSERS and SERS ranked 50th and 49th respectively out of 52 U.S. public pension plans. Notwithstanding the difficulties in doing peer comparisons, the absolute performance data would show that the PA plans have underperformed their peer universe over the last 5 and 10 years.
- Our risk-adjusted performance figures confirm the absolute performance assertions. The Sharpe Ratios for PSERS and SERS were calculated to be slightly lower than alternative simple balanced indices at the 30-year level and significantly less at the 10-year level. Negative information ratios for both plans at the 10-year level and 30-year level for SERS indicate that both plans have significantly and consistently underperformed simple multi-asset index portfolios on a risk-adjusted basis.

The analysis in this project indicates that the asset allocation strategy of the funds might need to be addressed. For PSERS, it would appear that the use of leverage to extend duration in fixed income, the allocation to illiquid asset classes such as private equity,

and the allocation to commodities and hedge funds should all be looked at and reconsidered. For SERS, the allocation to private equity should be addressed, although we note that SERS' allocation to public equities is more in line with what is likely to contribute most to the total portfolio returns.

The second area of analysis for this project highlighted the various cost-saving pathways available to institutional investors. We summarized the drivers and related strategies to be:

- Investment innovation – seeding new managers, new collaborative vehicles, platform companies.
- Strategy simplification – active to index, illiquid to public.
- Cost Arbitrage – risk factor approach for more efficient access points, internal management.
- Monitoring and Revisiting – renegotiating current mandates.

We provided illustrative examples of how the above strategies can save money for pension funds, with the savings achieved by certain investors being quite significant. There are, however, certain factors that need to be considered for the adoption of some of the strategies. The most important consideration, in particular for investment innovation and internal management (cost arbitrage), is governance. We indicate (from research) that strong governance (having an investment board as opposed to purely an administrative board), and specifically the nomination procedures of pension board members, is a prerequisite for adopting innovation and internal management as a cost-saving strategy.

When looking at the PSERS and SERS boards (based on an incomplete and preliminary analysis due to denied access by the plans), we note that both funds have best practice administrative boards with political and member representation. However, they have far from best practice investment boards. This is evident by the large number of board members, the composition, the training, and expertise requirements for nomination. A board without the sufficient expertise to adequately oversee and hold the investment staff accountable can be problematic and a recipe for disaster if complex or innovative strategies are adopted. These findings are further emphasized when comparing the nomination procedures of PA board members with other U.S. public pension plans that have adopted innovative strategies and internal management successfully, namely the South Dakota Investment Council, the State of Wisconsin Investment Board and the Florida State Investment Board. All of these plans have separate investment boards to their administrative boards or they have specific investment expertise requirements (up to 10 years) for their board members.

Based on the initial governance analysis carried out, we do not believe that investment innovation and internal management are appropriate cost-saving strategies that should be recommended to the plans, despite the large cost-savings that could be achieved by the plans from these strategies. Our formal recommendations for cost-saving strategies are thus limited to strategy simplification and renegotiating current mandates.

The recommendation of strategy simplification is also in line with our asset allocation and performance analysis, where particularly in the case of PSERS, we observed complexity in the portfolio with regards to the use of leverage, private equity, seeding hedge funds and internal management. Our risk-adjusted performance analysis indicates that a shift to a simple balanced public index would have performed significantly better on a risk-adjusted basis than the current complex strategies. There are a number of aspects that would need to be addressed when considering a simplification of strategy, such as how the change in active risk exposure would impact the plans as well as the increased volatility that would be associated with moving private market allocations to public indices. Our preliminary analysis in this project would suggest that strategy simplification should be explored as a cost-saving strategy for the two plans. Further analysis would be needed to confirm this.

The second, most feasible cost-saving strategy for the plans based on our preliminary analysis is to renegotiate the current mandates of the two plans. Assuming no change whatsoever in asset allocation or risk tolerance, the easiest and quickest way to generate cost-savings can be to renegotiate the terms and conditions of mandates with existing managers. While we were not provided with data on the plans' entire portfolio, we were able to access data pertaining to the public equity mandates of the two plans. Our recommendations for the specified minimum of \$1.5 billion of cost-savings over 30 years for each plan come from detailed calculations of savings from the existing public equity mandates of the two plans. We also provide estimates of savings that could be achieved from the private equity mandates of the two plans. While more potential savings could come from analyzing the private equity mandates, we note that it is hard to alter these arrangements (which usually last for 10 years) once Limited Partnership Agreements have been signed. Our estimates for private equity savings thus need to factor in this time lag, whereas public equity mandates, being more liquid, could be achieved much more quickly.

We believe that both plans are able to meet the target, although due to the different size of the plans, achieving the target proves to be more difficult, although attainable, for the smaller of the two plans, SERS.

Over a 30-year time horizon, taking into account 7.25% interest for both SERS and PSERS, the plans' current investment strategy carries the potential to achieve the following actuarial savings:

SERS		
Asset Class	Savings Potential, p.a.	Implementation
Public equity	\$4.87 M	Assumed, immediate
Private equity	\$12.18 M	Assumed, upon reinvestment

Other Asset Classes	<i>No view to date</i>	
Total (p.a.)	\$17.05 M	
Total 30 years (compounded) (@7.25% assumed return)	\$1.51 B	
	<i>Assuming 30 years for Public Equity = \$584 M Assuming 25 years for private equity = \$926 M</i>	

PSERS		
Asset Class	Savings Potential, p.a.	Implementation
Public equity	\$4.91 M	firm, immediate
Private equity	\$15.48 M	assumed, upon reinvestment
High yield	\$42.50 M	firm, upon reinvestment
Other asset classes	<i>No view to date</i>	
Total (p.a.)	\$62.89 M	
Total 30 years (compounded) (@7.25% assumed return)	\$4.96 B	
	<i>Assuming 30 years for public equity = \$560 M Assuming 25 years for private equity = \$1.17 B Assuming 25 years for high yield = \$3.23 B</i>	

For SERS, we are confident that savings can be achieved, but because SERS did not provide unredacted contracts to base our view upon, there remains a level of uncertainty.

For PSERS, we have a high-conviction view of how savings can be achieved in public equity and high yield, as detailed in this set of chapters. For HY we have assumed an average life before reinvesting of 5 years, identical to private equity, although it is likely to be shorter.

Due to lack of data on private equity for both plans, we are working under the following conservative assumptions, based on our experience:

- Negotiable fee components of 3.00% p.a. (whereas total private equity costs are higher).
- Average life of private equity investment of 10 years, resulting in average 5 years before reinvesting.
- Achievable savings of 10% upon reinvesting of each private equity allocation.

Our analysis and recommendations above are premised on not having the full amount of data to do a comprehensive analysis on the plans. We thus caveat the recommendations put forward as being subject to doing a fuller analysis in certain areas, such as governance and cost-savings on the plans' current mandates in all asset classes.

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Appendix

APPENDIX 1: Section 2 Methodology and Supplementary Information

Phase 1 – Scope Definition & Peer Selection

- Defined project scope, approach, timelines, and high-level data requirements
- Performed research to identify similar assessments across the industry
- Defined peer selection criteria
- Developed preliminary peer candidate list
- Finalized peer list through client feedback

Phase 2 – Analytical Framework & Data Gathering

- Developed an analytical framework to identify potential assessment categories
- Created a master dataset to refine data requirements
- Identified data source alternatives and selected a main data source
- Gathered and audited data to reinforce consistency across the peer group

Phase 3 – Data Analysis & Insights Generation

- Performed asset allocation, benchmarking, and investment performance assessment
- Developed insights summary and gathered client feedback
- Prepared preliminary insights for Committee Hearing
- Developed final report

Peer Group Selection Process

The process for selecting funds for the Peer Group consisted of five major steps:

- **Step 1:** The first step consisted of developing "fund snapshots" with key information on SERS and PSERS to develop a deeper understanding of the funds' characteristics today and over time
- **Step 2:** The second step consisted of defining the criteria indicated above
- **Step 3:** With the Peer Group criteria established, the team expanded research for potential peers by tapping into common data sources in the investment management industry (*e.g.*, Pensions & Investments Online, Sovereign Wealth Funds Institute, Chief Investment Officer Publications, Public Pensions Database)
- **Step 4:** Having identified common data sources, the team amalgamated data points from across these sources into a master list of potential candidates and began applying the defined criteria to narrow down the potential list of options
- **Step 5:** Through discussions with project staff, a preliminary group of 11 funds were selected for analysis

Peer Asset Class Benchmarks

The following represent a summary of the asset class benchmarks of every fund in the peer group for 2017. For more information, refer to the Comprehensive Annual Financial Report (CAFR) of each fund.

Table A.1: Equity Benchmarks (2017)

Plan (2017)	Equity Benchmarks 2017
Arizona SRS	Total Equity Index
Georgia Teachers	S&P1500
Illinois Teachers	TRS Equity Composite Benchmark
Iowa PERS	Wilshire 5000 & Fund's Custom Benchmark
LA County ERS	Russell 3000 Index, Non-U.S. Equity Custom, Hedged Index
Oregon PERS	Combination of: Russell 3000 Index for Domestic and MSCI All Country
PSERS	MSCI USA Investable Market Index, MSCI ACWI ex USA IMI
SERS	MSCI ACWIM Index (Net)
South Dakota RS	Global Equity composite—MSCI All Country World Index (ACWI) weighted
Virginia RS	Custom Benchmark
New Mexico Educationa	Custom Benchmark

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Table A.2: Fixed Income Benchmarks (2017)

Plan (2017)	Fixed Income Benchmarks 2017
Arizona SRS	Custom Benchmark
Georgia Teachers	Barclays Government Credit
Illinois Teachers	Bloomberg Barclays Capital Aggregate Index
Iowa PERS	Custom Benchmark
LA County ERS	BBG Barclays US Universal Index
Oregon PERS	Custom Benchmark
PSERS	Custom Benchmark
SERS	Bloomberg Barclays US Aggregate Bond Index
South Dakota RS	USBIG Opportunistic
Virginia RS	Custom Benchmark
New Mexico Educationa	BBG Barclays US TR

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Table A.3: Private Equity Benchmarks 2017

Plan (2017)	Private Equity Benchmarks 2017
Arizona SRS	Russell 2000 Index
Georgia Teachers	Not Applicable
Illinois Teachers	Russell 3000 Index + 3%
Iowa PERS	Custom Benchamark
LA County ERS	Private Equity Return
Oregon PERS	Russell 3000 Index + 300 bps
PSERS	Mix of Standard & Poor's MLP Index for MLP and Burgiss Median, Vintage Year Weighted Index for Alternative Investments
SERS	Russell 3000 Index + 3%
South Dakota RS	Custom Benchamark
Virgina RS	Custom Benchamark
New Mexico Educationa	Cambridge Associates US All PE (1 Qtr Lag)

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Table A.4: Hedge Funds Benchmarks 2017

Plan (2017)	Hedge Funds Benchmarks 2017
Arizona SRS	Custom Benchmark
Georgia Teachers	Not Applicable
Illinois Teachers	BoA Merrill Lynch 91 Day Treasury Bill Index + 4.0%
Iowa PERS	Custom Benchmark
LA County ERS	Custom Benchmark
Oregon PERS	Russell 3000
PSERS	Three month LIBOR +3.50%
SERS	Hedge Fund Custom Benchmark
South Dakota RS	Not Applicable
Virgina RS	Custom Benchmark
New Mexico Educationa	GAA/Risk Parity Custom Index

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Table A.5: Commodities Benchmarks 2017

Plan (2017)	Commodities Benchmarks 2017
Arizona SRS	Bloomberg Commodity Index
Georgia Teachers	Not Applicable
Illinois Teachers	CPI + 5%
Iowa PERS	Not Applicable
LA County ERS	Bloomberg Commodity Index
Oregon PERS	CPI + 400bps
PSERS	Bloomberg Commodity Gold Index (37.5%) and the Bloomberg Commodity Index (62.5%).
SERS	Not Applicable
South Dakota RS	Not Applicable
Virginia RS	Not Applicable
New Mexico Educational	CPI +4%

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Table A.6: Real Estate Benchmarks

Plan (2017)	Real Estate Benchmarks 2017
Arizona SRS	NFI ODCE Index
Georgia Teachers	Not Applicable
Illinois Teachers	NCREIF Property Index
Iowa PERS	Not Applicable
LA County ERS	ODCE + 40 bps
Oregon PERS	Custom Benchmark
PSERS	Custom Benchmark
SERS	Custom Benchmark
South Dakota RS	MSCI US REIT Index multiplied by 120% less 20% of the Citi US Three-Month Treasury-Bill Index (2017)
Virginia RS	Custom Benchmark
New Mexico Educational	NCREIF Property Index

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

Table A.7: Cash Benchmarks 2017

Plan (2017)	Cash Benchmarks 2017
Arizona SRS	Not Applicable
Georgia Teachers	Not Applicable
Illinois Teachers	Not Applicable
Iowa PERS	US Treasury Bills
LA County ERS	Citigroup 6-Month T-Bill Index
Oregon PERS	Not Applicable
PSERS	Not Applicable
SERS	BofA ML 3 Month US TBill Index
South Dakota RS	Not Applicable
Virginia RS	Not Applicable
New Mexico Educationa	91 Day T Bills

Source: Individual Peer Fund 2017 Comprehensive Annual Financial Reports (CAFR)

APPENDIX 2: Section 3 United States Security and Exchange Commission (SEC) Fines for Private Investment Firms

The SEC has fined private equity firms for inappropriate fee charges and manipulating charges.

- (1) Oppenheimer & Co. - November 2012 - \$2,800,000
 - (a) Oppenheimer misled investors by manipulating the valuation of a fund by enhancing performance measurements.²
- (2) Kohlberg Kravis & Roberts (KKR) - August 2013 - \$30,000,000
 - (a) KKR was charged for disclosure violations, misallocating fees, and failing to implement a compliance program.³
- (3) Blackstone Group - January 2014 - \$39,000,000
 - (a) Three private equity fund advisors accelerated monitoring fees for personal benefit without informing investors.⁴
- (4) Fenway Partners LLC - February 2014 - \$10,000,000
 - (a) Fenway partners failed to disclose that portfolio company assets were used to pay former employees and an affiliate and failed to provide management fee offsets.⁵
- (5) WL Ross & Co. - September 2014 - \$2,300,000
 - (a) WL Ross failed to disclose how they calculated fees, leading to some investors paying up to \$10 million in unnecessary management fees.⁶
- (6) Apollo Global Management LLC - April 2015 - \$52,700,000

² "SEC Charges Former Oppenheimer Private Equity Fund Manager with Misleading Investors about Valuation and Performance." SEC Emblem. August 20, 2013. Accessed March 24, 2018. <https://www.sec.gov/news/press-release/2013-160-sec-charges-former-oppenheimer-private-equity-fund-mana>.

³ <https://www.sec.gov/news/pressrelease/2015-131.html>

⁴ "Blackstone Charged With Disclosure Failures." SEC Emblem. October 07, 2015. Accessed March 24, 2018. <https://www.sec.gov/news/pressrelease/2015-235.html>.

⁵ "SEC Charges Private Equity Firm and Four Executives With Failing to Disclose Conflicts of Interest." SEC Emblem. November 03, 2015. Accessed March 24, 2018. <https://www.sec.gov/news/pressrelease/2015-250.html>.

⁶ "SEC Fines Wilbur Ross Firm \$2.3 Million over Fees." Reuters. August 24, 2016. Accessed March 24, 2018. <https://www.reuters.com/article/us-wlross-sec/sec-fines-wilbur-ross-firm-2-3-million-over-fees-idUSKCN10Z2YJ>.

- (a) Apollo was fined for misleading clients about fee disclosures and failed to prevent a senior partner from charging personal expenses to clients.⁷
- (7) TPG Capital - June 2015 - \$13,000,000
 - (a) TPG was to pay a \$3 million fine and \$9.8 million disgorgement for misleading disclosures about fees to investors and accelerating fees.⁸
- (8) Resources Planning Group Inc. - October 2015
 - (a) RPG was charged for raising more than \$1.3 million by misrepresenting the Midwest Opportunity Fund as a viable private equity fund that could offer high returns and failed to tell investors about the fund's poor financial condition or that their money was being used to repay personal MOF promissory notes.⁹
- (9) Blackstreet Capital Management - November 2015 - \$3,100,000
 - (a) Blackstreet Capital Management and Murr N. Gunty (owner) performed in-house brokerage services and charged fees without registering and committed other securities law violations.¹⁰
- (10) Clean Energy Capital LLC - November 2015
 - (a) Clean Energy Capital LLC was charged for improperly paying more than \$3 million of the firm's expenses by using assets from 19 private equity funds that invest in private ethanol production plants.¹¹
- (11) Alpha Titans LLC - November 2015 - \$700,000

⁷ "SEC Fines Private-equity Firm Where Bayh Works Record \$53M." Indianapolis Business Journal | IBJ.com. Accessed March 24, 2018. <https://www.ibj.com/articles/60085-sec-fines-private-equity-firm-where-bayh-works-record-53m>.

⁸ Robinson, Matt. "TPG to Pay \$13 Million Over SEC Allegations It Mised Investors." Bloomberg.com. December 21, 2017. Accessed March 24, 2018. <https://www.bloomberg.com/news/articles/2017-12-21/tpg-to-pay-13-million-over-sec-allegations-it-mised-investors>.

