The Growth of Passive
What is happening, and why?

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S&P Dow Jones Indices
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“Active investing has been subjected to increasing abuse, particularly by those whose opinions are driven by the persistent accumulation of hard data and logical arguments.”

– Charles D. Ellis, “In Defense of Active Investing,” *Financial Analysts Journal*, 2015

One of the most significant developments in modern financial history…

- The first institutional index fund launched in 1971.
- First S&P 500 mutual fund tracker launched (barely) in 1976.
- The first ETF (also tracking the S&P 500) launched in 1993.
- Passive assets were negligible for many years.
- Today – 20+ percent of U.S. equity capitalization is held in passive portfolios.

The Rise of Passive

- Evidence
- Explanations
- Controversy

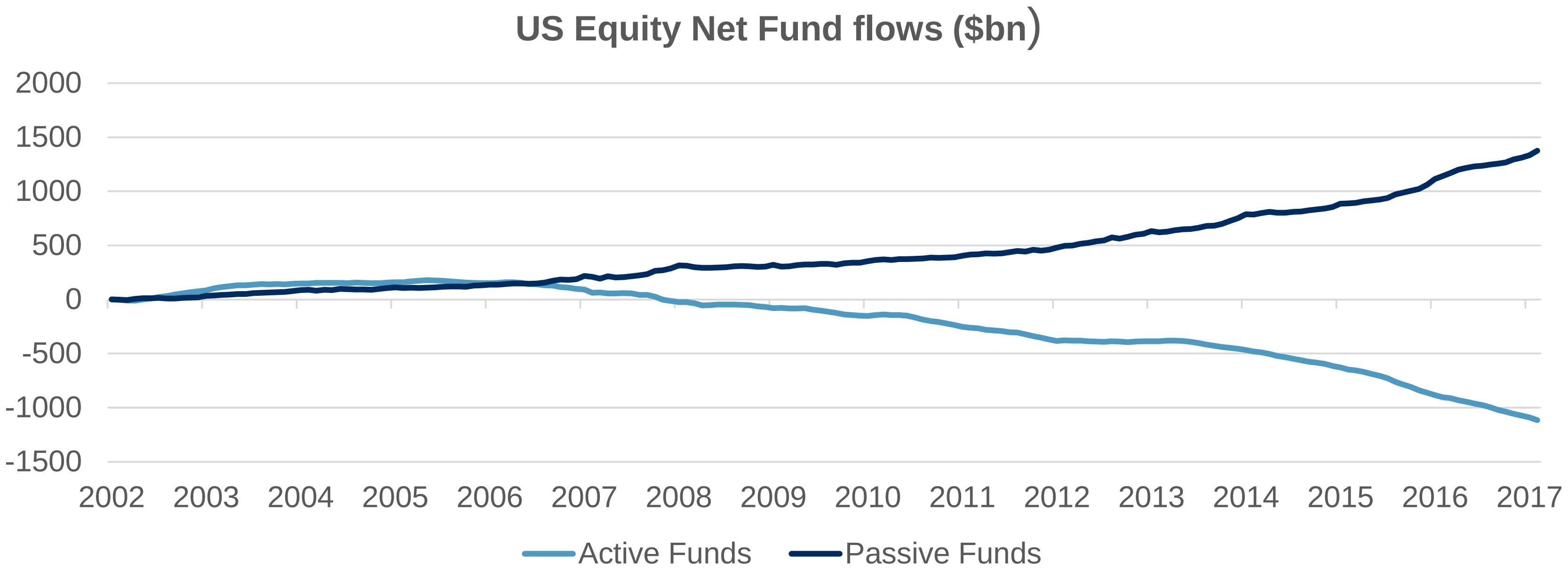
Evidence

Some Early Observations

"Contrary to their oft articulated goal of outperforming the market averages, investment managers are not beating the market: The market is beating them." – Charles D. Ellis, "The Loser's Game, *Financial Analysts Journal,* 1975

"A respect for evidence compels me to incline toward the hypothesis that most portfolio decision makers should go out of business – take up plumbing, teach Greek, or help produce the annual GNP by serving as corporate executives." – Paul A. Samuelson, "Challenge to judgment," *Journal of Portfolio Management,* 1974

Divergence in Asset Flows….



Category	Active			Passive		
	Estimated Net Flows		Assets	Estimated Net Flows		Assets
	Jan 2018 ($M)	1 Year ($M)	Jan 2018 ($B)	Jan 2018 ($M)	1 Year ($M)	Jan 2018 ($B)
U.S. Equity	(24,028)	(211,217)	4,479	41,126	233,238	3,855
Sector Equity	87	(16,706)	438	7,930	45,778	512
International Equity	14,998	49,485	2,135	27,178	214,195	1,339
Allocation	(2,753)	(25,966)	1,329	1,128	4,789	70
Taxable Bond	25,413	194,333	2,633	22,608	210,626	1,109
Municipal Bond	7,824	32,600	670	388	5,191	291
Alternative	2,662	4,550	177	2,699	6,853	57
Commodities	1,240	2,516	311	1,023	2,760	696
All Long Term	25,442	29,595	12,172	104,079	723,432	7,928

