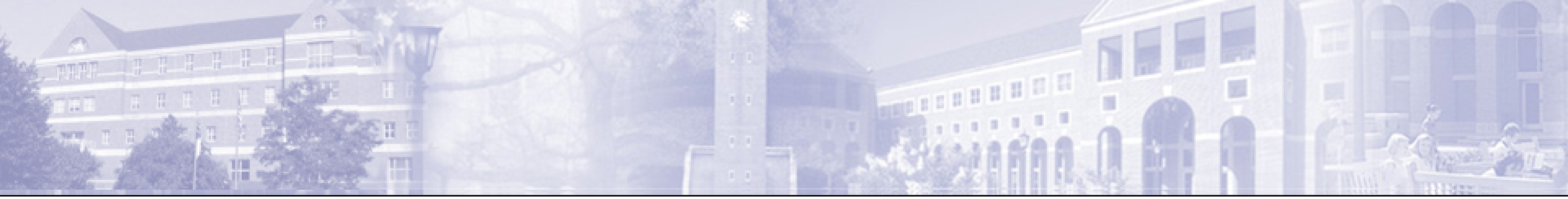

Alternative Investment Asset Allocation

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Presentation for:

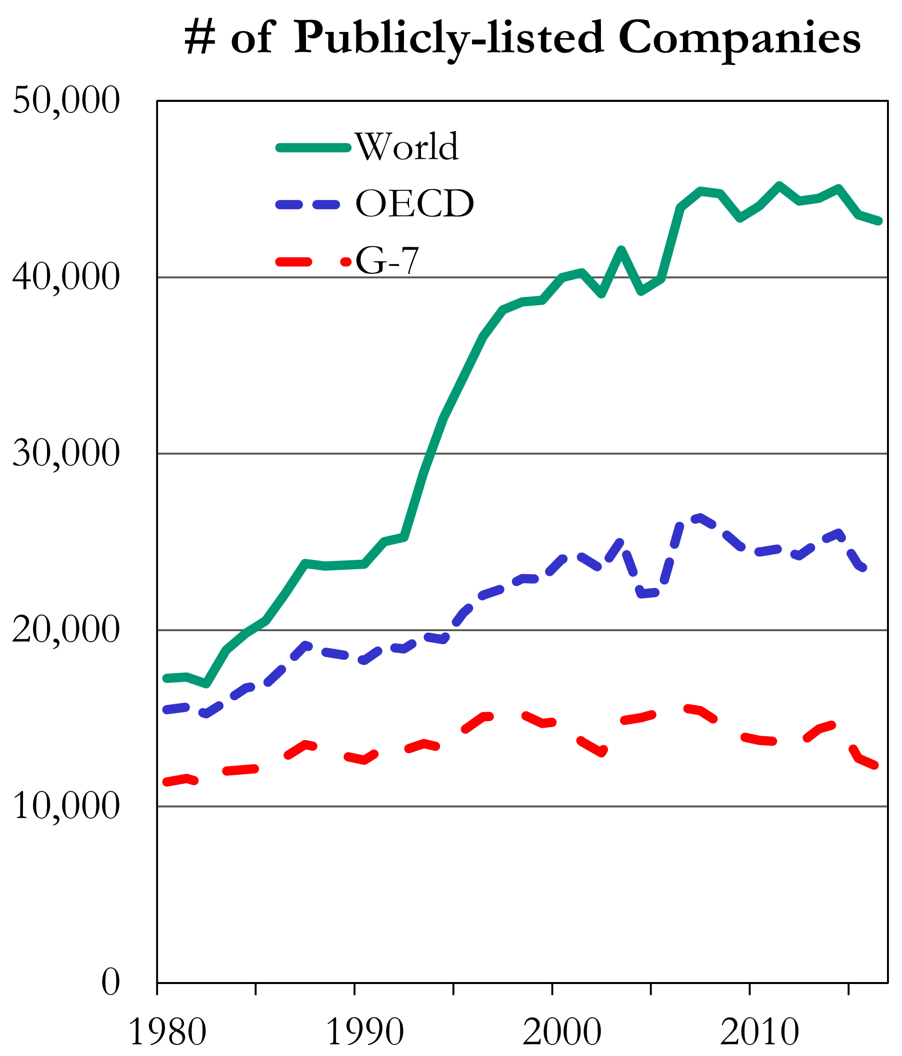
Meeting and Hearing of the Pennsylvania Public Pension Management & Asset Investment Review Commission