⁹ "Resources Planning Group, Inc., Et Al.: Release. No. LR-22548 / November 29, 2012." SEC.gov. November 29, 2012. Accessed March 24, 2018. <https://www.sec.gov/litigation/litreleases/2012/lr22548.htm>.

¹⁰ "SEC: Private Equity Fund Adviser Acted As Unregistered Broker." SEC Emblem. June 01, 2016. Accessed March 24, 2018. <https://www.sec.gov/news/pressrelease/2016-100.html>.

¹¹ "SEC Announces Charges Against Arizona-Based Private Equity Fund Manager in Expense Misallocation Scheme." SEC Emblem. February 25, 2014. Accessed March 24, 2018. <https://www.sec.gov/news/press-release/2014-41>.

- (a) Alpha Titans LLC and two executives were charged for improper allocations of fund assets to pay undisclosed operating expenses around \$450,000 in expenses.¹²
- (12) Lincolnshire Management - November 2015 - \$2,300,000
 - (a) Lincolnshire Management was charged with breaching its fiduciary duty to a pair of private equity funds by sharing expenses between a company in one's portfolio and a company in the other's portfolio in a manner that improperly benefited one fund over the other.¹³
- (13) Camelot Acquisitions Secondary Opportunities Management, LLC - June 2016
 - (a) CASO Management was charged for engaging in a fraudulent scheme of misappropriating \$9.3 million in fund assets, disadvantaging investors, and elevating its own interests above those of the fund they advised.¹⁴
- (14) Cherokee Investment Partners, LLC - August 2016
 - (a) Cherokee Investment Partners is a private equity fund advisor that manages two private equity real estate funds; they were charged for the improper allocation by these two fund advisers to client funds of certain consulting, legal, and compliance-related expenses incurred based on their standing as registered investment advisers.¹⁵
- (15) Potomac Asset Management Company - August 2016 - \$300,000
 - (a) PAMCO was charged for improperly charging \$2.2 million in fees and expenses to two private equity fund clients.¹⁶
- (16) Capital Dynamics, Inc. - September 2016 - \$275,000

¹² "SEC Charges Santa Barbara-Based Hedge Fund Firm, Executives, and Auditor for Improper Expense Allocations." SEC Emblem. April 29, 2015. Accessed March 24, 2018. <https://www.sec.gov/news/pressrelease/2015-76.html>.

¹³ "SEC Charges New York-Based Private Equity Fund Adviser With Misallocation Of Portfolio Company Expenses." SEC Emblem. September 22, 2014. Accessed March 24, 2018. <https://www.sec.gov/news/press-release/2014-205>.

¹⁴ <https://www.sec.gov/litigation/complaints/2014/comp-pr2014-19.pdf>

¹⁵ <https://www.sec.gov/litigation/admin/2015/ia-4258.pdf>

¹⁶ <https://www.sec.gov/litigation/admin/2017/ia-4766.pdf>

- (a) Capital Dynamics was charged for the improper allocation of certain expenses to private equity fund client; CDI caused the Solar Fund to pay for over \$1 million in legal, hiring, and consulting expenses.¹⁷
- (17) Cranshire Capital Advisors, LLC - December 2016 - \$250,000
 - (a) Cranshire was charged for inappropriately charging expenses to its fund clients and failing to adopt and implement certain compliance policies and procedures.¹⁸
- (18) First Reserve Management, LP - July 2017 - \$3,500,000
 - (a) First Reserve was charged for failing to disclose certain fees and expenses of two entities and charging certain premiums for a liability insurance policy.¹⁹
- (19) Paramount Group Real Estate Advisor LLC - August 2017 - \$250,000
 - (a) Paramount was charged for failing to cause Paramount Residential Development Fund to reimburse Fund III for development expenses. Paramount failed to seek approval from Fund II.²⁰
- (20) Platinum Equity Capital Partners, LP - September 2017 - \$2,000,000
 - (a) Platinum was charged for incurring out-of-pocket fees, costs, and expenses from investing \$5.3 billion in 85 companies.²¹
- (21) Platinum Partners - NYC - September 2017
 - (a) Platinum Partners was charged with conducting a fraudulent scheme to inflate asset values and illicitly move investor money to cover losses and liquidity problems.²²
- (22) JH Partners, LLC - December 2017 - \$225,000
 - (a) JHP was charged for failing to disclose potential conflicts of interests when loaning approximately \$62 million to portfolio companies to provide interim financing for working capital or other urgent cash needs.²³

¹⁷ <https://www.sec.gov/litigation/admin/2017/ia-4746.pdf>

¹⁸ <https://www.sec.gov/litigation/admin/2015/ia-4277.pdf>

¹⁹ <https://www.sec.gov/litigation/admin/2016/ia-4529.pdf>

²⁰ <https://www.sec.gov/litigation/admin/2017/ia-4726.pdf>

²¹ <https://www.sec.gov/litigation/admin/2017/ia-4772.pdf>

²² "SEC Charges Platinum Funds and Founder With Defrauding Investors." SEC Emblem. December 19, 2016. Accessed March 24, 2018. <https://www.sec.gov/news/pressrelease/2016-267.html>.

²³ <https://www.sec.gov/litigation/admin/2015/ia-4276.pdf>

Recommendations

Upon review of the work of the Consultant, as represented in these chapters, the Commission makes the following recommendations.

Performance and Asset Allocation

- We recommend that each fund revisit and reconsider its asset allocation in light of the findings in the consultant report as to past risk-adjusted and relative performance of the current models.
- At SERS, we recommend that such a reconsideration focus on the role of illiquid investments in the portfolio, particularly private equity. We note the finding that through the 2008 financial crisis, SERS allocation, heavy in illiquid investments, performed worse than a balanced public market index. We do not recommend that SERS exit private equity as an asset class, and note that SERS performance in this asset category has been stronger than PSERS. However, we recommend that SERS carefully reconsider the risks of its current allocation targets to illiquid private investments, particularly private equity, and reduce them to more appropriate levels, noting that the 2017 allocation was found to be “in line” with peers.
- At PSERS, where one measure of total fund risk was found to have “nearly doubled” in recent years and unusual levels of portfolio complexity noted, we find greater cause for concern, and we recommend that such a reconsideration focus on the role of illiquid investments more broadly, particularly private equity, hedge funds, and commodities. We note the troubling finding that PSERS level of illiquid investments overall at 43% (not including unfunded commitments to these investments) is a “significant outlier” and far more than either SERS or peer funds. We therefore urge that PSERS carefully reconsider the risks of its current allocation targets for illiquid private investments, and reduce them to more appropriate levels.
- We also recommend that PSERS, as a matter of priority, revisit and reexamine its use of leverage. The use of leverage – borrowing – by U.S. pension funds is extremely rare, and the extent to which PSERS uses leverage (effectively borrowing against over 17% its portfolio) is an anomaly, the potential risks of which are not widely understood by stakeholders. As the report notes, leverage can be “treacherous” and has sometimes led to catastrophic outcomes. We recommend that a PSERS review of leverage clearly examine and communicate risks, and ensure that robust board-level guidelines are in place and understood by all stakeholders.
- We commend SERS for maintaining a more rigorous fund-level benchmark, and note the finding that SERS performance weakness appears to have been more of “execution” rather than “strategy.” We recommend SERS continue to use such a rigorous benchmark, and focus its efforts on continuing to improve execution.
- We recommend that PSERS reconsider and revise its fund-level benchmark, found to be the lowest among a peer group over every period. We note the finding that PSERS performance weakness appears to have been both of “strategy” and “execution,” and recommend PSERS comprehensively reexamine both.
- We recommend that the investment management of the systems be redirected towards simplicity. Because complexity increases costs and risks without any assurance of higher returns, because the Consultant report shows that lower-cost simpler portfolios in fact would have performed “significantly better on a risk-adjusted basis than the current complex strategies,” and because findings in the Consultant report suggest the funds do not currently have the expertise and oversight in place to properly oversee their current complex (particularly in the case of PSERS) portfolios, we recommend the funds take a new and simpler approach.

Cost-savings Options

- We note the findings that there is a fundamental “mismatch” between oversight capacities for such complex portfolios as PSERS has adopted, particularly internal management, derivatives, and illiquid investments, and that such capacities appear “stretched” at SERS, particularly in the large number of allocations to private equity and real estate. We therefore recommend that new commitments of capital to these strategies, at either fund, are limited until these issues are addressed.
- We note the findings that sufficient accountability, risk monitoring, and management structures are not currently in place, and we recommend that certain “innovation” cost-savings options, such as further internal management, co-investments, seeding new managers and/or forming exclusive relationships with new firms, should NOT be pursued at this time.
- We note that the cost-savings recommendations in the Consultant report below are limited in that they were only able to analyze public mandates, and the recommendations are made in the context of presuming no change to current allocations or strategies. Thus, the following recommendations should be understood as options that may be superseded by recommendations found elsewhere in this report.

Cost-savings Analysis

- We note the Consultant report’s finding that in practice at both SERS and PSERS, “active mandates that cost more do not necessarily represent better value for money” and indeed, at one asset class at PSERS, the cheapest mandates were the best performing.
- We recommend that PSERS comprehensively review and revise its benchmarks for asset classes, sub-asset classes and managers, particularly all benchmarks used for performance-based compensation, noting the report’s finding that PSERS benchmarks across the board are not “sufficiently granular.”
- We note the report’s finding that in the PSERS high yield allocation, managers have been paid 93% of the “alpha over the 10-year period ending June 30, 2018 (100% in the 10-year period ending June 30, 2017)”, and we recommend that performance pay arrangements at both funds be rigorously reviewed, appropriately benchmarked, and entered into only after modeling total costs to the fund of different options. We recommend that all fees, whether base or performance, be considered and tracked, and do not recommend pursuing fee “savings” that are simply shifting costs from base fees to performance fees.
- We recommend that both funds adopt the following best practices to minimize fees:
 - o track the age of all fee schedules, and reviewing at least every two years
 - o track the age of all manager relationships, and considering longevity of relationship in recurring fee reviews and negotiations
 - o require all asset managers to confirm in writing that they do not receive commissions, rebates and the like in connection with fund investments
 - o require all asset managers to confirm in writing that they have not paid fees, commissions and the like in connection with obtaining investments into their funds
 - o establish a fee budget, at the fund level, for all investment managers, subject to waiver by the board
 - o prohibit the use of bundled brokerage by brokers and managers.
- We commend SERS for conducting regular transaction cost analysis, and recommend that PSERS do

the same.

- We recommend that both funds establish a better process for considering specific alternatives to each proposed investment under consideration, which the Consultant report findings suggest need improvement. Any proposed investment should be evaluated not in a vacuum, but against a specific low-fee equivalent-risk alternative, as a way of strengthening a commitment to cost discipline and better evaluation of expected and realized performance.
- We recommend that both funds evaluate procurement guidelines for asset management services.
- We recommend that both funds adopt the practices detailed in the Consultant report to negotiate harder on private markets investments, particularly when the Systems together would constitute one of the top investors in terms of asset size, including but not limited to: seeking to pay fees based only on invested rather than committed capital; seeking fee reductions during the investment phase; capping monitoring, oversight, and legal fees; negotiating carry terms more carefully and modeling different scenarios; seeking full transparency on waterfall terms, and whether other waterfall terms have been offered to other investors; recalculating GP-determined carry payments; having a process to ensure that all terms contained in marketing materials or arrived at in negotiations are legally documented and monitored; and monitoring and auditing all fees and costs charged by general partners in limited partnership structures.
- We recommend that both funds retain the services of an outside expert who, with proper access to full information, could assist them in developing and implementing further cost-savings.
 - o We recommend that SERS, with the assistance of an outside expert, immediately renegotiate public security mandates identified in the Consultant report that are mispriced to achieve at least \$4.87 million in savings on an annual basis, or \$584 million compounded over 30 years, while noting that this recommendation is not meant to preclude action on other savings recommendations elsewhere in this report that may supersede it.
 - o We recommend that deploying these and other approaches, SERS, with the assistance of an outside expert, renegotiate all new (or renewed) private equity investment agreements to achieve at least \$12.18 million in savings on an annual basis, or \$926 million compounded over 30 years.
 - o We recommend that PSERS, with the assistance of an outside expert, immediately renegotiate the public security mandates identified in the Consultant report that are mispriced to achieve at least \$4.91 million in savings on an annual basis, or \$560 million compounded over 30 years, while noting that this recommendation is not meant to preclude action on other savings recommendations elsewhere in this report that may supersede it.
 - o We recommend that deploying these and other approaches, PSERS, with the assistance of an outside expert, renegotiate all new (or renewed) private equity investment agreements to achieve at least \$15.48 million in savings on annual basis, or \$1.17 billion compounded over 30 years.
 - o We recommend that PSERS, with the assistance of an outside expert, immediately restructure its high yield allocation as suggested in the Consultant report, to achieve savings of at least \$42.5 million on an annual basis, or \$3.23 billion compounded over 30 years, while noting that this recommendation is not meant to preclude action on other savings recommendations elsewhere in this report that may supersede it.
- We recommend that, in the absence of the legislatively-created Central Pension Investment Office, the systems establish structures to share manager selection, monitoring, and risk control work between the two Systems.



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

CONSOLIDATION OF INVESTMENT OPERATIONS

IX. Consolidation of Investment Operations

I have difficulty understanding why you have two different plans from the point of view of investing and what I would call the back office operations. I can understand why you would have two different plans in terms of representation of the teachers and representation of all other employees, but why they ought to be operationally separated doesn't sound like anything that would be chosen by a rational observer. - Dr. Charley Ellis, Testimony to the Commission on October 25, 2018

Now, I have no idea ... whether that's even feasible in Pennsylvania or the like. I know it was hard in the U.K. But in general, I would have -- if you were designing the scheme afresh, right, you probably only have one public pension scheme in Pennsylvania. - Dr. Tim Jenkinson, Testimony to the Commission on September 20, 2018

Consolidation: A Commonsense Approach

For over 100 years, the Commonwealth of Pennsylvania has recognized the importance of providing, to those whose careers have been dedicated to public service, a fair and secure retirement. The Commonwealth has prioritized cost-savings in doing so by creating and managing multi-employer retirement systems: PSERS serves 750+ education employers, SERS serves 100+ state public employers, and PMRS serves 900+ municipal plans. While there are current and historical reasons why these are and should be different systems, there are many commonalities that make them ripe with opportunity for greater efficiency, better management, and lower costs through pooling resources. Both SERS and PSERS are mature plans (though PSERS has a slightly lower percentage of beneficiaries in retirement). The systems each use identical discount rates of 7.25%. In their quest to achieve the returns to meet this discount rate, the systems overlap considerably in the assets in which they invest. The efforts of best practice sourcing, evaluating, selecting, monitoring, and managing specific investments is not unique to either system. These similarities present opportunities for the principle of cost-sharing to extend to the two systems' investment implementation, without jeopardizing each system's unique service mandate, and to the benefit of each system's beneficiaries.

Experts throughout Commission hearings testified to the commonsense intuition that a consolidated pension investment office would cost less and be more operationally efficient than running two operationally duplicative offices. A consolidated pension investment office would provide the following benefits to Pennsylvania: (1) reducing operational and administrative costs through the elimination of duplication; (2) driving better deal terms with asset managers by leveraging scale of investments; (3) and improving performance by using market power to access, partner with, and concentrate relationships with select managers, enhancing focus on operations and risk management, and building internal capabilities to directly manage index equity and fixed income strategies.

What is a Consolidated Investment Office?

A consolidated pension investment office is a shared professional investment service for public employee retirement systems which, by pooling assets, can capitalize on economies of scale to achieve cost-effective operations and improve access to high quality investment management firms.^{ccxx} Generally, in instances where shared pension investment services are utilized, they have not resulted from the merging of assets, plans, or entire organizations. Instead, they are formed as new, independent pension investment management services, created as a utility for client pension systems. While exact composition of oversight boards vary,

these organizations are typically overseen by boards with professional financial expertise, and are entrusted with the duty to act in the best interests of client pension systems by ensuring that investment decisions are based solely on seeking the best returns without other influences. Ideally, consolidated pension investment offices deploy professional investment and risk management practices with assets under management sufficient to support investing in a broad range of asset classes at the most competitive costs.^{ccxxi} While investments may be pooled at an asset class or portfolio level, participating client pension systems may still participate in broad asset allocation decisions. One fifth of the largest U.S. pension funds trust a separate investment management organization with its own board to invest.^{ccxxii}

The Commission heard testimony from and analyzed some of these organizations regarding their common characteristics and the benefits they provide to client pension systems. A shared pension investment management office reduces duplicative staffing and investment provider costs, leverages scale including the ability to attract and retain the talent necessary to manage assets internally, and improves risk management to the benefit of the plan beneficiaries, employers, and taxpayers.

The Province of Ontario created the Ontario Investment Management Company (IMCO) in 2016, to invest the assets of more than 100 pension and other investment funds within the Canadian province.^{ccxxiii} In the Ontario model, the pension investment management office is tasked with operations, not policy. The scope of work for the shared pension investment office conducted on behalf of client pension funds may include: the selection and monitoring of managers, the negotiation and drafting of contracts, the oversight of performance, investment accounting, and compliance. The client pension systems, in contrast, set broad policy, including identifying the asset classes in which they invest. In practice, an investment office may create “a family of unitized pooled funds, similar to mutual funds” in which client assets would be invested.^{ccxxiv}

COMMONWEALTH OF MASSACHUSETTS PENSION RESERVE INVESTMENT MANAGEMENT BOARD

Massachusetts, the second state to create a defined benefit pension system in 1911, also provides an early model of a shared pension investment operation.