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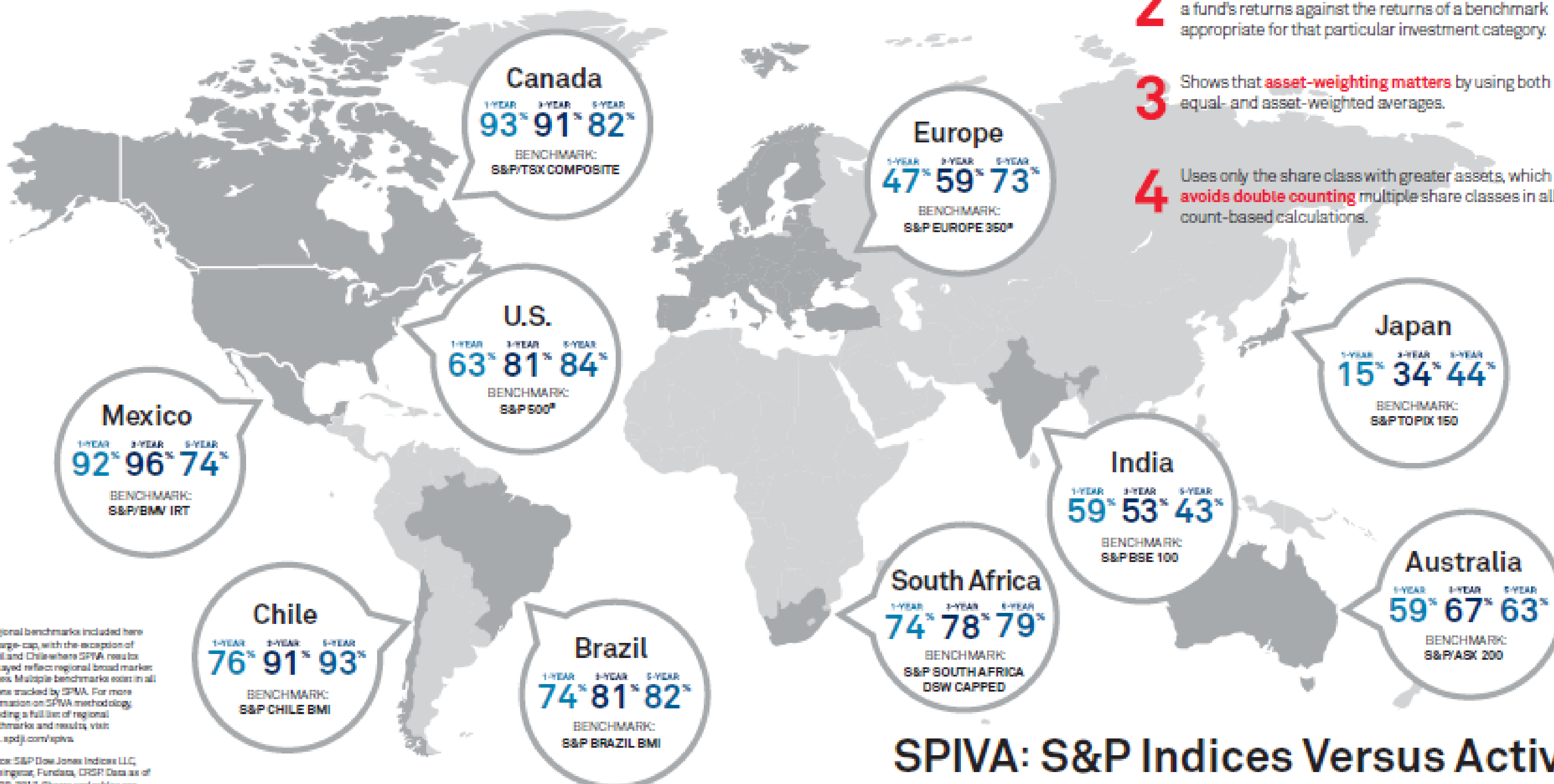
Source: S&P Dow Jones Indices LLC, Morningstar. Data as of 01/31/2018. Charts and tables are provided for illustrative purposes.

SPIVA® Around the World

Percentage of active funds outperformed by benchmarks* over 1-, 3-, and 5-year periods



The SPIVA Difference

1 Accounts for the entire opportunity set–not just the survivors–thereby **eliminating survivorship bias**.

2 Applies an **apples-to-apples comparison** by measuring a fund's returns against the returns of a benchmark appropriate for that particular investment category.

3 Shows that **asset-weighting matters** by using both equal- and asset-weighted averages.

4 Uses only the share class with greater assets, which **avoids double counting** multiple share classes in all count-based calculations.

*Regional benchmarks included here are large-cap, with the exception of Brazil and Chile where SPIVA results displayed reflect regional broad market indices. Multiple benchmarks exist in all regions tracked by SPIVA. For more information on SPIVA methodology, including a full list of regional benchmarks and results, visit www.spdji.com/spiva.

Source: S&P Dow Jones Indices LLC, Morningstar, Fundata, CRSP. Data as of Dec. 29, 2017. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results.