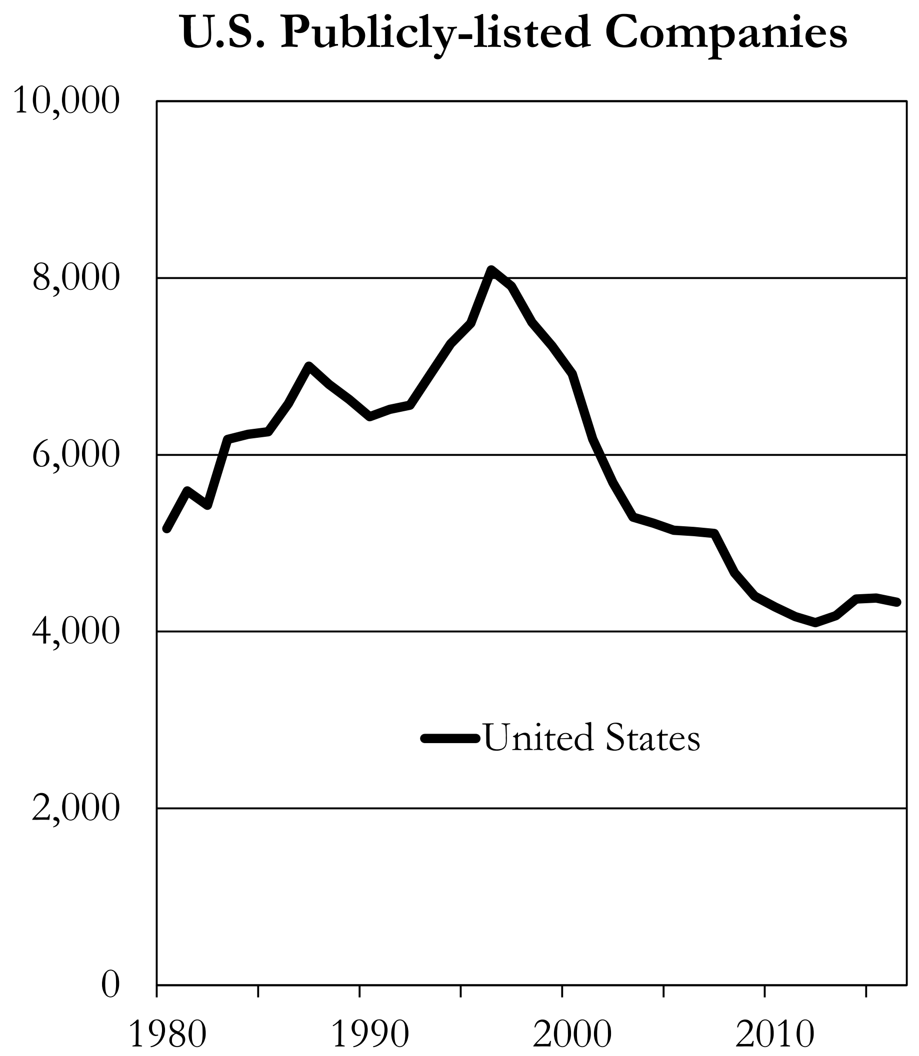
September 20, 2018

3 Eras of Modern Capital Market Growth

- The "Public Markets Era" (1950-1974)
  - Resurgence of public equity and debt markets after the dark ages of the depression and WW-II
  - Large growth in listings, market cap, and breadth of ownership
- The "Financial Engineering Era" (1975-1995)
  - Advances in derivative pricing theory and market structure lead to exponential growth in exchange-traded and OTC derivatives
  - Notional values of derivatives reach 100s of $trillions, financial engineering invents technology for unfathomably complicated securities.
- The "Private Markets Era" (1996-present)
  - Institutionalization of private fund market and direct investments
  - Alternatives and the endowment model of investing