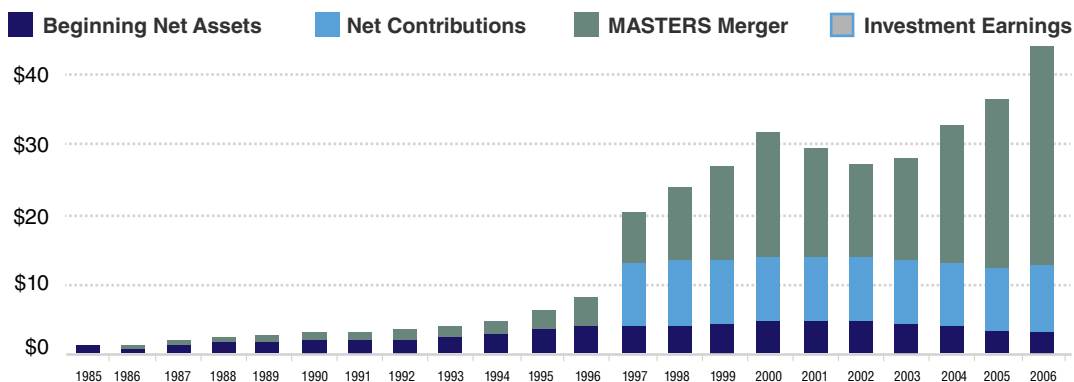
Following years of study of how its pay-as-you-go pension system would financially burden the state, in 1983 the Massachusetts General Assembly established the Pension Reserve Investment Trust Fund (PRIT) and its overseer, the Pension Reserve Investment Management Board (PRIM), in order to invest and grow the assets of the pension fund.^{ccxxv}

In 1996, the legislature enhanced the impact of the pension investment management organization through the consolidation of the PRIT with the Massachusetts State Teachers and Employees Retirement System (MASTERS). The same legislation also opened PRIT up to local pensions, by allowing them to invest either wholly into the well-diversified Trust or retain control of their asset allocation and invest in asset classes (called “segments”) of their choosing, with PRIM managing part or just some of their assets. An analysis from 2005, almost a decade after the MASTERS joined PRIT, found that 81% of income to the PRIT fund came from investment earnings.^{ccxxvi}

Today, just nine of the state’s 104 local pension systems do not invest with PRIM, and both the State-Boston/Teachers Retirement System and State Retiree Benefit Trust Fund (SRBTF) are required by legislation to invest their assets with PRIT.^{ccxxvii}

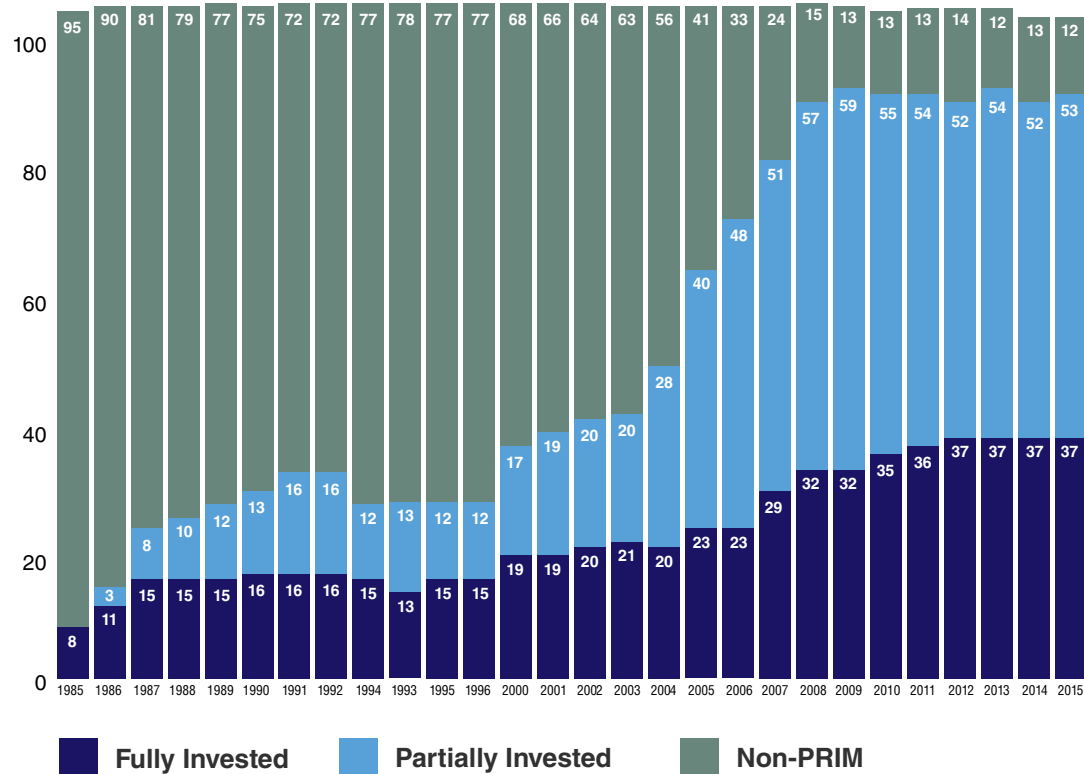
Figure 76: PRIT’s Growth in Net Assets

GROWTH IN NET ASSETS, FISCAL YEARS 1985 TO 2006



Source: *The Commonwealth’s Pension System: A Good Investment For Massachusetts* prepared on behalf of MA Public Pension Forum by Lussier, Gregor, Vienna Associates.

Figure 77: Local Pension Systems' investment in PRIM

LOCAL PENSION SYSTEMS' INVESTMENT IN PRIM 1985-1996, 2000-2015

Source: Pioneer Institute.

Benefits of Consolidation

There are three main benefits to be gained from a consolidated pension investment office: (1) eliminating duplication to reduce costs; (2) leveraging scale to drive better deals; and (3) improving performance.

1. Eliminate Duplication

Consolidated pension investment offices can lead to reduced operational and administrative costs through the elimination of duplication. Pension systems retain staff to select investment strategies reflective of the asset allocation determined by the board. For pension systems managing their assets independently, the size of internal investment staffs may vary by the size of assets and complexity of construction, but the function of staffs across two systems with investments in the same asset classes is duplicative. In parallel, pension systems hire numerous professional services to support the evaluation, selection, and monitoring of investments, including general investment consultants, alternative investment specialist consultants (e.g. hedge fund, real estate, private equity), risk systems (e.g. Bloomberg, FactSet), and investment-related service providers such as lawyers, accountants, or compliance staff and services. General consultants provide expert outside counsel to staff and boards. Examples of their work include asset liability studies and portfolio analysis. Systems retain specialist consultants to help assess the opportunity set across and quality of managers in complex alternative asset classes, like private equity, real estate, and hedge funds. Consulting firms commercialize their expertise by selling this core knowledge to and replicating work for many pension systems. These investment service providers have high fixed costs, and Pennsylvania's two largest state-run

systems would benefit by paying for this expertise once rather than twice. Of additional benefit would be the consultant's enhanced ability to leverage the scale of a large, collective asset pool in any support given to sourcing and negotiating with managers.

Bloomberg, BlackRock Solutions, and FactSet are examples of portfolio management tools that provide important portfolio and risk management insight to institutional investors who can afford them. These analytic and risk systems can and should be used across a portfolio, with functionality that scales with portfolio size. These technologies are priced at a relatively fixed cost, meaning they do not cost more for increased assets under management, and their high cost means some systems are too small individually to afford access. A shared pension investment management service would have the asset size to afford an expert staff capable of using such data and analysis systems for the benefit of client pension systems.

Support services to investment management are required by each pool of assets, and also offer an opportunity for duplicative cost reduction through a consolidated pension investment manager. Core staff and retained firms include accountants, lawyers, compliance officers / managers, and actuaries. Non-investment support services and overhead are also duplicated when pension assets are managed in isolation, including office space and administration.

2. Leverage Scale

A consolidated pension investment office can drive better deal terms with asset managers by leveraging scale. Asset management expenses are the most significant cost in investing pension capital and, as such, provide an opportunity for cost-savings through consolidation. Asset management fees have historically been charged to pension investors by basis points for assets under management. Management fees often feature a sliding scale with "break points" where, after certain asset levels, the percentage rate per dollar is reduced. This reduction acknowledges the operating leverage inherent in the asset management model: asset managers can implement an investment strategy without adding headcount or systems in line with the increase in the assets managed. Break points are features of both traditional public market strategies and alternative strategies. A recent private equity fund evaluated by the Systems featured a flat management fee of 1.5% per year, which reduced to 1.4% with a \$250 million dollar investment, 1.3% with a \$500 million dollar investment, and 1.15% with a \$750 million dollar commitment. As Systems' staff have been able to demonstrate, even a "sticker price" for funds with break points can be further negotiated.

Particularly in alternative investments, large investors may have access to preferential fee terms through co-investment opportunities. Co-investment is the additional direct investment in a single investment alongside one of the pension fund's external managers. As a direct investment in a single company, co-investment requires that investment staff have financial modeling and transaction experience that differs from those skills typically used to underwrite managers. Managers recognize the benefit they gain from this additional commitment by the pensions that already invest with them, as it allows them to invest in deals that do not otherwise fit with their investment fund (perhaps because of size or other terms) and in more recent years it has been seen as a method for reducing costs for their largest investors, without explicitly lowering their stated fee structure. A consolidated investment office offers the opportunity to attract staff skilled at analyzing and managing individual direct investments, including co-investments, which when paired with the proper risk controls may result in lower investment costs for the pension fund.

Large, consolidated offices actively engage their market power in negotiating relationships with managers, often going far beyond the benefit of break points offered by managers (which may eventually plateau). Combined assets change the dynamic of how terms are set between managers and plans. As Dr. Ashby Monk testified before the Commission: "Now, I admit that consolidation could be seen as innovation, it could be seen as cost arbitrage. But ultimately, what you're doing by consolidating plans is giving yourself a stronger negotiating position."^{ccxxviii} Grounding this theory in a recent real-world example, Dr. Jenkinson testified, "And if you look at what happened in the U.K. with the local authority pension schemes, they've had a big program

of consolidation. And for basically the reasons you say, that, [...] each one of them was much smaller, [...] the odd couple of billion didn't have much bargaining power.... So I think there is a general tendency towards consolidation, which I think is a good thing.”^{ccxxxix}

3. Improve Performance

Consolidation of investment operations can improve performance by using market power to access, partner with, and concentrate relationships with select managers, enhancing focus on operations and risk management, and building internal capabilities to directly manage index equity and fixed income strategies. In addition to eliminating costly redundancies, consolidation can create further value by giving the single investment organization access to high quality investment staff able to level the partnership with external investment managers. Potentially performance-enhancing investments -- beyond index managed stocks and bonds -- should only be contemplated by the few well-staffed professional management organizations capable of understanding the risks and underwriting the highest quality investment partners.^{ccxxx} Without qualifying which investors can prudently invest outside of traditional asset classes, Dr. Jenkinson testified, “I think also, as you go into private markets, [...] you need more specialist staff and expertise, and you might need some more manpower, as well. And [...] there can be economies of scale in putting these schemes together.”^{ccxxxi}

While pension funds traditionally partner with third-party investment managers, for certain asset classes, some organizations can credibly retain qualified staff within the organization to invest directly in the capital markets, thereby eliminating the cost of a third party asset manager. Direct investing by staff may be called internal asset management or “in-sourcing.” As an ancillary benefit, the threat of being deemed unnecessary by investment staff endows pension investment staff a stronger negotiation position with managers. Such savings have attracted the attention of many pensions globally, which is why Dr. Monk called “insourcing” ... probably the biggest buzz word of the last decade.”^{ccxxxii} Ash Williams, the Chief Investment Officer of the State Board of Administration (SBA), Florida’s \$150 billion dollar consolidated investment organization, testified to the Commission, “I think the key thing is, number one, yes, you can effectively centralize investment operations. Number two, you can and should manage money internally. It will save you a lot of money doing so. Number three, for the most part, passive investment is a good thing... by doing this [investing] ourselves, we avoid an awful lot of costs in fees that would otherwise be paid in management fees and carried interest.”^{ccxxxiii} Testimony from senior officials of other consolidated investment offices and independent consultant reports quantify the cost benefits that Mr. Williams discussed. The Chief Investment Officer of the State of Wisconsin Investment Board (SWIB), David Villa, quantified the benefit: “economies of scale and investing in professional staff can save about 20 basis points. So in the context of a \$100 billion plan, that’s about \$200 million a year in savings.”^{ccxxxiv} Dollars that would otherwise leave the pension trusts of the system effectively stay within the pension trust, continuing to compound and enhance performance.

The South Dakota Investment Council (SDIC), State of Wisconsin Investment Board (SWIB) and Florida State Board of Administration (SBA) demonstrate that it is possible to attract and retain world-class investment talent capable of both tough, knowledgeable negotiations with Wall Street and cost-saving, skilled internal management of index and fixed income mandates. With oversight by expert investment committees, the Chief Investment Officers of each organization, located away from typical global financial centers, differ in their exact approaches to recruiting and retaining capable team members. Mr. Williams described the transparent process, metrics, and communication to help attract and retain world-class investors to serve the State of Florida and its pensions:

I'm very, very sensitive to how difficult it is to provide even remotely competitive compensation in a traditionally, highly compensated field like investment management for public sector employees, particularly when the vast majority of public sector employees have rather modest compensation, and taxpayers, generally, if you look at average family or individual incomes in most states compared to average incomes in the invested management industry, the contrast tends to be rather steep, or rather severe. So in Florida, the way we approached that to gain understanding [and] buy-in and to share the value proposition with all of the constituencies and shareholders of the Florida Retirement Systems, was we held a series of public meetings -- and you'll think I'm exaggerating, I'm actually not -- over a period of six years developing our compensation scheme that we have now had truly operational for three years. And what we did was take great pains to ensure that everybody understood exactly what was going on. Very high degree of transparency, very high degree of structural alignment in the interest of the taxpayer, the beneficiary, the senior part of the governance structure, and the investment professionals working at the State Board. And we were able to establish very clear documentation using a third-party fiduciary external compensation consulting firm, Mercer, to advise us on that, get us comparable data, et cetera. And the other thing we did that I think was smart in retrospect was we never said, "Let's make our objectives to pay the same as Wall Street." That obviously would be a foolish and unfulfillable goal. And so we said, "Why don't we compare ourselves to our brethren in public pension land," other very large public pension funds," and compare our compensation to theirs and see where we stack up.^{ccxxxv}

Analysis of PSERS and SERS

The Commission considered the various opportunities for PSERS and SERS to benefit from consolidated investment opportunities. A discussion of the areas under consideration follows in this section.

1. PSERS and SERS duplicate many operational and administrative costs.

Together, PSERS and SERS spend more than \$23 million dollars per year on investment office costs, allocated across similar line items including staff, operating expense, consultants and legal, as summarized in the figure below. Some fixed costs may be duplicative, and thus a shared investment office for the two funds may only require some portion of the current total costs. Consultants offer a good example: SERS, whose assets are slightly more than half the size of PSERS, pays nearly same cost for these services. Other costs, such as staffing and operating expenses, vary with headcount and systems support. McKinsey, a management and strategy consulting firm, and their strategic partner CEM Benchmarking, a firm which gathers data from pensions and other institutional investors, studied the benefits of pension investment office consolidation.^{ccxxxvi} The investment costs per dollar of assets under management for a \$100 billion pension fund was 18% lower than a \$50 billion pension, and 22% lower than a \$25 billion pension plan. A closer inspection of the redundant costs to the system may yield an estimated \$9 million in potential annual savings (See the second table below).

Figure 78: Cost Areas of SERS and PSERS, 2017

ANNUAL COSTS - CURRENT
IN THOUSANDS OF DOLLARS

SERS		PSERS	
Personnel	2,864	Personnel	10,422
Consultants	3,183	Consultants	3,098
RVK	707	AonHewitt	700
StepStone, GCM	2,185	Hamilton Lane	1,400
NEPC	291	Courtland	298
		Aksia	700
ISS	93	Glass Lewis	179
Korn Ferry Hay Group	443	Conduent HR Services	630
Subscriptions	296	Subscriptions	1,873
	6,878		16,201
COST TO MANAGE EXISTING INDEX INVESTMENTS, EXTERNAL AND INTERNAL			
Equities	1,562	Equities	2,046
Fixed Income	308	Fixed Income	1,078
	1,870		3,124
BASE MANAGEMENT COST FOR PRIVATE EQUITY			
<i>Private Equity Allocation</i>		<i>Private Equity Allocation</i>	
\$4,077,500		\$5,950,167	
1.63%	66,463	1.38%	82,112

Please note that the plans indicate base management fees of 163 (SERS) and 138 (PSERS) bps in their annual and consultant reports.

Source: Estimates based on data in Systems' Budget Books, CAFRs, and Monk et al. chapters of this report.