SPIVA: S&P Indices Versus Active

www.spdji.com/spiva

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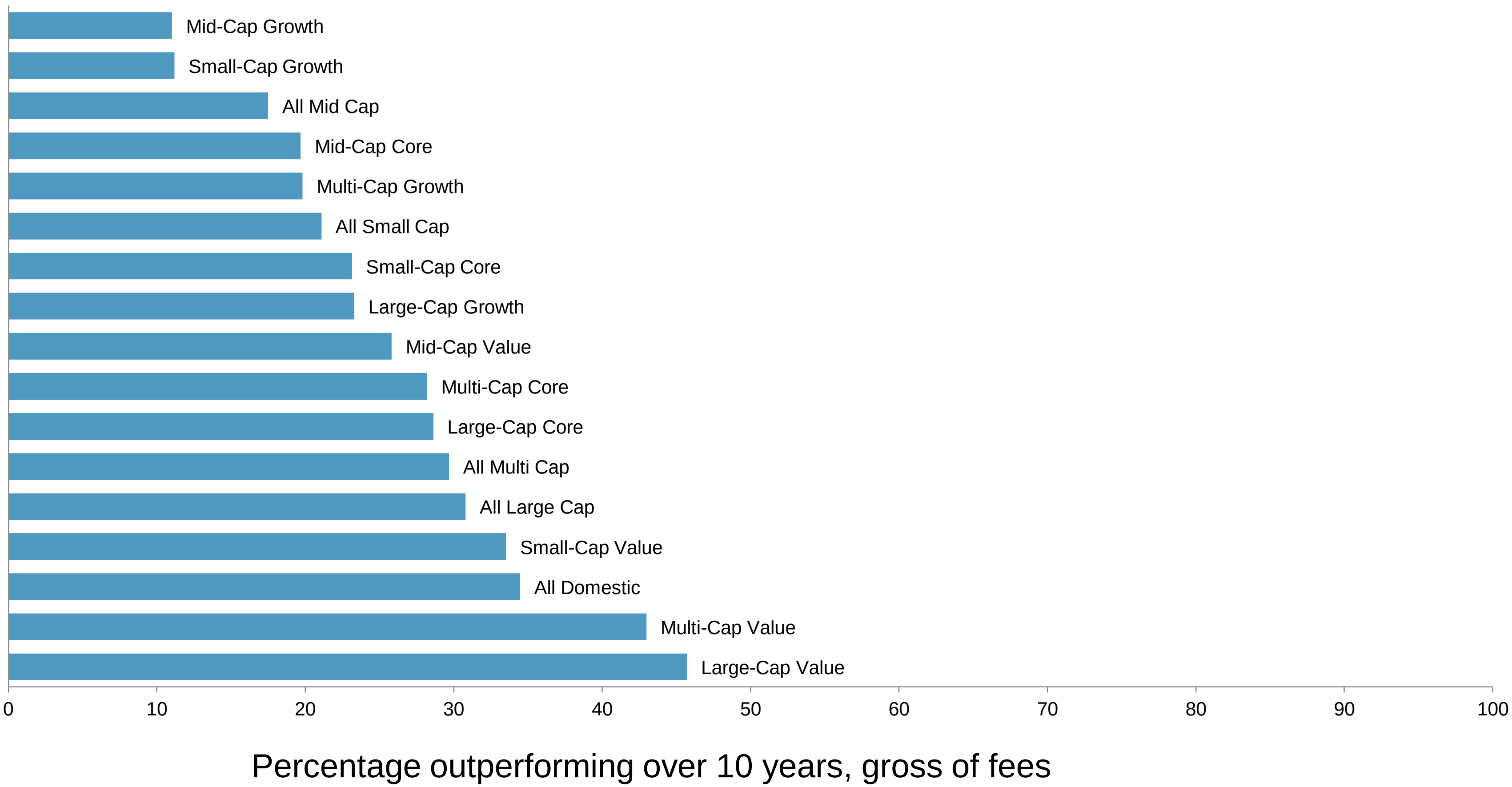
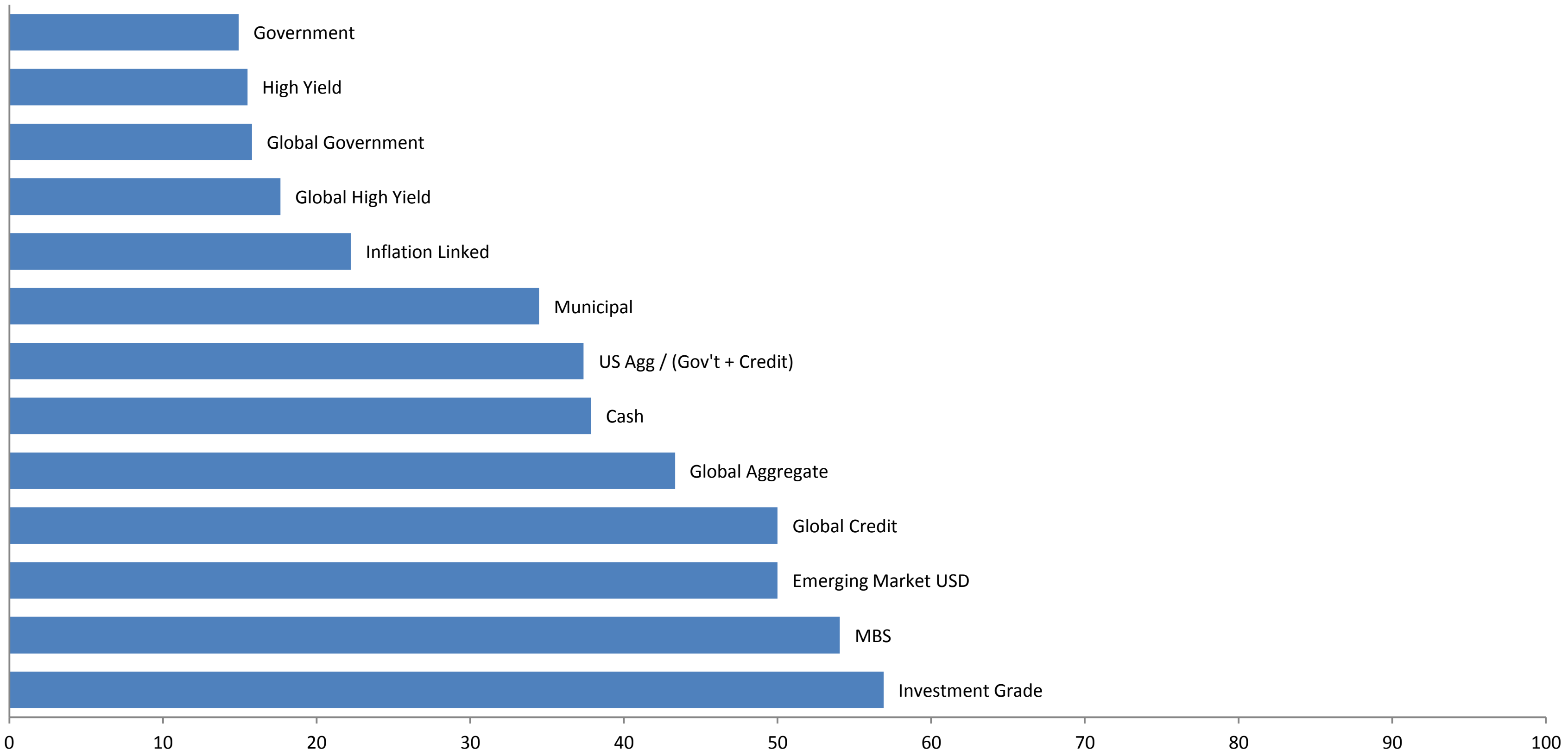
Most Institutional Equity Managers Underperform



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

Most Institutional Bond Managers Underperform



Percentage outperforming over 10 years, gross of fees

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

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.