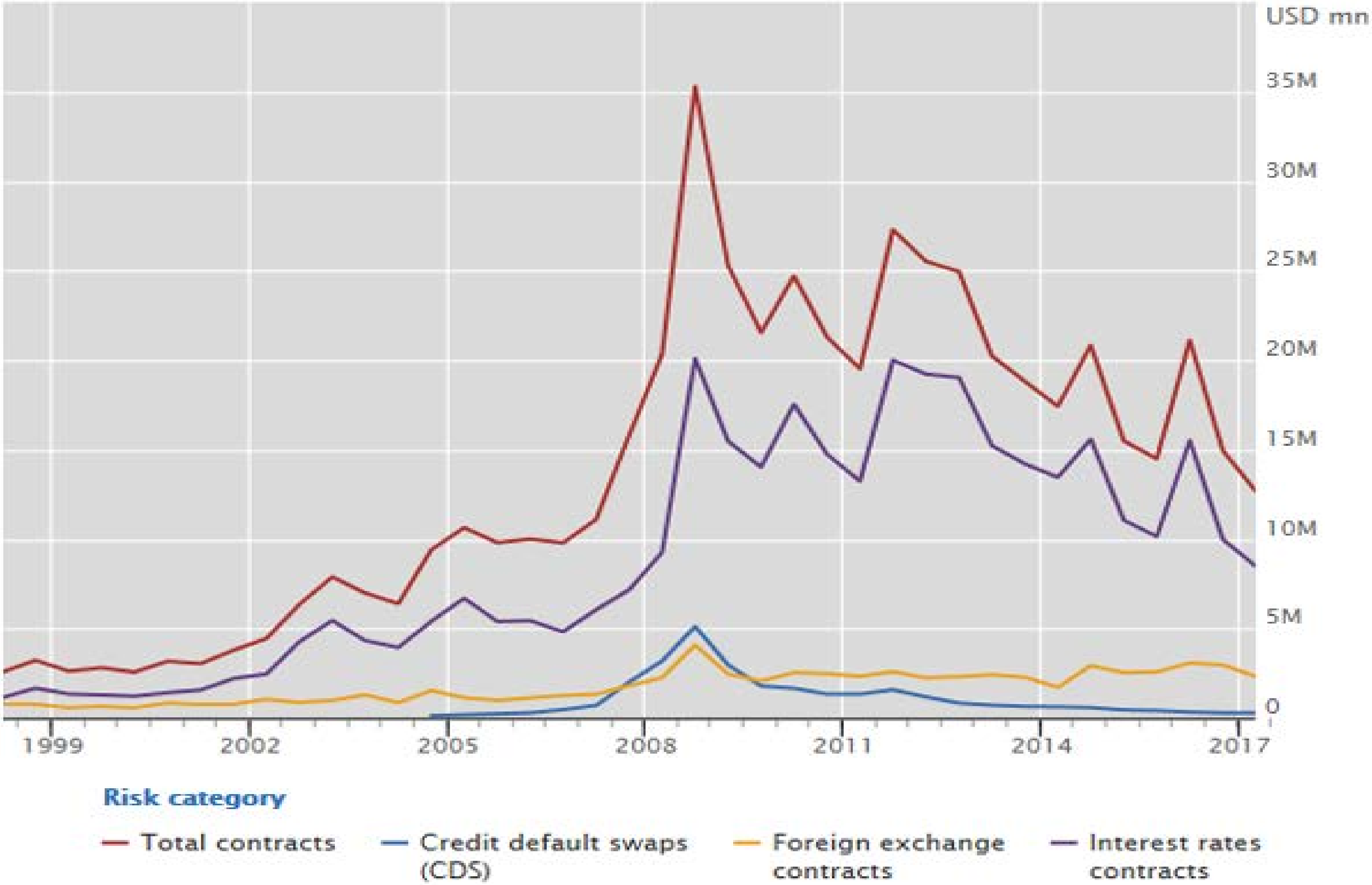
Public Equity Markets





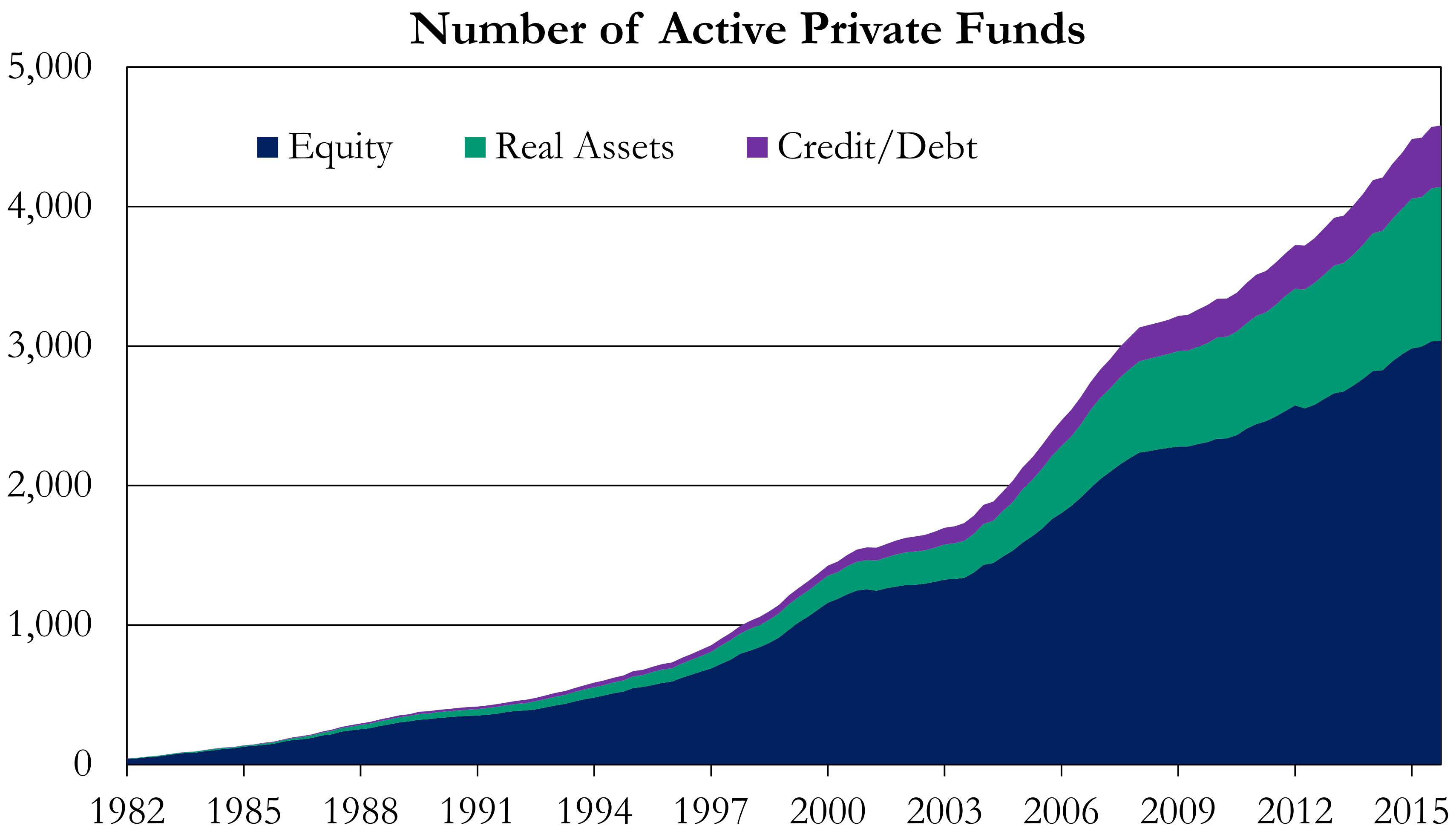