The separate pension investment operations of SERS and PSERS may lead to burdensome costs and to the misallocation of scarce resources that could otherwise be used to benefit returns. Separate investment implementation could mean duplicative investment staff, who evaluate opportunities in the same asset classes and who use the same, duplicative support services. (See figure below for areas of overlap.) This overlap spends money that could either be reinvested in the pension trusts or used to expand expertise in portfolio and risk oversight.

Outside service providers whose services may be duplicated include general and alternative investment specialists, accountants, and actuaries. Each board and staff retains a different general consultant to assist in asset allocation and asset liability study. In addition to dedicated portfolio teams to look after each asset class, each system also has specialty consultants to evaluate the quality of external asset managers within asset classes including real estate, private equity, and hedge funds. These firms commercialize their expertise by selling this core knowledge to and replicating work for many pension systems. Our Systems would benefit by paying for this expertise once.

Figure 79: Estimated Potential Cost Savings for Centralized Investment Office

CONSOLIDATION

IN THOUSANDS OF DOLLARS

SAVINGS	% REDUCTION IN SUM COSTS	1 YEAR	30 YEARS
1) ELIMINATION OF REDUNDANCIES			
Personnel	-33%	4,384	
Consultants	-44%	3,490	
General	-50%	703	
Private Equity	-50%	1,793	
Real Estate	-50%	295	
Hedge Fund	0%	700	
Proxy Voting Advisor	-50%	136	
Actuary	-33%	354	
Subscriptions	-33%	716	
Total		9,080	897,170
2) IN-HOUSE MANAGEMENT OF EXISTING EQUITY AND FIXED INCOME INDEX INVESTMENTS			
Equities	-43%	1,562	
Fixed Income	-22%	308	
Total		1,870	185,790
3) LEVERAGE SIZE TO REDUCE EXTERNAL MANAGEMENT FEES			
Private Equity	-7%	10,194	1,007,350
Total		21,144	2,090,310

Source: Systems Budget Books, CAFR, RCI Report

Source: Estimates based on data in Systems' Budget Books, CAFRs, and Monk et al. chapters of this report.

2. Diluted scale results in competing and inferior terms with asset managers.

PSERS and SERS retain separate, yet duplicative investment staff to implement asset allocation, meaning to execute the activities of investment management relating to the selection, management and monitoring of managers who provide access to the capital markets and strategies identified in the asset allocation. The two systems' experience in US Equities, a familiar asset class, shows that despite shared beliefs about the asset class, the two systems do not use their scale to reduce operational cost. Both systems have chosen to index a significant portion of their US public equity allocations. Yet SERS engages external, third party asset managers to invest assets in index-based strategies to whom the System pays \$1.8 million annually⁵⁵ while PSERS endeavors to manage internally an index strategy. To reduce costs, a shared investment office could use its scale to negotiate the smallest cost with one external asset manager or develop internal capabilities for index equity investments.

Worse than missing out on an opportunity to take advantage of scale, PSERS and SERS may compete against each other for partnership with the best external asset managers. For example, throughout 2017, a year of active fund raising by managers, both systems were in the process of building up high cost private equity

⁽⁵⁵⁾ See tables "Public Equity Assets under Active Management v. Invested in Indices at SERS" and "Fixed Income Assets under Active Management v. Invested in Indices at SERS" in Chapter IV: Active and Index Investing.

portfolios. Services such as Bloomberg provide a list of which managers are “in market” with funds, and include details of fund size and close dates. A well-known manager marketed their next in a series of large buy-out private equity fund. Both SERS and PSERS invested in the fund, one paying a 1.5% management fee and 20% performance fee subject to an 8% hurdle, while the other has a management fee of 1.4% which stepped down every 2 years to 0.75% after year 6. While both systems independently made use of staff, lawyers, and consultants to evaluate this private equity opportunity, the only risk free way to increase the return of this particular investment was overlooked – they did not use their combined purchasing power to reduce the direct costs of this investment even to the extent that it was offered to one of the two systems. The Systems’ consultants report that PSERS pays 138bps in base management fees to its private equity program, while SERS pays 163bps (Chapter VIII: Cost-Saving Analysis). SERS individual fund commitments also tend to be smaller than those of the larger fund, PSERS. Applying the lower base management fees to the entire allocation, collective bargaining power might save \$10 million in fees in private equity alone. A consolidated investment service would use its market power to negotiate the best terms with the managers identified.

Subsequently, PSERS and SERS have recently found opportunities to work together, as Executive Director Glen Grell testified, “We’ve had a couple of instances where PSERS and SERS were both looking at the same deal, so we collaborated. In one case, we were able to use our maybe bigger buying power to negotiate a lower fee, not for us, but for SERS, but we’re all in the same family, so that was a good outcome. We’d like to do more of that. But there really are limits to what can be done without statutory change.”^{ccxxxvii} In its fee analysis of the systems, consultant Novarca identified a public securities manager used by both SERS and PSERS for an identical strategy, but paid different rates irrespective of the scale of the mandate.⁵⁶ While informal collaboration appears to have increased in private equity following the 2017 example above, collaboration does not appear to be systematic or to occur across other asset classes, and would be institutionalized through the creation of a new, shared investment office for the two systems.

3. Duplicative costs misallocate resources that could be used to improve performance.

Duplication of costs across the two pension systems misallocates resources away from the internal investment infrastructure that is critical to improving performance, namely, (1) enhanced understanding and managing risks in portfolios and (2) the developing of internal investing capabilities in order to reduce investment fees paid to external managers. A large reliance by both Systems’ current staff on external consultants suggests a lack of prioritization on the tools to manage risk including: front office systems to analyze risk, asset allocation, attribution, and trading; middle and back office, including an investment book of record (IBOR) operations; and finance and administration. Front office risk systems such as Bloomberg, BlackRock Solutions, and FactSet have high but fixed costs. As previously mentioned, they do not cost more for increased assets under management, as would be expected through investment office consolidation. Moreover, these systems are also high value, and may provide important portfolio and risk management insight to those systems unable individually to afford access. A better resourced organization with a greater ability to attract world-class staff would be better equipped to pay for and utilize these systems. These skilled individuals seek to understand and manage risks when portfolios have complexity, and know such systems are essential to properly risk controlled internal investing.

A new consolidated pension investment operation with appropriate and expert oversight could also improve performance through bringing additional capabilities and talent to oversight. Given the complexity of investment strategies available to investors, Dr. Monk counseled, “Sponsors have a legitimate desire and right to oversee their plans. But that representative instinct has to be balanced with the expertise needed to oversee increasing complexity.”^{ccxxxviii} Table 3 below summarizes Dr. Monk’s observations on how consolidated investment boards are staffed, their qualifications, and his view on their improved abilities to oversee the implementation of the complex investment strategies available to large institutional investors.

⁽⁵⁶⁾ SERS is paying lower fees than PSERS (9bps v. 12.4bps) on the same PSERS Passive Mandate 1 product, despite SERS allocating smaller amount until recently. (See Chapter VIII: Cost-Saving Analysis of this report.)

Table 3: Oversight of Selected Consolidated Investment Offices

TABLE 3: OVERISGHT OF SELECTED CONSOLIDATED INVESTMENT OFFICES

System	Number Board Members	Type	Function	Investment Expertise	Reliance on Consultants	Board fits Complexity of Portfolio
SDIC	5 expert appointees, plus 3 ex-officio	Expert	Investment	"members of the State Investment Council shall be qualified by training and expertise in the field of finance"	Low	Yes
SWIB	5 experts, 1 local government finance professional, 2 retirement board reps, 1 secretary of administration	Expert	Investment	minimum 10 years experience making investments	Low	Yes
SBA	9 on Investment Advisory Council (3	Expert	Investment	Knowledgeable about financial markets	Low	Yes

Source: Dr. Ashby Monk, 2018.

Elements of a consolidated central pension investment office (“Office”)

A properly established Office would avoid duplication of investment operations, enhance internal execution capacities, leverage combined fund size and bring additional investing governance capacity, while maintaining the existing governance structure for both retirement systems. In order to maximize the potential benefits associated with a consolidated central pension investment office and applying the best practices of examples in other jurisdictions, a properly established Office should include the following elements:

- a) Be responsible for the management, implementation and execution of all investment mandates on behalf of each client pension system, SERS and PSERS, pursuant to each retirement board’s adoption of asset allocation plans recommended by the Office;
- b) Be exclusively composed of high-caliber investment professionals recruited and retained by the Office’s oversight committee;
- c) Be overseen by an Investment Oversight Committee of small number (e.g., 5) of well-established, senior investment professionals selected and nominated by an appropriate process, such as nomination by the Governor and confirmation by the Senate. Each member should have at least ten years relevant investing or financial experience. The Investment Oversight Committee should have exclusive authority to select and hire all Office investment professionals;
- d) The Office and its Investment Oversight Committee should be subject to a fiduciary standard, requiring it to act in the sole and best interest of each client retirement fund and maintain vigorous reporting and disclosure standards consistent with those recommended in this Commission’s Report;
- e) The Office should develop necessary competencies and capacity for the prudent management of all equity, fixed income, real estate, or other strategies as may be required for the benefit of the client funds;
- f) The Office should be the sole contracting authority to retain external investment management and consulting services on behalf of the retirement funds when there are insufficient internal capacities;
- g) The Office should also be responsible for providing all necessary back-office support associated

with prudent investment management, including by way of example, accounting, legal, compliance, auditing, risk monitoring, and reporting services;

- h) The Office should be subject to an annual review by each retirement system. Investment staff salaries and promotions would take into account the results of each annual review.

Eliminating investment operation redundancies between the two pension systems will not “fix” Pennsylvania’s unfunded pensions, but – in concert with consistent funding – consolidated pension investment organizations with expert oversight and highly professional staff have been shown to reduce costs and improve investment outcomes as a shared steward of pension trust assets.

RECOMMENDATIONS:

It is recommended that the General Assembly enact legislation to establish a consolidated central pension investment office (“Office”) to manage and execute all investment mandates on behalf of and as directed by each of the Commonwealth’s retirement systems. While maintaining the existing governance structure for both retirement systems, the Office would avoid duplication of investment operations, enhance internal execution capacities, and leverage their combined fund size. The Office would have the following responsibilities:

- The Office would be responsible for the management, implementation, and execution of all investment mandates on behalf of both Systems pursuant to each retirement board’s adoption of asset allocation plans;
- The Office should be composed of high caliber investment professionals;
- The Office would be subject to a fiduciary standard requiring it to act in the sole and best interest of each client System and shall maintain vigorous reporting and disclosure standards consistent with those recommended in the Commission’s report; and
- The Office, in consultation with the respective System, should be the sole contracting authority to retain external investment management and consulting services on behalf of the Systems.



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

PROCUREMENT

X. Procurement

Procurement of Investment Services

In the context of this chapter, “procurement” refers to the process by which public pension systems identify, evaluate, and select external investment managers and consultants.

- Investment managers (also referred to as asset managers or portfolio managers) invest system assets according to agreed-upon objectives and parameters; some classes of investment managers offer commingled investment funds to which the system subscribes.
- Investment consultants are retained by the system to provide advice on various investment issues, including asset allocation; asset/liability studies; investment in specialty asset classes; and the selection, monitoring, and termination of investment managers. PSERS retains a consultant in each of the following areas: Absolute Return, Commission Recapture, Custodian Bank, Securities Lending, General Investment Consultant, Private Markets Investment, Proxy Voting Agent, Real Estate Investment, IAASP (Investment Accounting Application Service Provider).^{ccxxxix}

This chapter focuses on the activities that culminate in signing a contract with an investment manager or consultant. In particular, it looks at identification and sourcing of managers and consultants. This chapter does not cover post-retention policies and practices, such as routine and on-demand reporting; monitoring and audit, performance evaluation, and contract review; or conditions and procedures for manager/consultant termination. For details on these topics, please see:

- PSERS: “Investment Policy Statement,”^{ccxi} “Draft External Portfolio Manager Fee Policy,”^{ccxli} “Investment Consultant Performance Reporting Policy,”^{ccxlii} and “Draft External Manager Monitoring Policy: Traditional Asset Classes.”^{ccxliii}
- SERS: “Investment Manager Monitoring Policy.”^{ccxliv}

Pennsylvania Statute Governing Procurement of Investment Services

For both PSERS and SERS, procurement of investment services is governed by Pennsylvania’s Commonwealth Procurement Code.^{ccxlv} Section 511^{ccxlvi} states that, unless otherwise authorized by law, all Commonwealth agency contracts shall be awarded by competitive sealed bidding (see sidebar). This includes public notice of the invitation for bids and public bid opening.

However, Section 513^{ccxlvii} allows for competitive sealed proposals when the contracting officer determines in writing that the use of competitive sealed bidding is either not practicable or advantageous to the Commonwealth. In this situation, a request for proposal (RFP) must be created and made public, but the contents of the proposals may be withheld.

Furthermore, Section 515^{ccxlviii} permits sole source procurement in a variety of situations, including, as stated in §515(a)(8), when “The contract is for investment advisors or managers selected by the Public School Employees’ Retirement System, the State Employees’ Retirement System, or a State-affiliated entity.”

Practices: PSERS & SERS

What follows is a discussion of the current practices of PSERS and SERS in the following areas: investment manager selection; investment consultant selection; and (for PSERS) approval of other financial professionals. It includes quotations from the relevant system policy manuals along with commentary from the reports of the audits conducted by the Auditor General’s office in 2017.

A. PSERS: Current Investment Service Procurement Practices

Investment Manager Selection Process. In its response to a PPMAIRC data request,^{ccxlix} PSERS stated that it does not have procurement guidelines for asset management services. As of this writing, it is unclear how PSERS interpreted “procurement” and in what ways it might differ from manager selection as defined in their Investment Policy Statement and the due diligence process for evaluating prospective managers, as explained in their Draft External Investment Manager Underwriting Policy.^{ceI}

The PSERS Investment Policy Statement contains detailed information on the manager selection process.^{ceIi} To summarize: PSERS does not perform a competitive bidding process to select investment managers. Instead, staff work with the relevant investment consultant(s) to identify, evaluate, and recommend managers for intermediate and final Board approval.

For public markets managers (including public equity, fixed income, and commodities), a search process results in a short list of candidates. The investment consultant prepares for each candidate a profile including historical performance, ranking/score, analysis of assets under management of the manager and the product; and a style/size comparison (if applicable). For private markets managers (including private debt, private equity, and venture capital), staff routinely monitors new private markets funds coming to the market.

Candidates meeting the initial criteria are screened and interviewed, and further in-depth due diligence is performed. When a candidate is selected, staff negotiates the fees and contract terms. Only then is the candidate brought to the Board for final approval. Before the final contract is executed, the manager selection will have been approved by several levels of the investment office staff, the investment consultant, the Finance Committee, and the full Board.

Investment Consultant Selection Process. PSERS issues public RFPs for investment consultants through the PA e-Marketplace portal. See, for example, the RFP of May 4, 2018.^{ccxlii}

PROCUREMENT TERMINOLOGY

Competitive procurement involves soliciting and evaluating bids from multiple providers.

Competitive sealed bidding typically is used when price is the most important consideration. An invitation for bid (IFB) is publicly issued; it includes specifications for the goods or services; administrative requirements; and bid submittal date. The bids are opened in a public forum and the contract is awarded to the lowest responsive, responsible bidder.

Competitive sealed proposals typically are used when price is not the only important factor. A Request for Proposals (RFP) is the solicitation document for this method of procurement. The RFP includes the scope of work and evaluation criteria. It may ask the bidder to propose ways to meet a stated objective, and in that way is more conceptual than an IFB. In some cases, an RFP is preceded by a Request for Information (RFI), which is used to gather information about possible approaches and how to formulate the RFP.

Non-competitive procurement process, the buyer (here, a state agency such as a pension system) either selects the service provider without going through a bidding or RFP process, or they restrict the set of providers who may bid.

Sole source procurement occurs when there is only one supplier who offers the desired product—for example, a particular investment fund offered by a particular private equity firm. In some cases, the buyer is required to issue public notice of their intent to do sole source procurement. Often, the buyer must submit a sole source justification to a review process. (Sole source procurement should not be confused with single source procurement, in which there is a decision to purchase only from one selected supplier, although there are other suppliers of similar products.)

Approval of Other Financial Professionals. The PSERS Investment Policy Statement also specifies selection procedures for two additional categories of external professionals:

- **Securities lending agents** facilitate securities transactions by identifying a borrower and negotiating the loan terms on behalf of the fund sponsor (here, the pension system). PSERS lending agents must be approved by the Board of Trustees and the Finance Committee, and the Investment Office Staff is authorized to negotiate and execute appropriate agreements.
- **QIRs** (Qualified Independent Representatives) facilitate swaps—exchanges of future cash flows. The PSERS policy sets forth criteria for the QIRs to be used by prospective Swap Dealers and Major Swap Participants.