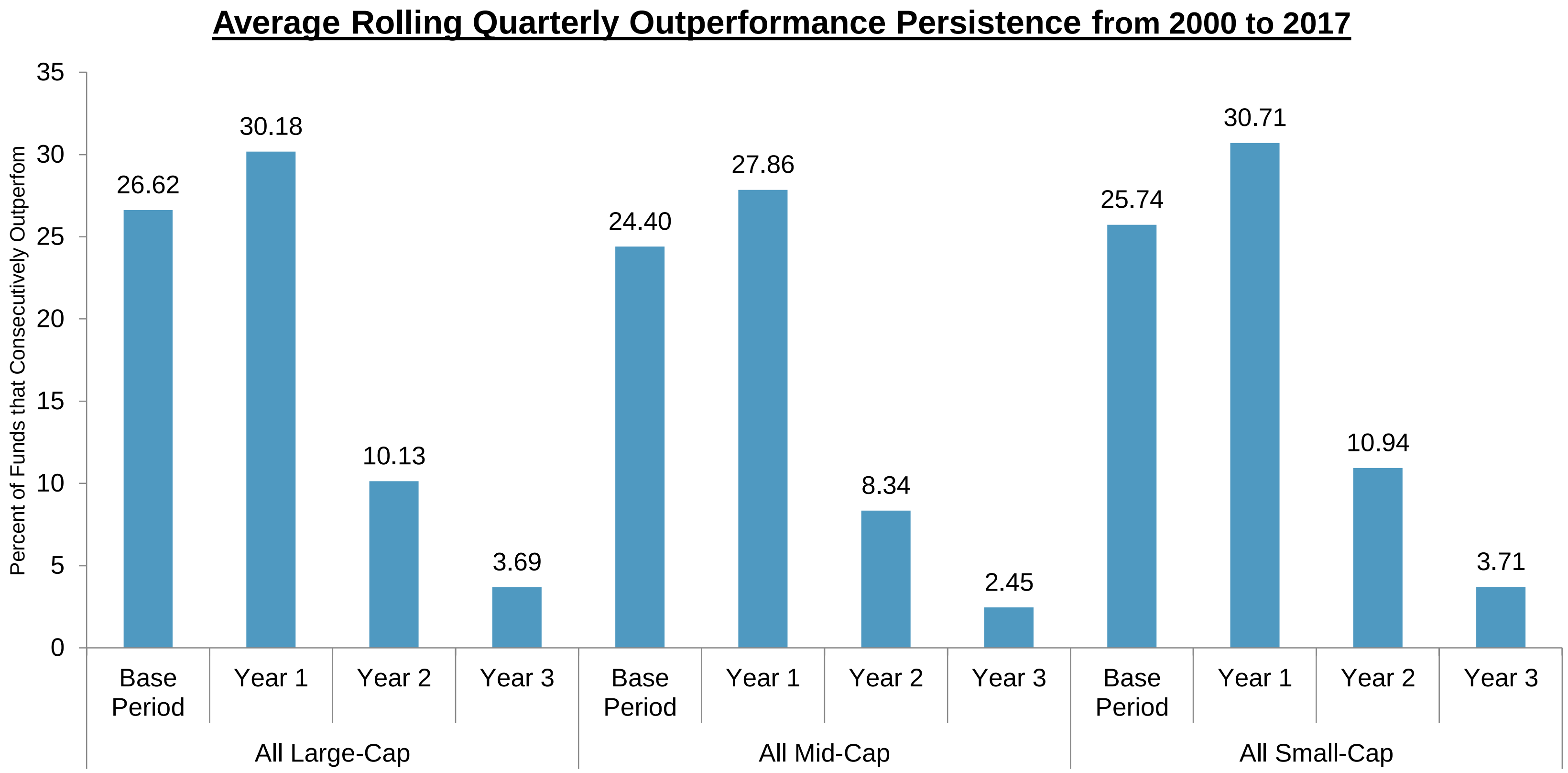
Successful Bond Performance Does Not Persist

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 LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Outperformance is Fleeting



"Base Period" represents the percentage of funds that outperformed the benchmark over the past three years (the "winners"). Year 1, Year 2, and Year 3 then show what percentage of the "winners" outperformed in the following years. To calculate what percentage of the original group of funds outperformed across all time periods, multiply the results. For example, 26.62% * 10.13% = 2.69% of large-cap funds outperformed in the base period AND year 1 AND year 2.

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Sep. 30, 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes only.