The Pennsylvania Auditor General conducted an audit of PSERS in 2017. The audit report^{cecliv} states, “During our audit period, PSERS and the Board appear to have properly procured investment consultants and external investment managers in accordance with its written procedures.”⁵⁷

B. SERS: Current Investment Services Procurement Practices

Investment Manager Selection. SERS does not issue RFPs for investment managers. The SERS process is described in their Statement of Investment Policy:

[Members of the Board of Trustees are responsible for] approving the engagement and termination of investment managers. Staff and consultants will identify potential candidates. Potential managers will be evaluated based on their ability to achieve the objectives outlined in the Investment Plan and their demonstrated experience and expertise for the specific mandate. Board suggestions for potential managers who meet these criteria will be evaluated by staff and consultants. While individual Board Members may meet with prospective managers, all group meetings involving a quorum of Board Members for a presentation by prospective managers shall be through formal Board meetings or Board Committee meetings. Staff and consultants are jointly responsible for carrying out the research and initial due diligence to identify qualified candidates. Staff and consultants are also jointly responsible for performing the on-going monitoring of investment managers and funds. Lastly, all prospective investment opportunities and/or investment manager terminations which are recommended to the Board must be supported by a memo from Staff and a memo from the relevant investment consultant.^{ceclv}

The Pennsylvania Auditor General conducted an audit of SERS in 2017. The audit report states, “We found that SERS’ procedures to sufficiently research and hire investment managers and investment consultants appear to be adequate and were performed in accordance with their written procedures.”⁵⁸

A CLOSER LOOK AT THE DUE DILIGENCE PROCESS FOR INVESTMENT MANAGERS

The PSERS “Draft External Manager Underwriting Policy”^{cecliii} sets forth the steps to be followed by its in-house investment professionals in evaluating prospective external managers once they are identified. The steps are: sourcing and identification; manager interviews; performance analysis; document review; public information review; reference calls; review of the manager’s operations; establishment of investment guidelines; preparing a memo of recommendation; Allocation Implementation Committee approval; operational preparation; Board approval; and contracting/legal negotiations.

⁽⁵⁷⁾ The report also states that PSERS failed to document its investor fee negotiations. The topic of investment manager and consultant fees is covered extensively elsewhere in the PPMAIRC report.

⁽⁵⁸⁾ The audit report also notes that, as with PSERS, SERS failed to document its fee negotiations.

Investment Consultant Selection. The audit report outlines the process followed by SERS for hiring investment consultants. Prospective consultants respond to a Request for Information (RFI) and due-diligence questionnaire and then submit technical proposals:

Approximately one year before a current investment consultant's contract is up for renewal, or when the Investment Office and the Board deem it necessary to hire a new investment consultant, a selection committee develops a Request for Invitation (RFI). The RFI and a due diligence questionnaire are provided to potential investment consultants. Candidates then submit technical proposals to SERS' Investment Office and Legal Office, which jointly recommends three to four semi-finalists to the Board's consultant selection committee. The selection committee interviews the semi-finalists and selects two to three finalist consultants for the full Board to interview. SERS investment staff provides a memo to the full Board, describing the finalists' profiles and fee structures and the selection committee's recommendation. The full Board interviews the finalists during a regular Board meeting and then decides through a vote which consultant is to be awarded the contract.^{celvii}

The audit concludes that "The Investment Office follows SERS' documented procedures for the hiring and managing of investment consultants."^{celviii} However, the audit then describes the extension of a contract for the real estate sector consultant due to unusual circumstances and comments on sole-source procurement:

SERS management stated that because the procurement of investment consultants is exempt under the sole source requirements within the Commonwealth Procurement Code there are no mandated requirements that other consultants needed to be considered. However, just because competitive bids are not required by law, that does not mean that SERS should not make it a point to offer all RFIs to multiple firms or to publicly advertise RFIs to ensure its hiring practices are the most prudent and cost-effective.

We acknowledge that awarding a contract to investment consultants without competition does not violate the Commonwealth Procurement Code nor SERS' internal written policy/procedures. However, if SERS fails to pursue a competitive advantage by considering other consultants, it loses the opportunity to negotiate the best contract terms and threatens its compliance with the prudent investor rules. SERS illustrated this point when it ultimately conducted the RFI process for its real estate consultant and found a more suitable and less costly consultant than this firm it had been contracting with for the past two decades.^{celix}

Procurement Sourcing Best Practices for Public Pension Systems

Many states exempt the selection of investment managers and consultants from their general procurement requirements. In 2015, as part of its research for a proposed bill, CalSTRS (California State Teachers' Retirement System, the second-largest U.S. pension system) stated that:

All 11 state pension funds contacted by CalSTRS are not required to abide by the same state-mandated procurement processes required for the procurement of other types of goods and services by other state agencies. For example, the board of the Ohio Public Employees Retirement System has the full power to invest the funds solely in the interest of participants and beneficiaries, including the power to adopt policies and criteria for selecting investment manager firms.^{celx}

However, pressure has been mounting on public pension systems to conduct open, competitive processes for the selection of external investment professionals. The following arguments are typically advanced in favor of such processes:

- They enable the investor to obtain the most-qualified service providers, by widening the pool of prospects.
- They enable the investor to obtain the most-favorable fee structures and terms, by fostering competition.
- They ensure all minimum requirements are met.
- They prevent questionable selection practices, or the appearance thereof.
- They facilitate monitoring the selections for diversity and other desired criteria.

Arguments that are typically advanced against open processes include:

- They handicap the investor in obtaining the most-qualified service providers, because some may be reluctant to undergo an open process, particularly if not just the fact of their participation but also the content of their response is made public.
- They generate a surfeit of responses/bids, particularly from unqualified respondents, thus burdening the investor’s staff.

However, it is not always clear what constitutes an “open and competitive” process.

A best-practices document from the Government Finance Officers Association (GFOA) on selecting investment professionals for pension funds^{cebx i} states that “a competitive, merit-based procurement process should be employed.” But it does not elaborate on what a “competitive” process entails and whether that implies the use of publicly-released RFPs.

In 2011, Massachusetts enacted legislation^{cebx iii} requiring an “explicit open and competitive procurement process to be followed by retirement boards when soliciting investment, actuarial, legal or accounting services.” Their intended meaning for the phrase “open and competitive” is illuminated in a best-practices investment manual issued by the state’s retirement administration (PERAC) in 2007.^{cebx iv}

The PERAC report states, “The main purpose of a competitive process is to assure that the retirement board has a sufficient number of highly qualified respondents from which to choose and that the ultimate selection is based on an informed and fair analysis of objective criteria.” It goes on to advocate a number of basic principles, including:

- Well-defined roles for all parties in the selection process.
- Openness: The use of publicly-issued RFPs. To address a common objection on the part of investors, the report states that “While it is possible that an RFP notice might attract so many responses as to make the job of the board and its consultant extremely time consuming and difficult, the greater risk is advertising in an outlet that attracts too few qualified responses.”

SELECTING INVESTMENT PROFESSIONALS FOR PENSION FUNDS

1. Selection Method. The responsible public official or the governing board should appoint a pension investment consultant³ and/or review committee to conduct the search process. Training should be provided to the governing board so that they may determine appropriate qualifications for consultant or committee suitability. Responsibilities of the review committee and/or pension investment consultant should be stated as should be the method of selection. A competitive, merit-based procurement process should be employed. Responsibilities of the investment professional(s) should be clearly defined in writing.

2. Sourcing Investment Professionals. The consultant and/or review committee should determine the sources for candidates to be considered based on procurement rules, including, but not limited to:

- a. consultants’ database on investment management firms,
- b. industry reports and articles,
- c. marketing materials,
- d. references from other pension plans or jurisdictions,
- e. existing vendor database or registry, and
- f. other governmental entity resources and information.^{cebx ii}

- **Fairness:** Having not only a well-documented and disciplined RFP process and deadlines, but also an informative RFP that contains detail on the scope of the proposed mandate, minimum requirements and standards, specific and objective evaluation criteria and weighting.
- **Objectivity:** Having clear pre-established criteria of minimum standards. For investment managers, such standards might include assets under management (firm-wide and in the specific asset class mandate); length of track record; and preferences relative to style (e.g., concentrated or diversified, aggressive or risk-constrained).

In 2017, the state of Kentucky adopted legislation^{ccclxv} requiring open, competitive bidding procedures when hiring investment managers for their retirement systems. Essentially, Kentucky removed the former exemption for investment managers, placing them under the standard procurement procedures.

However, other states maintain exemptions for investment manager procurement. For example, similarly to Pennsylvania, the Rhode Island General Treasurer’s Office exempts the procurement of investment managers from an open-bidding requirement^{ccclxvi}. The Chicago Teachers’ Pension Fund is required to conduct procurement of investment managers and consultants using a competitive RFP process, but they can invoke a sole-source exemption.^{ccclxvii} Note also that some systems, such as CalPERS and CalSTRS, exempt selection of emerging investment managers^{59ccclxviii} from competitive procurement procedures.^{ccclxix}

Recommendations

- We recommend that both PSERS and SERS consider the benefits and limitations of adopting open competitive-bidding processes for investment managers.
- We recommend that SERS adopt an open competitive-bidding process for all investment consultants. (PSERS already has this in place.)
- We recommend that both PSERS and SERS publish policy documents that address the following:
 - o Circumstances (if any), for which asset classes, and for which categories of investment professionals are RFIs and RFPs issued?
 - o Publish all RFIs and RFPs. Publish the names of all respondents.
 - o Publish the contents of the responses.

CFA ASSET MANAGER CODE

The CFA Institute is a leading investment management organization whose stated mission is to promote “the highest standards of ethics, education, and professional excellence for the ultimate benefit of society.”^{ccclxx} In 2017, a number of pension funds including PSERS wrote an open letter urging investment management firms to embrace the standards of the CFA Asset Manager Code.^{ccclxxi} The Code establishes minimum ethical standards for asset management services, including adherence to the following general principles of conduct:

1. Act in a professional and ethical manner at all times.
2. Act for the benefit of clients.
3. Act with independence and objectivity.
4. Act with skill, competence, and diligence.
5. Communicate with clients in a timely and accurate manner.
6. Uphold the applicable rules governing capital markets.

The open letter notes that more than 1,300 firms in more than 50 countries claim compliance with the code. Former Kentucky Retirement System board member Chris Tobe noted in his book *Public Pensions, Secret Investments* that SB2 (the procurement and transparency legislation mentioned previously) additionally requires individuals and firms managing money for the system to adhere to the CFA manager code.^{ccclxxii} He finds, however, that few alternative investment managers of the Kentucky Retirement System have endorsed the code. See Appendix for a summary of the Asset Manager Code.

- o Identify the criteria and justification for exercising the single source / sole source exemption.
- We commend PSERS for urging investment management firms to comply with the CFA Manager Code and recommend that SERS do the same. We recommend SERS and PSERS include a firm's compliance with the CFA Manager Code as part of the evaluation and due diligence process.



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DIVERSITY

XI. Diversity⁶⁰

Research across a multitude of fields and industries has identified the potential economic and social benefits of diversity. There is ample research confirming that diverse asset managers are competitive across industries and asset classes. Yet, the asset management industry continues to face challenges with a lack of diversity. Research studies and articles have consistently documented the low level of representation by women and racial/ethnic minorities among asset managers.

Through intentional, structural adjustments to be more inclusive in the manager selection process, organizations can do a better job of identifying top-performing diverse managers across all asset classes and address the structural inequality that exists for women and minorities across the asset management industry.

Representation of diverse-owned firms has increased modestly in recent years among hedge funds, private equity and real estate. However, assets under management (AUM) with diverse-owned firms has fluctuated significantly year-to-year.

The universe of asset managers is predominantly white and male. One of the biggest practical barriers to utilizing diverse asset managers is, quite simply, lack of awareness. When we talk about being more inclusive, it means making sure those managers who may not be naturally networked are not unintentionally excluded from managing assets. Unconscious bias affects inclusion.

“Diversifying Investments – A study of ownership diversity in the asset management industry” was commissioned by the John S. and James L. Knight Foundation in May 2017 and led by Josh Lerner, chair of the Entrepreneurial Management Unit and the Jacob H. Schiff Professor of Investment Banking at Harvard Business School, and the Bella Research Group.⁶⁰ The study examined four segments of the industry – mutual funds, hedge funds, private equity funds and real estate funds – finding that the number of women- and minority-owned firms ranged from 3 to 9 percent, and AUM ranged from below 1 percent to 5 percent. The study grew out of Knight’s efforts to diversify its own endowment investments. Knight has moved \$472 million of its endowment – or 22 percent – to management by women- and minority-owned firms in the past decade, with no compromise on performance. Below is the data collected across asset classes.

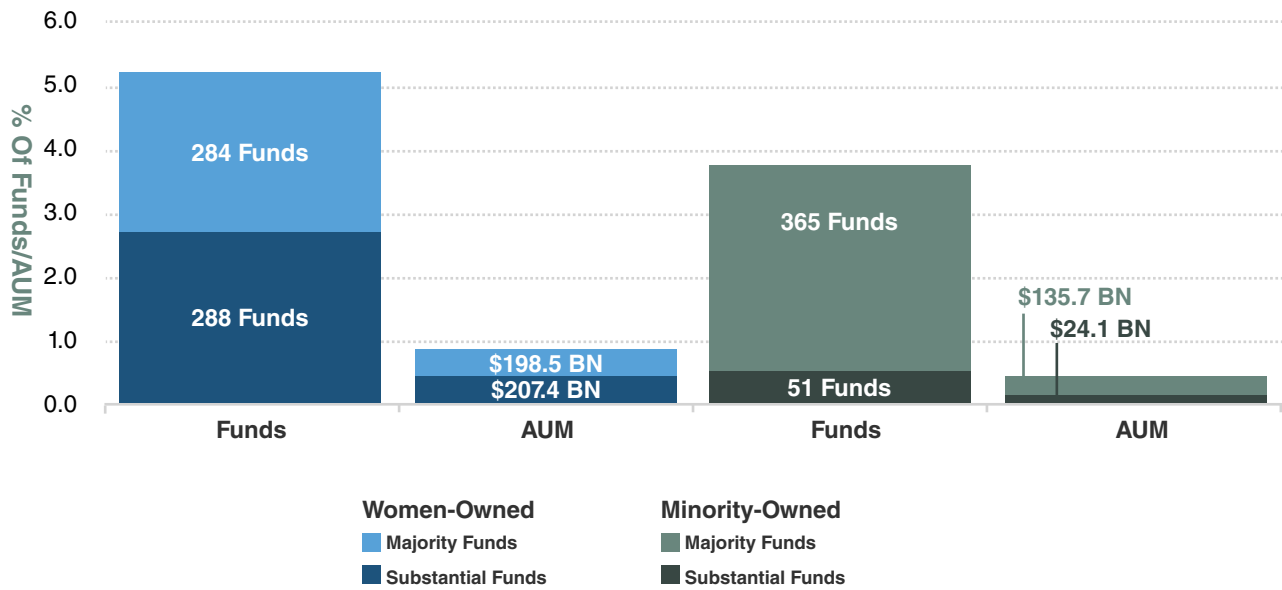
Mutual Funds

The research identified 127 women-owned and 107 minority-owned firms as of Q2 2016, managing 572 and 416 mutual funds, respectively. Women- and minority-owned mutual funds represent just 5.2 percent and 3.8 percent of all mutual funds, respectively.

The women-owned mutual funds comprise 288 funds with substantial female ownership (25 to 49 percent) and 284 funds with majority female ownership (50 percent and higher). Together, these women-owned funds manage \$405.9 billion in AUM, accounting for less than 1 percent of the total industry AUM. Similarly, minority mutual funds comprise 51 funds with substantial minority ownership and 365 funds with majority-minority ownership (that is, 50-plus percent minority ownership); all together, minority-owned mutual funds manage less than 0.5 percent of the industry AUM.

⁶⁰ The data, charts, and much of the discussion within this chapter are principally derived and cite from the following studies: Josh Lerner, Ann Leamon, Meagan Madden, and Jake Ledbetter, “Diverse Asset Management Project Firm Assessment,” Bella Research Group, commissioned by the John S. and James L. Knight Foundation, May 2017; Jason Lamin, “Optimizing Your Emerging Manager Program: An Instructional Roadmap for Institutional Investors,” Lenox Park, commissioned by the Teacher Retirement System of Texas, January 2014.

Figure 80: Women and Minority-Owned Mutual Funds

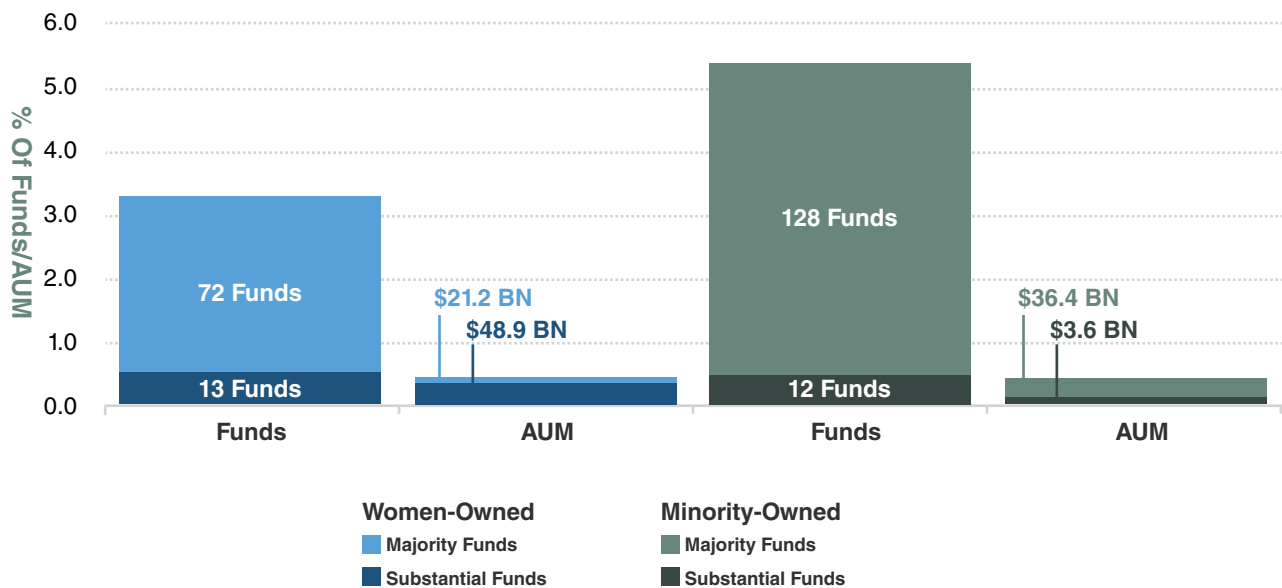


Source: Bella Research Group

Hedge Funds

As of mid-2016, hedge funds managed by women- and minority-owned firms represent about 3.3 percent and 5.5 percent of all hedge funds, respectively. Most of the identified diverse hedge funds are managed by firms with 51 percent or more female or minority ownership. Together, women- and minority-owned hedge funds control less than 1 percent of the total industry AUM.

Figure 81: Women and Minority-Owned Hedge Funds



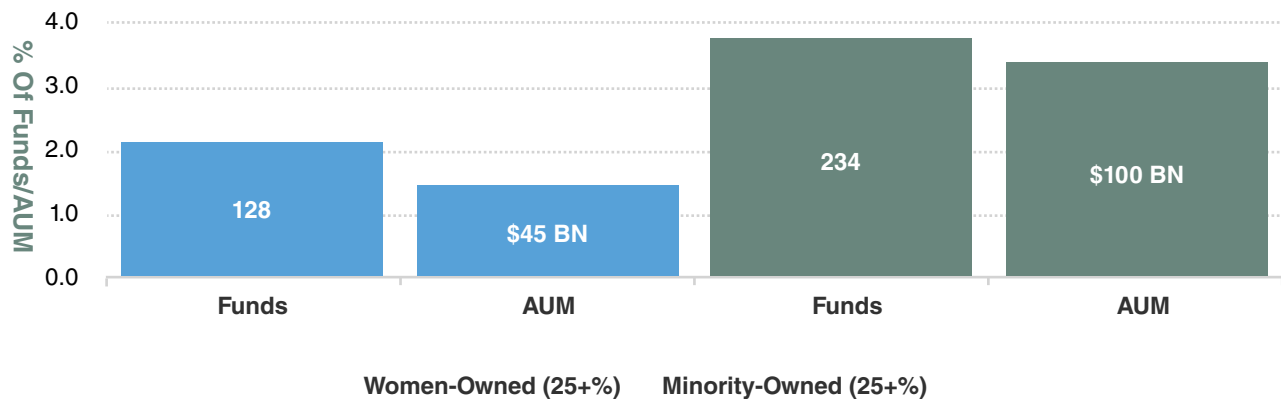
Source: Bella Research Group

Private Equity

Among active private equity funds (established since the beginning of 2004), the research identified 128 funds managed by women-owned firms and 234 funds managed by minority-owned firms, making no distinction between substantial ownership (25 to 49 percent) and majority ownership (50-plus percent) because of data constraints. These firms represent less than 6 percent of the total fund count and control less than 5 percent of AUM in the private equity industry.

Figure 82: Women and Minority-Owned Private Equity Funds

DIVERSE PE FUNDS



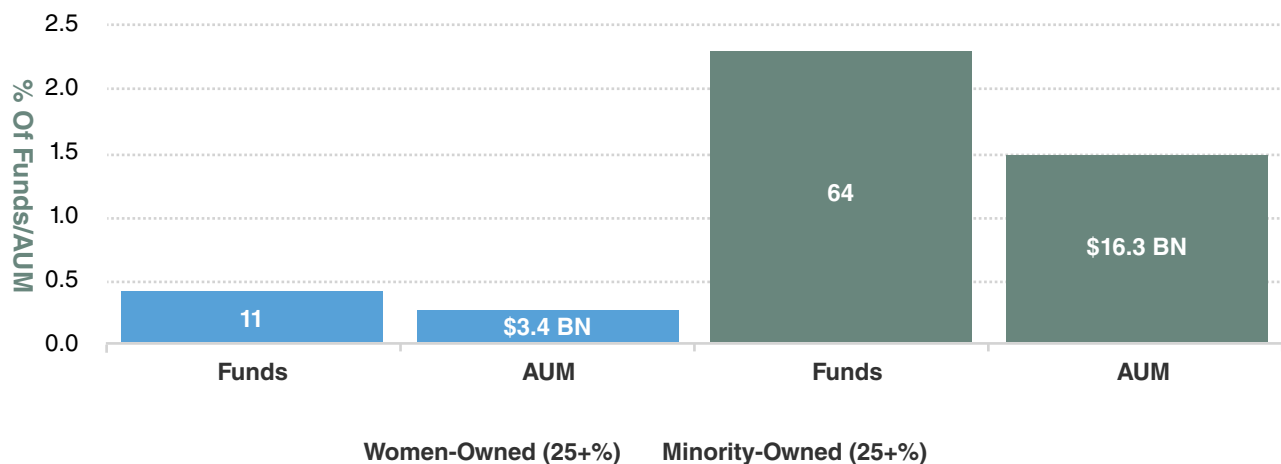
Source: Bella Research Group

Real Estate

The research identified 11 women-owned funds and 64 minority-owned funds among the universe of real estate funds in Preqin (established since the beginning of 2004). Together, this represents less than 3 percent of all real estate funds. Representation by AUM is even lower, with women and minorities representing about 0.3 percent and 1.5 percent of the industry totals, respectively.

Figure 83: Women and Minority-Owned Real Estate Funds

DIVERSE REAL ESTATE FUNDS



Source: Bella Research Group

The study confirmed there is no legitimate reason not to invest with diverse asset managers in the 21st century. While diverse-owned firms have grown in representation in recent years, the growth has been moderate and has not uniformly occurred across all asset classes. Diverse firms still represent a small fraction of the total asset management industry. The study sheds light into just how little diversity there is in ownership of asset management firms. Aggregating across all four asset classes examined in the report, diverse-owned firms represent just 1.1 percent of industry AUM.

An important finding of the research is that there is no statistical difference in performance between diverse-owned firms and their peers. Diverse-owned funds perform at a level comparable to that of their non-diverse peers. Within conventional statistical confidence levels, funds managed by diverse-owned firms typically perform as well as non-diverse funds after controlling for relevant characteristics (such as firm size, fund size, geography and investment focus). A common refrain has stated that poor performance among diverse-owned firms has precluded their receipt of greater investment; the findings of this study cast doubt on this assertion.

Recommendations

Pennsylvania can adopt practices other states have utilized to encourage and increase diversity and inclusion in public assets under management.

Consultants in the industry point to Illinois as one of the leaders among public pension funds promoting diversity and inclusion in the management of public assets. Illinois pensions have boosted investments with women- and minority-owned money managers in the 15 years since the General Assembly began tracking allocations.

In October of 2018, the Chicago Teachers' Pension Fund (CTPF) announced that it invested \$4.5 billion, more than 41.9 percent of total fund assets, with Minority, Women and Disabled-Owned Business Enterprise (MWDBE) firms in fiscal year 2018. This represents a 9.11% increase over 2017 investments.

Public pension plans in Illinois by far have done the largest hiring relative to total assets of minority- and women-owned firms and have set the highest future targets for such hirings, according to reports to the governor and Legislature. Not only does Illinois state law set a strict definition of "emerging," but also the state's pension plans must set targets to increase the hiring of managers, consultants and senior staff, among others, who meet that definition.

CTPF invests in emerging managers through direct mandates and Manager-of-Managers programs (MoMs). Currently, the Fund has direct relationships with 29 MWDBE firms who manage 54 portfolios. The Fund has MoMs relationships with an additional 17 MWDBE firms who manage 21 investment portfolios. Managers who perform well under the MoMs program may graduate to direct mandates with the Fund. Since the program's inception, eight firms have graduated to direct mandates.

The Illinois Pension Code includes the following language:

to encourage the trustees of public employee retirement systems, pension funds, and investment boards to use minority investment managers in managing their systems' assets, encompassing all asset classes, and to increase the racial, ethnic, and gender diversity of their fiduciaries, to the greatest extent feasible within the bounds of financial and fiduciary prudence, and to take affirmative steps to remove any barriers to the full participation in investment opportunities afforded by those retirement systems, pension funds, and investment boards.^{cc1xxiv}

As a point of reference, the Illinois Municipal Retirement Fund Board of Trustees has adopted the following minimum goals for the utilization of Minority Investment Management firms.

Figure 84: Example Utilization Goals for Minority Investment Managers

UTILIZATION GOAL FOR MINORITY INVESTMENT MANAGERS BY CLASSIFICATION

CLASSIFICATION	MINIMUM GOAL AS % OF TOTAL FUND MARKET VALUE
Minority Owned Businesses	13%
Women Owned Businesses	6%
Businesses Owned by a Person with a Disability	1%
TOTAL MINORITY INVESTMENT MANAGERS	20%

UTILIZATION GOAL FOR MINORITY INVESTMENT MANAGERS BY ASSET CLASS

PORTFOLIO ASSET CLASS	MINIMUM GOAL AS % OF ASSET CLASS
Domestic Equity	8%
International Equity	15%
Fixed Income	25%
Real Estate	8%
Private Equity	15%
Timberland	Best Efforts
Agriculture	Best Efforts

Source: Illinois Municipal Retirement Fund. Timberland and Agriculture percentages are calculated using NAVs. Private Equity and Real Estate percentages are calculated using committed amounts.

The Public School Teachers' Pension and Retirement Fund of Chicago (CTPF) Board of Trustees adopted a Investment Manager Diversity Policy to set goals for increasing the Fund's utilization of MWDBE Investment Management firms.^{ccclxxv}

The State of New York's efforts were spurred by a law signed in November 2010.^{ccclxxvi} The legislation, while not requiring set-asides or quotas for minority- or woman-owned asset management firms, attempted to increase opportunities for those groups. The law required New York state to create a database of minority- and woman-owned asset managers and requires the state to hold an annual conference to make diverse groups aware of asset management opportunities.

Organizations that are successful in allocating to diverse asset managers have boards and investment teams that prioritize diversity and inclusion. Organizations that have been prudent and successful in allocating capital to diverse asset managers are those that have strong support from the boards of their organizations. By intentionally collaborating with others in the field and educating themselves about diverse managers, support and enthusiasm at the top level grows. By collaborating with other industry experts, board members and investment staff can be made aware of the rich pool of talent among diverse asset managers. Diversity starts at the top. Our state boards and staff must have a focus on diversifying our assets under management by minority- and woman-owned firms.

One way to ensure this prioritization is requiring that the composition of Pennsylvania's public pension boards reflect the diversity of the state with its membership. Furthermore, the pension systems should also be required to consider women and minorities in their hiring practices for staff. Organizations such as the National Association of Securities Professionals (NASP), the National Association of Investment Companies (NAIC), and the Asian American Association of Investment Managers (AAAIM) focus on minority investment professionals and could be a source for recruiting more diverse talent.

A 2014 study commissioned by the Teacher Retirement System of Texas indicated that strong leadership from boards and staff is a critical building block for creating a high functioning emerging manager program (EMP).^{celxxvii} All of the well-established EMPs examined easily identified at least one champion of the program on the Board or among the staff. When selecting board and staff leadership, candidates should be sought out that will be strong advocates for a successful EMP. The study found a strong correlation between boards and investment staff that were demographically diverse and the organizational commitment to EMPs. Organizations that value inclusiveness and a wide range of backgrounds naturally see value in EMPs as part of the asset allocation.

SERS and PSERS rely on external consultants for sourcing and vetting asset managers. The importance of these relationships cannot be ignored. The Boards and staff of the pensions systems must communicate to their consultants the priorities of diversity and inclusion when presenting managers for consideration. Without strong and specific encouragement, most consultants have not recommended diverse asset managers. It is imperative that consultants understand they are expected to be inclusive in their search. To that end, the staff and boards Pennsylvania's public pension funds need to hold the consultants accountable in meeting this goal.

Public reporting seems to be one means of holding Illinois and City of Chicago pension funds report annually on a long list of questions regarding the ethnicity and gender of the members of their own staffs and boards as well as money managers they hire to invest pension dollars.

The thrust is that holding boards and staff accountable for their hiring and selection practices and airing their performance publicly will advance more diverse choices. It is important to note, that increasing diversity among asset managers is not in conflict with the stated goals and recommendations of this Commission – in particular, recommendations involving investment asset management.

We recommend that the Pennsylvania General Assembly follow the lead of other states by enacting legislation to encourage diversity and inclusion efforts to increase the use of minority- and woman-owned asset management managers and firms. These initiatives include but are not limited to:

- Encouraging the Commonwealth's public pension systems and other investment boards to use minority investment managers in managing their assets, encompassing all asset classes, and to increase the racial, ethnic, and gender diversity of their fiduciaries, to the greatest extent feasible within the bounds of financial and fiduciary prudence, and to take affirmative steps to remove any barriers to the full participation in investment opportunities.
- Requiring the public pension systems and other investment boards to report annually on the ethnicity and gender of the members of their own staffs and boards as well as money managers they hire. (For reference, the Chicago Teachers' Pension Fund Response to the 2017 Senate Committee on Public Pensions and State Investments Minority and Female Investment Hearing Questionnaire can be found at https://www.ctpf.org/sites/main/files/file-attachments/2017_senate_questionnaire_report_final_vk3_0.pdf.)
- Requiring the public pension systems and other investment boards to obtain diversity information on each current and prospective manager and produce a minority inclusion report annually.

- o The report should include information from investment advisors, consultants, or private market funds:
 1. the number of its investment and senior staff and the percentage of its investment and senior staff who are (i) a minority person, (ii) a woman, and (iii) a person with a disability; and
 2. the number of contracts, oral or written, for investment services, consulting services, and professional and artistic services that the investment advisor, consultant, or private market fund has with (i) a minority-owned business, (ii) a women-owned business, or (iii) a business owned by a person with a disability;
 3. the total number of searches for investment services made by the consultant in the prior calendar year that included (i) a minority-owned business, (ii) a women-owned business, or (iii) a business owned by a person with a disability;
 4. the total number of searches for investment services made by the consultant in the prior calendar year in which the consultant recommended for selection (i) a minority-owned business, (ii) a women-owned business, or (iii) a business owned by a person with a disability;
 5. the total number of searches for investment services made by the consultant in the prior calendar year that resulted in the selection of (i) a minority-owned business, (ii) a women-owned business, or (iii) a business owned by a person with a disability; and
 6. the total dollar amount of investment made in the previous calendar year with (i) a minority-owned business, (ii) a women-owned business, or (iii) a business owned by a person with a disability that was selected after a search for investment services performed by the consultant.
- Creating a Commonwealth online database of minority- and woman-owned asset managers.
- Adopting minimum goals for the utilization of minority- and woman-owned asset management firms.



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GLOSSARY

Glossary

Glossary entries are tailored to the context of public pension investment and specifically to the work of the Commission.

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Glossary Terms

2 and 20. A typical structure of payments owed to external *alternative investment* managers. For example, the *management fee*, intended to cover fund administration costs, is often set at 2% of total *committed* asset value. In addition, the manager might earn a *performance fee* of 20% of the *carry* (net profits that exceed the agreed-upon *benchmark*, also known as the “preferred return” or the *hurdle rate*).

Active management. Active funds management (also called active investing) refers to a portfolio management strategy where the manager makes specific investments with the goal of outperforming an investment benchmark index or target return. [Wikipedia]

Actuarial savings. Projected savings based on actuarial projections of plan assets and liabilities.

Actuarial Standards Board (ASB). The nine-member Actuarial Standards Board (ASB) establishes and improves standards of actuarial practice for the United States. These Actuarial Standards of Practice (ASOPs) identify what the actuary should consider, document, and disclose when performing an actuarial assignment. [ASB]

Actuarial Standards of Practice (ASOP) (see *Actuarial Standards Board*).

Actuarially Determined Contribution (ADC). A target or recommended contribution to a defined benefit pension plan for a given reporting period, determined in conformity with *Actuarial Standards of Practice* based on the most recent measurement available when the contribution for the reporting period was adopted. The ARC may or may not be the amount actually paid by the plan employers (sponsors). [GASB 67/68]

Alignment. In this context, alignment of interests/incentives between stakeholders. For example, it is desirable for the financial incentives of an external investment manager to be closely aligned with those of the pension fund participants.