Fees Contribute to Underperformance – Equity

Percentage of Managers Underperforming Over 10 Years

Fund Category	Institutional Accounts (Net of Fees)	Institutional Accounts (Gross of Fees)
All Domestic Equity	76.31%	65.52%
Large Cap	79.58%	69.20%
Mid Cap	92.02%	82.51%
Small Cap	90.61%	78.91%

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

Fees Contribute to Underperformance – Bonds

Percentage of Managers Underperforming Over 10 Years

Fund Category	Institutional Accounts (Net of Fees)	Institutional Accounts (Gross of Fees)
Investment Grade	48.28%	43.10%
U.S. Aggregate	69.53%	62.62%
High Yield	93.80%	84.50%
Global Aggregate	73.33%	56.67%
Global High Yield	100.00%	82.35%

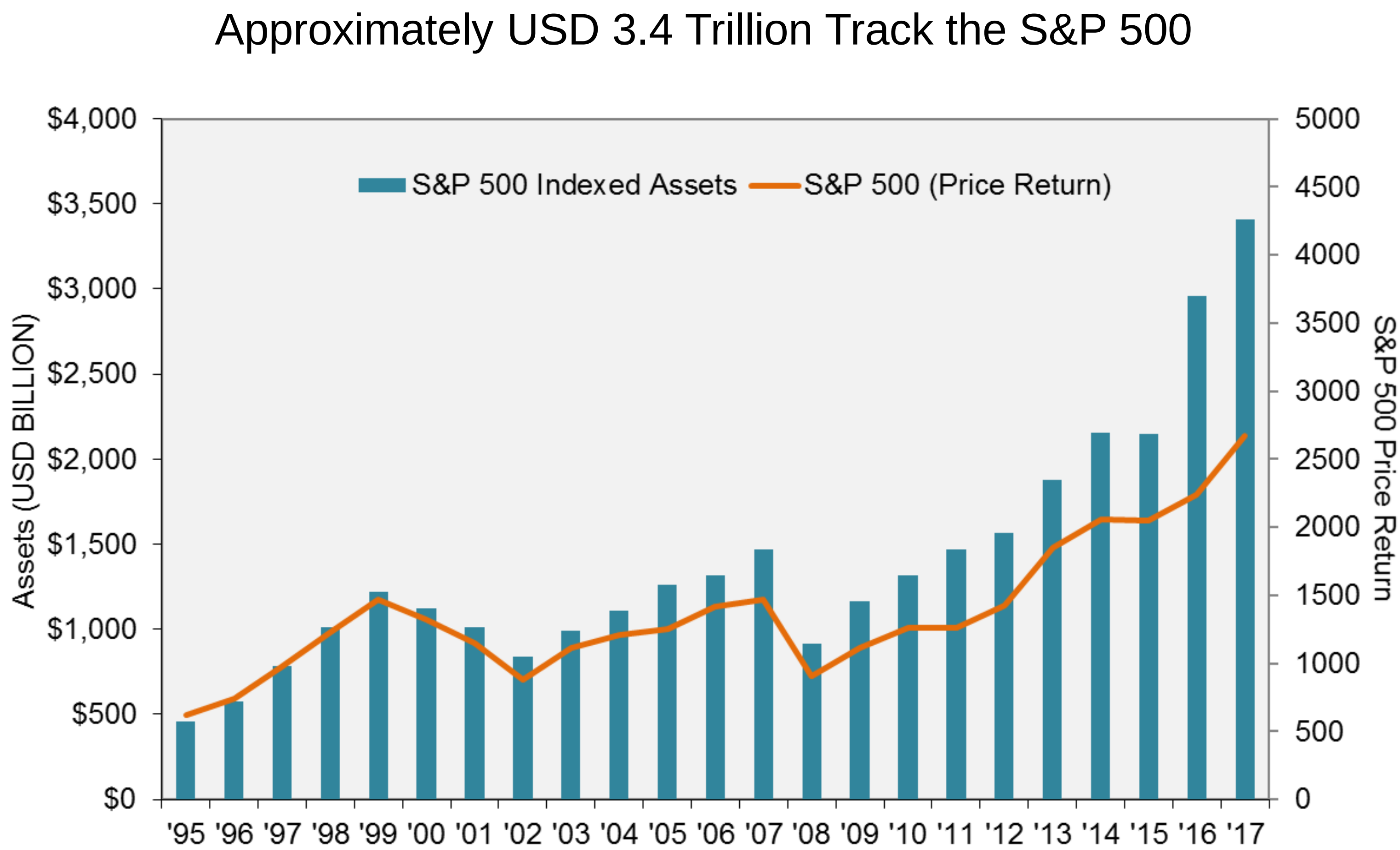
Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Explanations

Why Is Active Management So Difficult?

- Cost
- Professionalization and Market Efficiency
- Return Skewness
- Index Innovation

Assets Tracking the S&P 500



Source: S&P Dow Jones Indices. Data as of Dec. 31, 2017. Charts are provided for illustrative purposes. Past performance is no guarantee of future results.

No Natural Source of Alpha

- Investor A can be above average only if Investor B is below average.
- The total outperformance of the winners must equal the total underperformance of the losers (before costs).
- The source of the winners’ positive alpha is the losers’ negative alpha.
- When funds shift from active to passive, the least skillful active managers lose the most assets.

Might Active Management Become Even More Difficult?

	A	B
Total Market Cap	$20.0 T	$20.0 T
% actively managed	100%	90%
Value Actively Managed	$20.0 T	$18.0 T
Value Outperforming	$10.0 T	$9.0 T
Value Underperforming	$10.0 T	$9.0 T
Average Underperformance (%)	5%	4%
Total Underperformance ($)	$500 B	$360 B

A hypothetical 10% reduction in active AUM led to a hypothetical 28% reduction in outperformance.