Alpha. The returns for an investment that exceed the benchmark set for it. [Investopedia]

Alternative investments. An umbrella term for certain types of investments. The unifying theme of alternative investments is the legal structure, in which there is a *general partner* that manages an investment fund on behalf of itself and a set of *limited partners*. Alternative investments include private equity, hedge funds, distressed debt, real estate, and commodities—basically anything other than publicly-traded fixed-income, cash, and public equities. Typically, alternative investments lack an established public exchange; have low liquidity; and can be more difficult to value than stocks or bonds. [Pew]

Annually Required Contribution (ARC). The amount the pension plan’s employers (sponsors) must contribute for a given year in order to cover the pension’s annual normal cost and amortize the unfunded accrued liability. [Public]

Asset allocation. Investment choices made among broad asset classes such as equities, fixed income, securities, real estate, etc. Also referred to as “asset mix.” [SERS Investment Policy]

Asset class. A group of assets that exhibits similar characteristics, behaves similarly in the marketplace and is subject to the same regulations. There are multiple, sometimes overlapping, categorization schemes for assets, and there is no single authoritative classification. The following primary classes are generally recognized: (1) Cash equivalents with a holding period of less than one year; this includes bank deposits, short-term Treasury bills and bonds, mortgage-backed securities, and money market accounts; (2) Commodities; (3) Bonds—principally, domestic and foreign government and corporate bonds; (4) Equities which are ownership shares in a private or publicly-exchanged company; (5) Real estate. Investments in *alternatives* are sometimes classified within the above categories or on their own, including labels such as *hedge funds*, *private equity*, private debt, multi-strategy and *venture capital*.

Assets Under Management (AuM). The AUM measures the total market value of all the financial assets that a financial institution manages on behalf of its clients and themselves. [Wikipedia] Note that investment fees may be assessed as a percentage of AUM for a particular investment fund.

Base fee. The fee (also known as a *management fee*) that is charged by an *external manager*. It is typically calculated as a percentage of assets under management for traditional investments and as a percentage of either invested capital or committed capital for limited partnership structures. The base fee is often tiered, where incremental additional investments are charged a progressively lower amount. [PSERS]

Basis points (bps). A common unit of measure for interest rates and other percentages in finance. One basis point is equal to 1/100th of 1%, or 0.01%, or 0.0001. For example, an investment fee of “200 basis points” is equivalent to 2%. Similarly, a reduction in the target rate of return from 7.5% to 7.25% represents a reduction by 25 basis points.

Benchmark. A benchmark is a standard against which the performance of a security, mutual fund or investment manager can be measured. [Investopedia]

Beta. In finance, the beta (β or beta coefficient) of an investment or of a portfolio is a measure of sensitivity to an index. It is the estimated or forecasted regression coefficient when regressing the excess returns (over a risk-free rate) of the investment with the excess returns of the index. Beta measures the *systematic* risk arising from exposure to general market movements as opposed to *idiosyncratic* factors.

Blue Ribbon Panel (BRP). The Blue Ribbon Panel on Public Pension Plan Funding (2013-14) was convened by the Society of Actuaries. The report recommended actions to strengthen financial and risk management practices by providing new information to trustees, funding entities and their elected officials, employees and their unions, taxpayers and other stakeholders. [SOA]

Broker-dealer. In the U.S., a registered entity that engages in the business of trading securities on behalf of its customers (in which case it is acting as a broker) or for its own account (in which case it is acting as a dealer). [Wikipedia] A *placement agent* is a broker-dealer that connects a company offering securities with potential qualified investors such as pension systems.

Buckets. The strategy of apportioning assets into several portfolios (“buckets”), each with a range of investments meeting specific needs over a particular time frame.

Bundled brokerage. The situation in which an investor pays one rate of commission to its broker and receives the broker’s research as part of the “bundle.” Unbundling is the process of separating the execution commissions paid by an investor from its research spending.

Burgiss data. Data provided by the Burgiss company (provider of investment decision support tools) to investors on the *transparency* of their private capital portfolio holdings; this data helps them measure risk, portfolio composition, and manager performance.

Call (“capital call”). A general partner may, at any time during the investment period, “call” a portion of the capital that a *limited partner* has committed to the investment fund. The amount and timing of when the limited partner must provide the funds define the terms of the capital call. See also *committed capital*.

CalPERS. The California Public Employees’ Retirement System, the largest U.S. public pension fund.

Carried interest (“carry”). Compensation earned by the investment manager that is calculated as a percentage of the returns in excess of a *preferred return* or *hurdle rate*. Also known as a “profit share,” “performance fee,” or “incentive fee.”

Catchup. One aspect of the distribution of an investment’s returns to the general partner and the limited partner (the investor). The rationale of a catchup is to give to the GP all or a majority of the gain, until the share of the profit received by the GP equals the carried interest. [Wikipedia: Distribution Waterfall]

Co-investment. An ownership investment made directly into an operating company, alongside a financial sponsor or other private market investor. Co-investments exist in any type of private markets transaction, including leveraged buyout, recapitalization or growth capital transaction, real estate, and private debt.

COLA. Cost of living adjustment; pension benefits may be adjusted periodically to reflect a COLA.

Committed capital. The amount of capital that a limited partner agrees to invest in a limited partnership structure, e.g., a private equity fund. Typically, the general partner draws down (*calls*) the capital over time, typically 3-5 years.

Commodities. A type of asset that has been standardized such that each unit is indistinguishable from another. Examples include oil, beef, grain, precious metals, electricity, foreign currencies and emissions credits. Commodities are considered one of the *asset classes*.

Comprehensive Annual Financial Report (CAFR). A set of financial statements comprising the financial report of a state, municipal or other government entity that complies with the accounting requirements outlined by the Governmental Accounting Standards Board. [SERS]

Covariance. The degree to which the value of the assets in a portfolio move in tandem, thus corresponding to the investment risk. The higher the covariance, the larger the risk.

Cost arbitrage. The act of investing in opportunities with similar risk and return characteristics to those already held, but at a lower cost.

CWI (All Country World Index). The MSCI ACWI, maintained by Morgan Stanley Capital International (MSCI), is a market capitalization weighted index designed to provide a broad measure of equity-market performance throughout the world in both developed and emerging markets. [Investopedia]

Defined Benefit (DB) plan. A retirement program under which the employer guarantees a level of retirement benefits, as determined by formula, to employees who meet certain eligibility requirements. [JSGC]

Defined Contribution (DC) plan. A retirement program under which the amount of the retirement benefit depends on the amount contributed to the plan by the employer, the employee, or both, and the investment return on those contributions. A DC plan gives participants a way to save for retirement in a tax-deferred environment. [JSGC]

Deterministic analysis. In *deterministic* financial models used for *stress testing*, the scenario considered in the model is fully determined by the parameter values and the initial conditions, and randomness is not considered. (Contrast with *stochastic analysis*.)

Direct fees. In private equity/markets, direct fees (or “direct investment expenses”) are deducted from a limited partner’s account balance or paid from other assets of the limited partners (i.e., paid through the accounts payable process). By contrast, *indirect* fees are deducted from fund returns and thus are not invoiced directly to the limited partner. *Management fees* often are direct, while *performance fees* often are indirect. Pension systems report direct fees, but current practices for reporting indirect fees vary.

Direct investment. An approach to investing in private equity in which the investor (here, the pension system) directly purchases ownership shares in the securities of a private company instead of purchasing through an intermediary, e.g., an investment manager’s fund.

Discount rate. For defined benefit pension plans, the rate used to value the current cost of future pension obligations. It reduces (discounts) the plan’s liabilities based on its long-term assumed rate of investment return (*target rate*).

The discount rate is a critical factor for determining how much gets saved today to pay pensions in the future. The higher the discount rate employed, the lower will be the net present value of anticipated pension benefits, which are also known as accrued pension liabilities. The lower the present value of the accrued pension liabilities (i.e. the value of all future pension benefits measured in today’s dollars), the less the government and employees will need to pay into pension coffers today to cover those promised benefits when they come due. Thus, the higher the discount rate, the lower the rate of contributions flowing into a pension fund (all else equal). Conversely, the lower the discount rate, the higher annual contributions will need to be to ensure a fully funded system. [Reason]

Dodd-Frank. Following the global financial crisis of 2008, the Dodd-Frank Wall Street Reforms and Consumer Protection Act of 2010 required banks to be subjected to stress tests in order to gauge their ability to withstand crises such as stock market drops, housing market crashes, and high unemployment.

Employee contribution. The percentage of salary deducted from the employees' paychecks and allocated to the retirement funds.

Employer. In this context, the Pennsylvania public school district or public agency (commonwealth agency, judicial and legislative system, community college, port authority, Turnpike system, etc.) that employs the individuals participating in the pension plan.

Employer contribution. The percentage of payroll the *employer* ("sponsor") contributes to the retirement fund.

Environmental, social and governance (ESG). The three central factors in measuring the sustainability and ethical impact of an investment in a company or business. These criteria help to better determine the future financial performance of companies. [Wikipedia]

Equities. Stocks, held by investors, that represent ownership shares of a company (domestic or international). Equities do not guarantee a return, but they are a claim on the future value of the company.

External investment manager. Third-party investment manager, as opposed to an investment manager who is on the staff of the pension system.

Ex-officio member. A member of a body (e.g., a board or committee) who is part of it by virtue of holding another office or position. [Wikipedia]

Fiduciary. A legal or ethical relationship of trust between two or more parties where one party has undertaken to act for and on behalf of another party. A pension fund's board is a fiduciary for the pension plan members.

Fixed-income. A type of investment whose return is usually fixed or predictable and is paid at a regular frequency. The class is composed principally of bonds (including U.S. Treasuries, municipal and corporate bonds), bond mutual funds, certificates of deposit, and money market funds.

Forward rate. An interest rate applicable to a financial transaction that will take place in the future. It may also refer to the rate fixed for a future financial obligation, such as the interest rate on a loan payment. [Investopedia]

Fully funded. The situation wherein a pension fund has sufficient assets to support its net liabilities for the benefits of all active and retired members at a given time. [JSGC]

Fund. A company (or a fund, in the case of a *fund-of-funds*) that gathers capital from a number of investors to create a pool of money that is then reinvested into stocks, bonds and other assets.

Fund gross exposure. The absolute level of a fund's investments, including the value of a fund's long positions plus the absolute value of the short positions.

Fund-of-funds. An investment fund that itself invests in other externally-managed funds. Unlike investment managers of typical funds, the fund-of-funds investment manager does not select securities of companies but instead selects other funds in which to invest. This strategy is also referred to as a "multi-manager investment." Contrast with *direct investment*.

Funded ratio ("funding ratio"). The ratio of a pension system's assets to the present value of its liabilities. It is one measure of the system's health. A funded ratio less than 100% indicates the pension does not have enough assets to cover its liabilities under the current actuarial assumptions; the gap is referred to as the unfunded liability.

Governance budget. Allocation of an organization’s governance activities based on assessment of its governance responsibilities and its human-resources capacity—in this context, a pension system’s board of trustees and investment committee.

Governmental Accounting Standards Board (GASB). The independent, private-sector organization that establishes accounting and financial reporting standards for U.S. state and local governments that follow Generally Accepted Accounting Principles (GAAP). [GASB]

General partner. In *private equity*/market investing, the entity that raises capital from investors (in this context, the pension system) and invests and manages the funds. The investors from whom capital is raised are the *limited partners*.

Gross of fees/gross fees. The return to the investor on an asset or portfolio, before fees, costs, taxes and expenses are subtracted. (See *net of fees*.) Gross fees, as typically used by private equity investment professionals, includes all investment-related expenses, including but not limited to: administrative costs, compliance costs, travel, and oversight expenses, in addition to management fees and performance payments.

Hedge fund. An investment fund that pools capital from accredited individuals or institutional investors and invests in a variety of assets, often with complex portfolio-construction and risk-management techniques. [Wikipedia] In contrast to a private markets investment, typically a hedge fund invests in securities that are publicly traded. Hedge fund strategies often involve leverage, derivatives, and both long and short positions. (See *asset classes* and *alternative investments*.)

Hurdle / hurdle rate. In hedge funds, private equity or other private markets investing, a hurdle rate is the threshold return that must be earned before a general partner earns *carried interest* (profit-sharing) on an investment. If the hurdle rate is not achieved, the general partner does not receive the carried interest.

IBOR (Investment Book of Record(s)). A centralized data repository that gives an investor real-time information on the value of their assets.

Idiosyncratic risk. The risk from adverse events associated with a particular asset or investment manager that impact the value of the investment. It is the opposite of *systematic risk*, which is the overall risk that affects all the portfolio assets, such as fluctuations in the stock market or interest rates. Idiosyncratic risk can be mitigated by diversification in the portfolio, ensuring that each idiosyncratic risk exposure is small. (See *beta*.)

Index fund (“indexing”). An index fund is a type of mutual fund with a portfolio constructed to match or track the components of a market index, such as the Standard & Poor’s 500 Index (S&P 500). Indexing is the act of investing in portfolios designed to replicate an index. (See *passive management*.)

Indirect fees. See direct fees.

Information ratio. A measure of portfolio returns above the returns of a *benchmark*, usually an index, relative to the volatility of those returns. [Investopedia]

Investment consultant. A consultant retained by an investor (here, the pension system) to provide advice on various investment issues, including asset allocation; asset/liability studies; investment in specialty asset classes; and the selection, monitoring, and termination of external investment managers. Sometimes referred to as an “investment advisor,” although occasionally that term is also used to refer to investment managers.

Internal investment manager (internal or external). An investment manager who is part of the investment staff of the investing entity—in this context, the pension system. (Contrast with *external manager*.)

Institutional investor. An organization that invests on behalf of its members. Institutional investors face fewer protective regulations than individual investors because it is assumed they are more knowledgeable and better able to protect themselves. There are generally six types of institutional investors: endowment funds, commercial banks, mutual funds, hedge funds, pension funds, and insurance companies.

Institutional Limited Partners Association (ILPA). With approximately 450 member institutions across 50+ countries, representing more than \$2 trillion USD in assets under management, the ILPA supports limited partners through education, research, advocacy and events. [ILPA]

Internal Rate of Return (IRR). A metric used to measure an investment's return. Technically speaking, the IRR is the interest rate (also known as the *discount rate*) that will bring a series of positive and negative cash flows to a *net present value* (NPV) of zero (or to the current value of cash invested). [Investopedia] (Contrast with *rate of return*.)

Leverage. Leverage investing is a technique that seeks higher investment profits by using borrowed money. These profits come from the difference between the investment returns on the borrowed capital and the cost of the associated interest. Leveraged investing exposes an investor to higher risk. [Investopedia]

Liability-driven investment (LDI). A strategy based on the cash flows needed to fund future liabilities. It is sometimes referred to as a “dedicated portfolio” strategy. Hedging is often involved, either in part or in whole, to block or limit the fund's exposure to inflation and interest rates. The LDI strategy tends to focus on using swaps and various other derivatives. [Wikipedia] LDI hedges unrewarded risks and provides a framework for taking rewarded risks, targeting the volatility of surplus instead of asset-only.

Limited partner (LP). An investor—in this context, a pension system—in a private markets fund. Most private markets funds are structured as limited partnerships and are governed by the terms set forth in the *limited partnership agreement*. Such funds have a *general partner* (GP), which raises capital from institutional investors such as pension plans, universities, insurance companies, foundations, endowments, and high-net-worth individuals, which invest as limited partners (LPs) in the fund. [Wikipedia]

Limited Partner Agreement (LPA). The legal document governing the relationship between a private equity *general partner* and a *limited partner*.

Liquid market. A market with many bids and offers, low spreads, and low volatility. In a liquid market, it is easy to execute a trade quickly and at a desirable price because there are numerous buyers and sellers. [Investopedia]

Liquidity/ illiquidity. The degree to which an asset or security can be quickly bought or sold in the market without affecting the asset's price. [Investopedia]

Management fee. The fee charged by an investment manager (in private equity, the *general partner*). Also known as the *base fee*.

Mandate (“investment mandate”). An instruction to manage a pool of capital, or a set of funds, using a specific strategy and within certain risk parameters. Some managers are given multiple mandates, each with a specific strategy.

Maturity. The most common measure of a pension fund's maturity is the ratio of retirees who are drawing benefits to active members who are making contributions.

Mean variance optimization (MVO) models. Modern portfolio theory, or mean-variance analysis, is a mathematical framework for assembling a portfolio of assets such that the expected return is maximized for a given level of risk. It is a formalization and extension of diversification in investing, the idea that owning different kinds of financial assets is less risky than owning only one type. Its key insight is that an asset's risk and return should not be assessed by itself, but by how it contributes to a portfolio's overall risk and return. It uses the variance of asset prices as a proxy for risk. [Wikipedia]

MFN (“most-favored nation”) provision. In this context, a contract provision in which a general partner agrees to give a limited partner the best terms that it makes available to any other limited partner of comparable or lesser commitment amount. A MFN clause is typically contained in a “side letter” that sets out terms that supplement or, in some cases, modify the terms of the governing partnership agreement.

Monte Carlo analysis. A *stochastic* method of *stress testing* used to model the probability of different outcomes in a process that cannot easily be predicted due to the intervention of random variables. It is a technique used to understand the impact of risk and uncertainty in prediction and forecasting models. [Investopedia]

Net asset value (NAV). The net value of an entity calculated as the total value of the entity's assets minus the total value of its liabilities. [Investopedia]

Net excess return. The return after deducting all fees and costs of an investment over that of a defined alternative investment. (See *risk-free rate*.)

Net of fees. The return to the investor on an asset or portfolio, after all fees, taxes and expenses (e.g., legal, accounting, reporting) are subtracted. Compare to *gross of fees*, which is the return before subtraction of fees, taxes, and expenses.

Net present value (NPV). Net present value (NPV) is the difference between the present value of cash inflows and the present value of cash outflows over a period of time. NPV is used in investment planning to analyze the profitability of a projected investment or project. [Investopedia]

Net value added. In this context, the additional net value provided by *active (investment) management* as compared to *indexing*.

Non-disclosure agreement (NDA). A legal agreement between parties to maintain specified information in confidence between the parties, except as explicitly provided by the agreement.

Normal cost. The present value of projected lifetime benefits to be paid to active workers that is allocated to the current year by the actuarial cost method. [Public]

Outsourced CIO. A company that is hired by an *institutional investor* to manage some portion of its investments, ranging from an individual asset class to the entire portfolio. In this sense, the institutional investor is outsourcing some of the functions that a Chief Investment Officer would normally perform.

Pareto efficiency (“pareto optimality”). A state of allocation of resources from which it is impossible to reallocate so as to make any one individual or preference criterion better off without making at least one individual or preference criterion worse off. The Pareto frontier (or “efficiency frontier”) is the set of all Pareto efficient allocations, conventionally shown graphically. [Wikipedia]

Passive management. Passive funds management (also called passive investing or *indexing*) refers to a portfolio management strategy that tracks a market-weighted index or portfolio. Often, this involves mimicking the performance of an externally specified index by buying an index fund. [Wikipedia]

Pension plan. A retirement plan that requires an employer (“sponsor”) to make contributions into a pool of funds set aside for a worker’s future benefit. The pool of funds is invested on the employee’s behalf, and the earnings on the investments generate income to the worker upon retirement. In addition to an employer’s required contributions, some pension plans have a voluntary investment component. A pension plan may allow a worker to contribute part of their current income from wages into an investment plan to help fund retirement. The employer may also match a portion of the worker’s annual contributions, up to a specific percentage or dollar amount. [Investopedia]

Performance fee. See *carried interest*.

Performance persistence. The extent to which an investment manager consistently obtains favorable results over time.

Placement agent. A registered *broker-dealer* retained by an external investment manager to connect it with qualified investors such as pension systems.

Platform company. Typically, a financial management firm that an asset owner (a pension, sovereign wealth fund, or large family office) owns--usually in perpetuity--in order to access a particular asset class.

Portfolio. A collection of assets owned by an institution (here, a pension system), typically containing assets from many *asset classes*.

Preferred return. See *hurdle rate*.

Private equity (“PE”). Equity capital that is not quoted on a public exchange and consists of investors and funds that make investments directly into private companies or conduct buyouts of public companies that result in a delisting of *public equity*. Private equity investments often demand long holding periods to allow for turnaround of a distressed company or a liquidity event such as an initial public offering (IPO) or sale to a public company. Often, pension funds invest in private equity funds that hold ownership in multiple assets. [World Bank]

Private markets investments. There are non-listed securities in all types of markets, not just equity. For example, there are private debt securities as well as private securities for the financing of real estate investments. Private markets investing encompasses investment in any publicly-traded securities. Since *private equity* is the largest segment of this market, the term private equity is often used to refer to private markets.

Procurement. Here, the process of identifying, evaluating, and engaging external investment managers and consultants.

Proprietary information. Information concerning an organization’s operations, assets, partnerships, etc. that is not public knowledge and that is viewed as the property of that organization. For example, *investment managers* may view information about their fee structures and other key contract terms as proprietary.

Public equity. Equity (ownership shares) of capital that is listed on a public exchange.

Public market equivalent (PME). A set of analyses used to evaluate the performance of a private market investment against a public-markets benchmark or index. The analysis is also known as ICM (index comparison method). A “PME return” on a private market investment is one that is equal to the return earned by the benchmark or index.

Rate of return (ROR). The percentage increase or decrease of an investment over a given period of time. ROR tells an investor about the total growth, from the starting point to the current date, of the investment. By contrast, the *internal rate of return* (IRR) tells the investor what the annual growth is. [Investopedia]

Rebalancing. Realigning the weightings of a portfolio of assets across asset classes. Rebalancing involves periodically buying or selling assets in a portfolio to maintain a target level of *asset allocation* in each class. [Investopedia]

REIT (Real Estate Investment Trust). A company that owns, operates or finances income-producing real estate, including office and apartment buildings, hotels, infrastructure and timberland. Investors purchase shares of the trust.

Return distribution. The probability distribution of the possible values of the returns from an asset or portfolio.

Risk. The uncertainty of outcome or the likelihood of not meeting an objective. In the context of public pensions, risk may be measured along several dimensions. *Volatility* (often measured as standard deviation) indicates how much the current return is deviating from its expected historical normal returns. *Beta* measures the amount of systematic risk an individual security or an industrial sector has relative to the whole stock market. “Downside risk” estimates how much can be lost on the investment. [Investopedia]

Risk appetite. The level of risk (for individual investments or across an entire portfolio) an institution is prepared to accept/tolerate.

Risk-adjusted return. A refined measure of an investment’s return that reflects how much risk is involved in producing that return. Risk-adjusted returns are applied to individual securities, investment funds, and portfolios. [Investopedia]

Risk-free rate. The risk-free *rate of return* is the theoretical rate of return of an investment with zero risk. The risk-free rate represents the interest an investor would expect from an absolutely risk-free investment over a specified period of time. [Investopedia] The return on domestically held short-dated government bonds is normally perceived as a good proxy for the risk-free rate. [Wikipedia]

Risk parity. A portfolio allocation strategy that uses risk to determine allocations across various components of an investment portfolio. [Investopedia]

Risk premium. The return in excess of the *risk-free rate of return* an investment is expected to yield; an asset’s risk premium is a form of compensation for investors who tolerate the extra risk, compared to that of a risk-free asset, in a given investment. [Investopedia]

Scenario testing (“scenario analysis”). The process of estimating the expected value of a portfolio after a given period of time, assuming specific changes in the values of the portfolio’s securities or key factors take place, such as a change in the interest rate. Scenario analysis is commonly used to estimate changes to a portfolio’s value in response to an unfavorable event and may be used to examine a theoretical worst-case scenario. [Investopedia]

Sensitivity analysis. A method for determining how different values of an independent variable affect a particular dependent variable under a given set of assumptions. This technique is used within specific boundaries that depend on one or more input variables, such as the effect that changes in interest rates (independent variable) has on bond prices (dependent variable). Sensitivity analysis is also referred to as “what-if” or simulation analysis and is a way to predict the outcome of a decision given a certain range of variables. By creating a given set of variables, an analyst can determine how changes in one variable affect the outcome. [Investopedia]

Sharpe ratio. Measures the *risk-adjusted return* of an investment asset, portfolio, or strategy. The ratio is the average return earned in excess of the *risk-free rate* per unit of volatility or total risk. A higher number is favorable, indicating that the investment is earning more return per unit of risk. [Investopedia]

Side letter. An agreement between a private equity fund and one particular investor to vary the terms of the *limited partner agreement* with respect to that particular investor (typically, in favor of the investor).

Skewness. A measure of the degree of asymmetry of a distribution around its mean; a normal distribution has a skewness of zero. Here, we are referring to the distribution of the possible returns of an investment. Positive skewness means that the investors have a greater chance of extremely positive outcomes.

Sortino ratio. A modification of the *Sharpe ratio* that penalizes only those returns falling below a user-specified target or required rate of return, while the Sharpe ratio penalizes both upside and downside volatility equally. [Wikipedia]

SPIVA® scorecard. S&P Indices Versus Active (SPIVA®) measures the performance of actively managed funds against their relevant S&P index benchmarks. SPIVA® scorecard reports for various fund markets are issued semi-annually.

Stochastic analysis. Stochastic financial-simulation models address the inherent randomness of the future; the same set of parameter values and initial conditions will lead to an ensemble of different outputs. *Monte Carlo* analyses are one type of stochastic analysis used for *stress testing*. Compare to *deterministic analysis*.

Stress testing. Assessment of the impact of extreme scenarios on an investment portfolio and/or an institution's financial health. Stress tests usually take the form of computer-generated simulation models that test hypothetical scenarios. (See *scenario analysis*.) Broadly speaking, stress tests can be classified as *deterministic* or *stochastic*.

Subscription line of credit. A private equity firm may use the commitments of capital by its investors to its funds as collateral to secure a line of credit.

Swensen J curve. In private equity, the characteristics of an investment's return and cash flow profile. The J curve illustrates the tendency of private equity funds to deliver negative returns and cash flows in the early years and investment gains and positive cash flows later in the investment fund's life as the portfolio companies mature and are gradually exited. [Capital Dynamics]

Systematic risk. The risk to the value of an investment or portfolio from aggregate economic events and general market movements, such as a decline in a broad index of equities. In contrast, *idiosyncratic risk* is due to factors particular to an asset. Systematic risk cannot be diversified in a portfolio that holds only long positions in securities. (See also *beta*.)

Target rate. The annual percentage return on investments that a pension system is seeking.

Transparency. Generally, transparency refers to the degree of disclosure about an entity's operations. In this context, it may refer to a limited partner's access to financial information (including fees, valuation, and performance results) concerning a particular private equity asset. It may also refer to the information shared by a pension system with its stakeholders.

Undrawn. Funds committed by a *limited partner* that have not yet been called by the general partner but are still a legal obligation of the limited partner to the fund. Also known as "unfunded capital commitments." (See *committed capital*.)

Value add ("value added"). A moderate to high risk investment strategy. In real estate, value add properties often have little to no cash flow at the time of acquisition but have the potential to produce a tremendous amount of cash flow once the value has been added. These buildings typically have some combination of occupancy issues, management problems, and deferred maintenance. [Origin]

Venture capital. Financing that investors provide to startup companies and small businesses that are believed to have long-term growth potential. [Investopedia] (See *asset class* and *alternative investments*.)

Volatility. One type of risk, volatility measures how much the price of a security, derivative, or index fluctuates.

Zombie fund. Also referred to as a “closed fund,” a with-profits fund that is closed to additional investment. Typically, a with-profits fund provides annual bonuses and a terminal bonus. A zombie fund holds some or all of its assets beyond its initially-intended holding period, awaiting a time when it can sell the asset for a profit.

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Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

APPENDIX I: SUBMISSIONS TO THE COMMISSION

Appendix I: Submissions and Exhibits

Separately printed document.



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

APPENDIX II: ADDITIONAL RESEARCH MATERIALS

Appendix II: Additional Research Materials

Separately printed document.



Final Report and Recommendations:
**PUBLIC PENSION MANAGEMENT AND
ASSET INVESTMENT REVIEW COMMISSION**

APPENDIX III:
“INDEPENDENT REVIEW OF THE PPMAIRC REPORT”
SUBMITTED BY COMMISSIONER GALLAGHER

Appendix III: “Independent Review of the PPMAIRC Report” submitted by Commissioner Gallagher

Separately printed document.

ⁱ Smith, “Management fees remaining a sticking point,” *Private Equity International* (December 5, 2018).

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- ⁱⁱⁱ Act of June 12, 2017 (P.L. 11, No. 5) (codified at 24 Pa.C.S. § 8538 and 71 Pa.C.S. § 5958).
- ^{iv} See Legal Opinion of the Joint State Government Commission (October 19, 2018); Legal Opinion of the Legislative Reference Bureau (October 17, 2018).
- ^v All statistical references pertaining to the State Employees Retirement System and the Public School Employees' Retirement System have been directly sourced from the public records of each retirement system. See e.g. State Employees' Retirement System, "2018 Snapshot" (February 28, 2018); SERS Comprehensive Annual Financial Report (June 2018); Public School Employees' Retirement System, "Budget Report Highlights, FY 2018-19" (February 2018); PSERS Comprehensive Annual Financial Report (June 2018).
- ^{vi} Government Finance Officers Association, "Role of the Actuarial Valuation Report in Plan Funding," (February 2013), 1.
- ^{vii} See e.g., Legislative Journal of the Senate of Pennsylvania 575-579 (June 5, 2017) (Remarks of Senators Cornman and Browne).
- ^{viii} Independent Fiscal Office, Actuarial Note Transmittal – Amendments to Senate Bill 1 at 1 (June 3, 2017).
- ^{ix} *Id* at 18.
- ^x The standard deviation of the expected return of an asset portfolio is included as a measure of the risk to the financial position of a pension fund by the Blue Ribbon Panel. "Report of the Blue Ribbon Panel on Public Pension Plan Funding" (Schaumburg, Illinois: Society of Actuaries, February 2014).
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- ^{xii} Kapinos, Mitnik, Martin, "Stress Testing Banks: Whence and Whither," Federal Deposit Insurance Corporation –Center for Financial Research (November, 2015).
- ^{xiii} Joseph Newton, Testimony before the Pennsylvania Public Pension Management and Asset Investment Review Commission, Harrisburg, Pennsylvania, July 30, 2018.
- ^{xiv} David Draine, Testimony before the Pennsylvania Public Pension Management and Asset Investment Review Commission, Harrisburg, Pennsylvania, July 30, 2018.
- ^{xv} "Report of the Blue Ribbon Panel on Public Pension Plan Funding" (Schaumburg, Illinois: Society of Actuaries, February 2014), 24.
- ^{xvi} Greg Mennis, Susan Banta, and David Draine, "Assessing the Risk of Fiscal Distress for Public Pensions: State Stress Test Analysis," 6, May 2018.
- ^{xvii} Joe Newton, Testimony before the Pennsylvania Public Pension Management and Asset Investment Review Commission, Harrisburg, Pennsylvania, July 30, 2018.
- ^{xviii} "Report of the Blue Ribbon Panel on Public Pension Plan Funding" (Schaumburg, Illinois: Society of Actuaries, February 2014), 35.
- ^{xix} Kenneth Kent, Testimony before the Pennsylvania Public Pension Management and Asset Investment Review Commission, Harrisburg, Pennsylvania, July 30, 2018.
- ^{xx} "Report of the Blue Ribbon Panel on Public Pension Plan Funding" (Schaumburg, Illinois: Society of Actuaries, February 2014), 10.
- ^{xxi} "Report of the Blue Ribbon Panel on Public Pension Plan Funding" (Schaumburg, Illinois: Society of Actuaries, February 2014), 10.
- ^{xxii} Mark Freedman, "Letter from the SOA President," in Blue Ribbon Panel on Public Pension Plan Funding: Resource Guide. Available at <https://www.soa.org/blueribbonpanel/>.
- ^{xxiii} Robert Stein, Testimony before the Pennsylvania Public Pension Management and Asset Investment Review Commission, Harrisburg, Pennsylvania, July 30, 2018.
- ^{xxiv} "SERS-004-Questionnaire Responses" (SERS, July 2, 2018).
- ^{xxv} Joe Newton, Testimony before the Pennsylvania Public Pension Management and Asset Investment Review Commission, Harrisburg, Pennsylvania, July 30, 2018.

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- ^{xxviii} “SERS-001-1.1-Stress Test Analysis: Commonwealth of Pennsylvania State Employees’ Retirement System,” (RVK, December 6, 2017);
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- ^{xxx} “Report of the Blue Ribbon Panel on Public Pension Plan Funding” (Schaumburg, Illinois: Society of Actuaries, February 2014), 21.
- ^{xxxi} “PPMAIRC PSERS-004 #8B Aon2, PSERS Follow-Ups to Asset Liability Study, (Aon Hewitt, August 2017); “PPMAIRC PSERS-001 #1 Asset-Liability Study Results: Pennsylvania Public School Employees’ Retirement System (PSERS),” (Aon Hewitt, September 15, 2017); “PSERS-Asset-Liability Study Results (20180723) FINAL-Asset Liability Study Results: Pennsylvania Public School Employees’ Retirement System (PSERS),” (Aon Hewitt, July 2018); “PPMAIRC PSERS-004 Responses-Public School Employees’ Retirement System (PSERS) Responses to Public Pension Management and Asset Investment Review Commission (PPMAIRC) Data Request PSERS-004,” (PSERS, July 2, 2018).
- ^{xxxii} Robert Stein, email communication, October 23, 2018.
- ^{xxxiii} David Draine, Testimony before the Pennsylvania Public Pension Management and Asset Investment Review Commission, Harrisburg, Pennsylvania, July 30, 2018.
- ^{xxxiv} Robert Stein, Presentation to the Pennsylvania Public Pension Management and Asset Investment Review Commission, Harrisburg, Pennsylvania, July 30, 2018.
- ^{xxxv} Greg Mennis, Susan Banta, and David Draine, “Assessing the Risk of Fiscal Distress for Public Pensions: State Stress Test Analysis,” 32, May 2018.
- ^{xxxvi} “Public School Employees’ Retirement System (PSERS) Responses to Public Pension Management and Asset Investment Review Commission (PPMAIRC) Data Requests PSERS-001, 002, and 003. (PSERS, June 20, 2018).
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- ^{xxxviii} Patrick Marr, Panel Discussion at the 2018 National Association of State Treasurers Annual Conference, “The State of Public Pensions: Current Issues and Trends,” Scottsdale, Arizona, October 2, 2018.
- ^{xxxix} Arleen Jacobius, “California Funds Feel Private Equity Shock,” Pensions & Investments, May 14, 2018, <https://www.pionline.com/article/20180514/PRINT/180519947/california-funds-feel-private-equity-shock>.
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