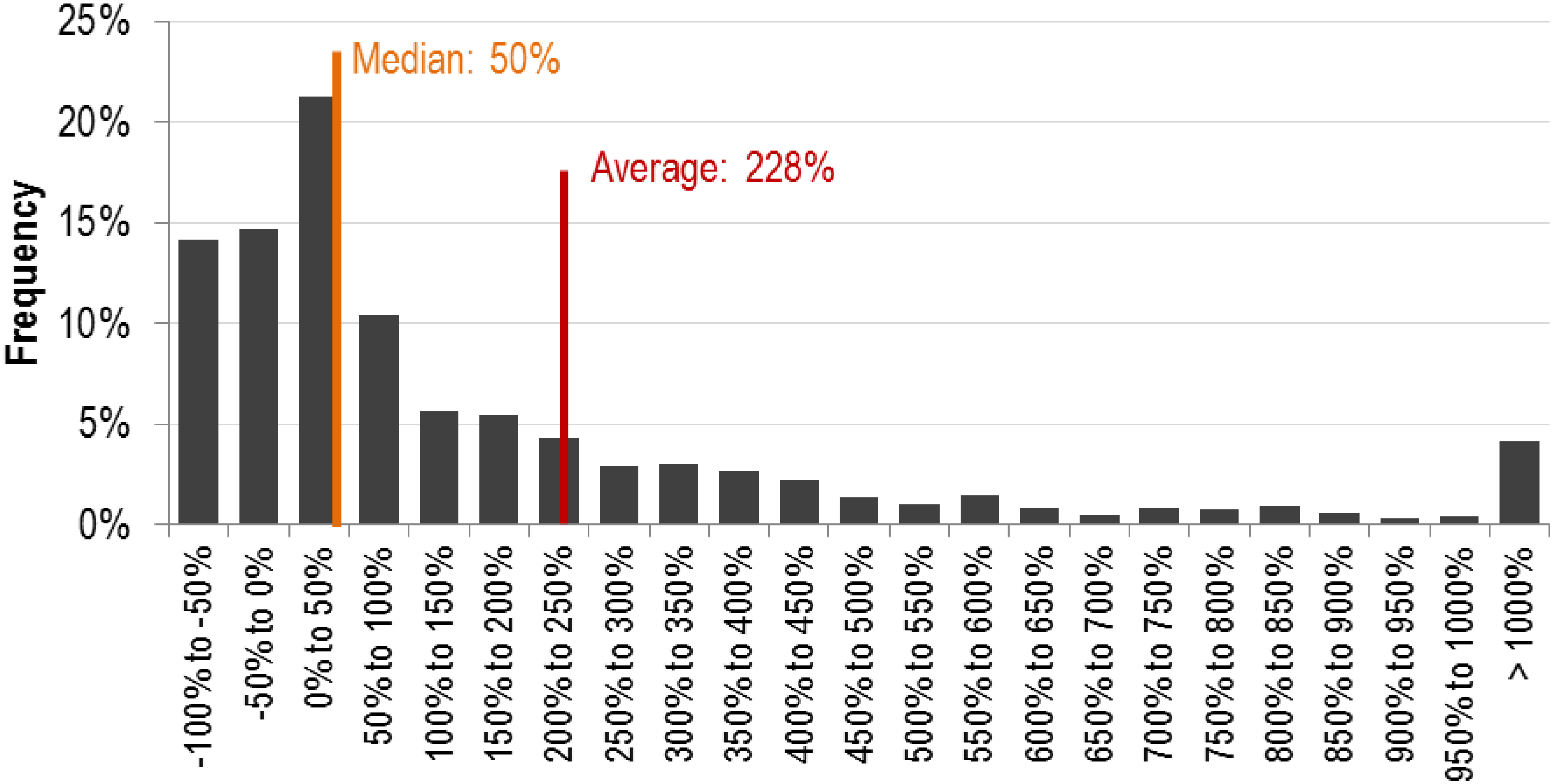
Source: S&P Dow Jones Indices. Chart is for illustrative purposes only and reflects hypothetical performance.

Skewness

- Stock returns are not normally distributed.
  - A stock can go down only 100%,
  - But can appreciate by much more than that.
- Simple definition of positive skewness: average return > median return
- How often does average return exceed median return?
  - For S&P 500 (1991-2017): 23 of 27 years
  - In U.S. (1926-2016), 4% of stocks “explain the net gain for the entire U.S. stock market…as other stocks collectively matched Treasury bills.”

Source: S&P Dow Jones Indices; Bessembinder, Hendrik, “Do Stocks Outperform Treasury Bills?,” November 2017. Past performance is no guarantee of future results.

Historical Skewness for S&P 500



Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 1997 through Dec. 31, 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

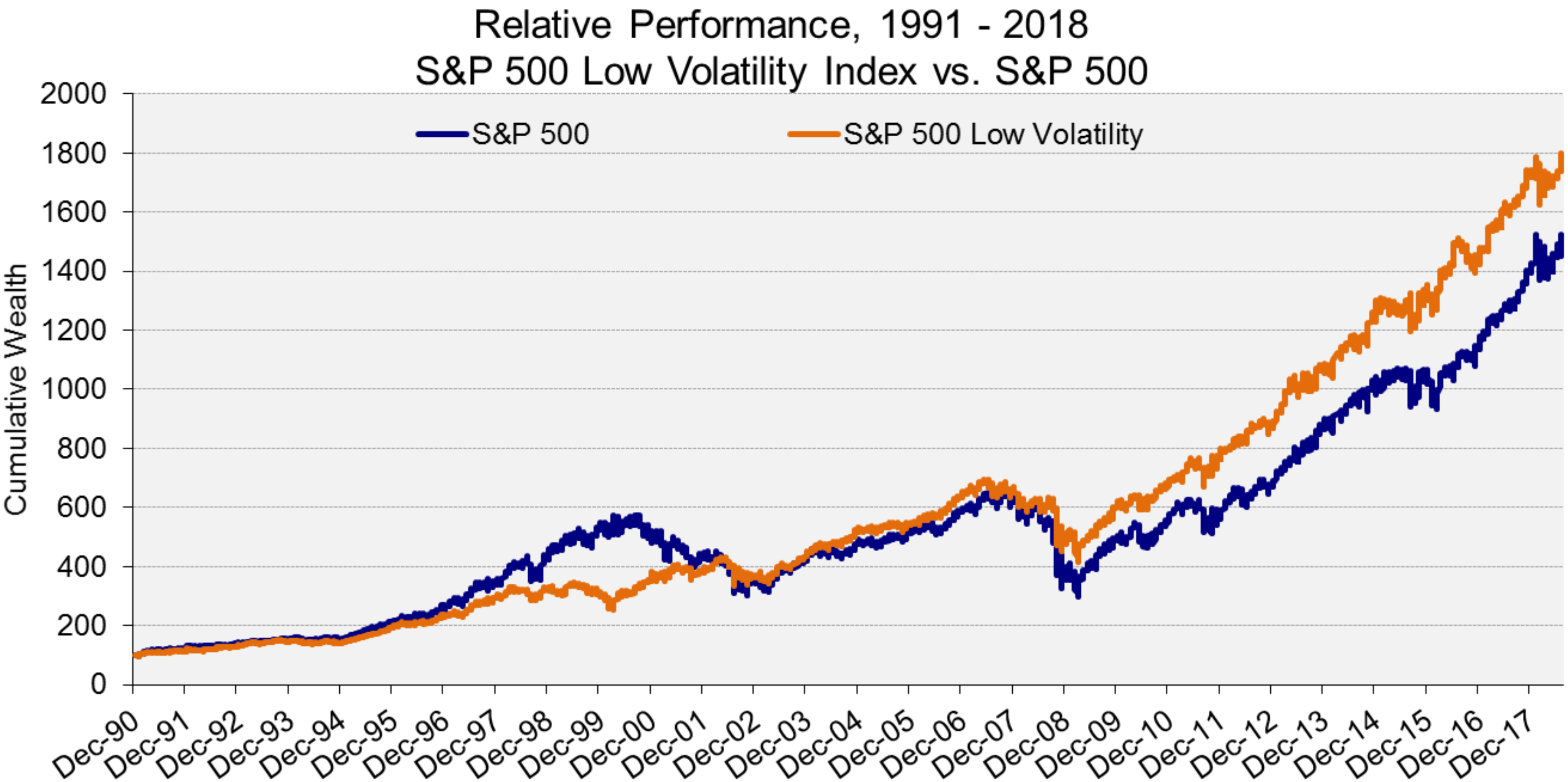
Consequences of Skewness

- Handicaps active managers
  - 50% of selections outperform the median return
  - Less than 50% outperform the average return
- Probability of outperformance rises when portfolios hold more stocks
- Suggests possible equilibrium between active and passive
  - If majority of active managers underperform by “a little,” then
  - A minority of active managers can outperform by “a lot”

Index Evolution

Indices	Examples	Attributes
Broad Market	S&P 500®, S&P Global BMI	• Capitalization-weighted • Aim to represent an asset class
Specialized	S&P MidCap 400®, S&P Select Sectors	• Focus on a subset of the broader market • Typically capitalization-weighted
Factor/ Smart Beta/ Strategic Beta	S&P 500 Low Volatility, S&P 500 Equal Weight	• Focus on specific *patterns* or *characteristics* • Better “indicize” active strategies • Typically *not* capitalization-weighted

S&P 500 Low Volatility Index



Source: S&P Dow Jones Indices. Data from Dec. 31, 1990 through July 31, 2018. Charts are provided for illustrative purposes. Past performance is no guarantee of future results. This chart may reflect hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Average Monthly Returns and Spreads

		Average Monthly Return			
	# of Mos	S&P 500 Low Volatility	S&P 500	Low Volatility minus S&P 500	Hit rate
Less than -2.45%	55	-2.81%	-5.61%	2.80%	87%
Between 0 and -2.45%	55	-0.63%	-1.42%	0.79%	76%
Between 0 and 2.47%	111	1.15%	1.26%	-0.11%	47%
Greater than 2.47%	110	3.27%	4.93%	-1.66%	18%

Source: S&P Dow Jones Indices. Data from Dec. 31, 1990 through July 31, 2018. Charts are provided for illustrative purposes. Past performance is no guarantee of future results. This chart may reflect hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Controversy

Active Managers' Challenges to Indexing

- Common Ownership
- Stewardship
- Bubbles
- Market Efficiency

Common Ownership

Complaint: Ownership of a substantial fraction of most competitors in an industry leads to diminished competition and higher prices.

Response

- Confuses correlation with causation.
- Econometric argument not universally accepted.
- Most frequently-cited study deals with airline tickets.
  - Airlines are 0.5% of the S&P 500.
  - Why increase revenue for 0.5% of a portfolio and raise expenses for the other 99.5%?

Stewardship

Complaint: Index funds have no incentive to engage with corporate management on governance issues.

Response

- Index funds are permanent capital. This gives them a greater incentive to engage with corporate management, not a lesser incentive.
- Index funds may be locked into their investments, but their clients are not.
- The three largest indexers have all enlarged their corporate engagement staff, and been quite vocal about governance issues.

Bubbles

Complaint: Flows into index funds cause distortions in the pricing of index constituents; “too much” money going into index funds makes it hard for active managers to compete.

Response

- Index flows do not cause distortions in relative valuation, since index buy programs depend on pre-existing constituent weights.
- There may be a momentum effect as underperforming managers are fired, but
  - It would still occur in the absence of indexing.
  - Indexing reduces this effect because index funds are more diversified than active portfolios.

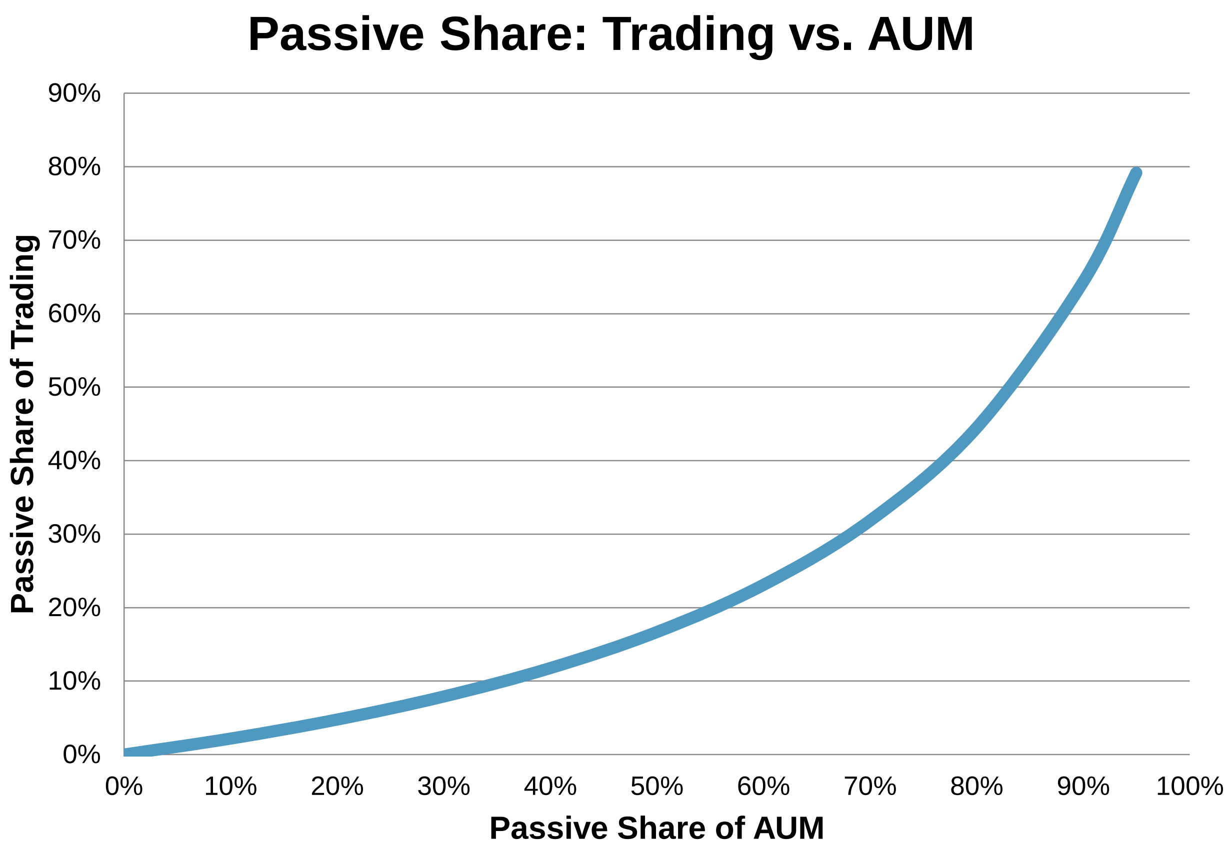
Market Efficiency

Complaint: Market efficiency depends on the work of active managers; index funds are “price takers,” and “too much” indexing could lead to a loss of capital market efficiency.

Response

- Factor indices are not price takers.
- Index trading contributes to price discovery at a macro level; the most heavily traded stock in the U.S. is an S&P 500 tracker.
- The growth of passive management raises the quality of the surviving active managers.
- Market efficiency depends on trading, not AUM per se; most individual stock trading is done by active managers.

Trading Consequences of Index Growth



Source: S&P Dow Jones Indices. Assumes active turnover = 50% per year, passive turnover = 10% per year. Chart is provided for illustrative purposes.

A Hypothetical Market

Stock	Return
A	10%
B	10%
C	10%
D	10%
E	50%
Average	18%
Median	10%

Source: Heaton, J.B., N.G. Polson, and J.H. Witte, "Why Indexing Works," October 2015, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2673262 and S&P Dow Jones Indices. Chart is for illustrative purposes only.

Possible Portfolio Combinations

Number of Stocks	Number of Portfolios	Median Return	Average Return	Probability of Outperformance
1	5	10%	18%	20%
2	10	10%	18%	40%
3	10	23%	18%	60%
4	5	20%	18%	80%

- *Expected* return is the same regardless of portfolio size, but
- Holding more stocks increases the *likelihood* of outperformance.

Source: S&P Dow Jones Indices. Chart is for illustrative purposes only.

How Might the Supply of Alpha Shift?

	B	C
Total Market Cap	$20.0 T	$20.0 T
% actively managed	90%	90%
Value Actively Managed	$18.0 T	$18.0 T
Value Outperforming	$9.0 T	$6.0 T
Value Underperforming	$9.0 T	$12.0 T
Losers’ Underperformance (%)	4%	3%
Winners’ Outperformance (%)	4%	6%
Total Underperformance ($)	$360 B	$360 B

Distribution of outperformance and underperformance need not be symmetric.

Source: S&P Dow Jones Indices. Chart is for illustrative purposes only.

Final Thoughts

- Most active managers fail most of the time.
- The rise of indexing has saved investors billions of dollars in management fees without requiring a sacrifice in investment performance.
- Passive alternatives (including “smart beta”) create a difficult challenge for active management performance.
- Indexing has considerable capacity to grow without damaging market efficiency.

Performance Disclosure

The S&P 500 Low Volatility Index was launched April 4, 2011. All information presented prior to an index's Launch Date is hypothetical (back-tested), not actual performance. The back-test calculations are based on the same methodology that was in effect on the index Launch Date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. Complete index methodology details are available at www.spdji.com. Past performance of the Index is not an indication of future results. Prospective application of the methodology used to construct the Index may not result in performance commensurate with the back-test returns shown.

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