Source: WorldBank

OTC Derivatives



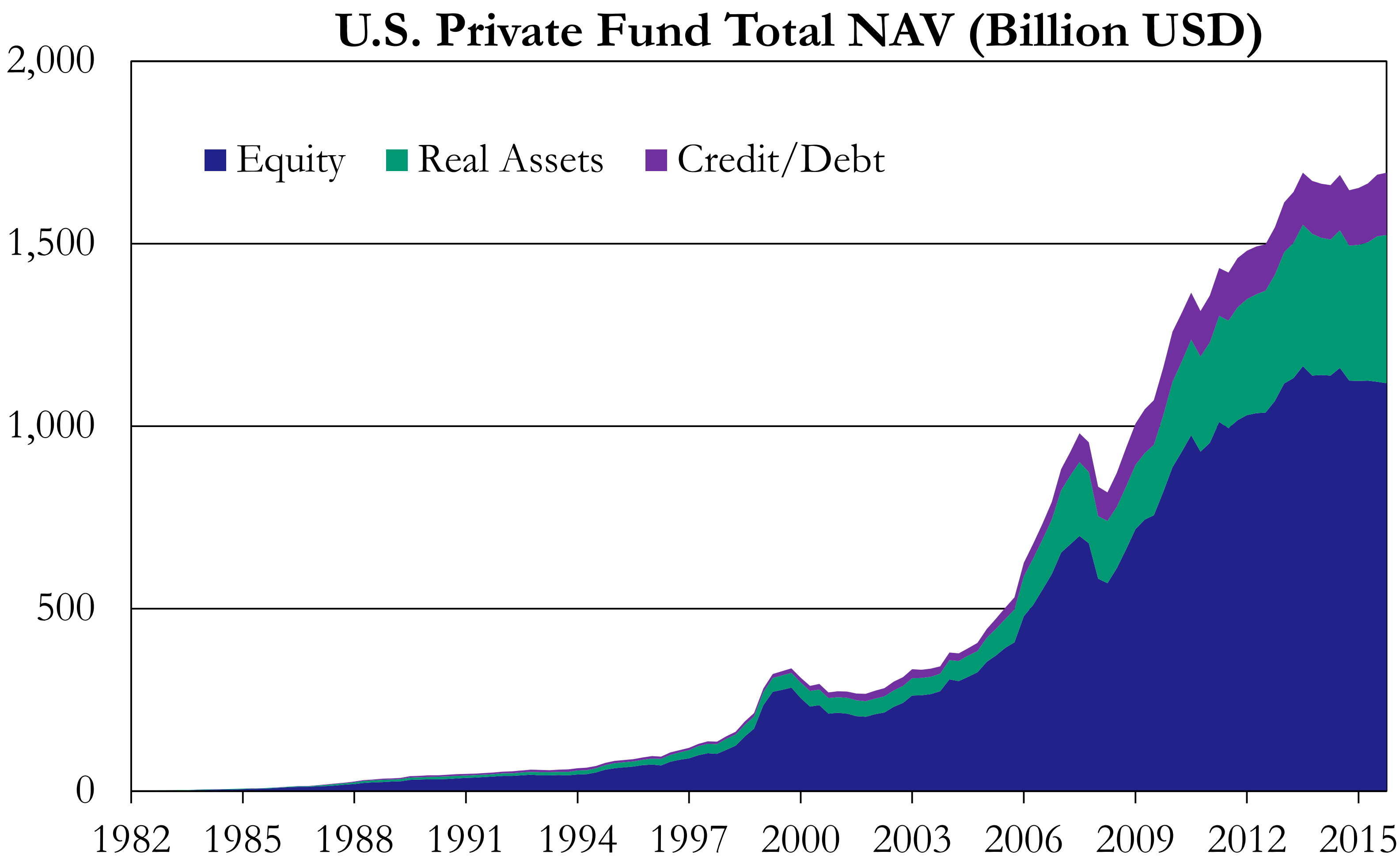
Source: BIS OTC derivatives statistics (Table D5.1).

Emergence of Private Fund Industry



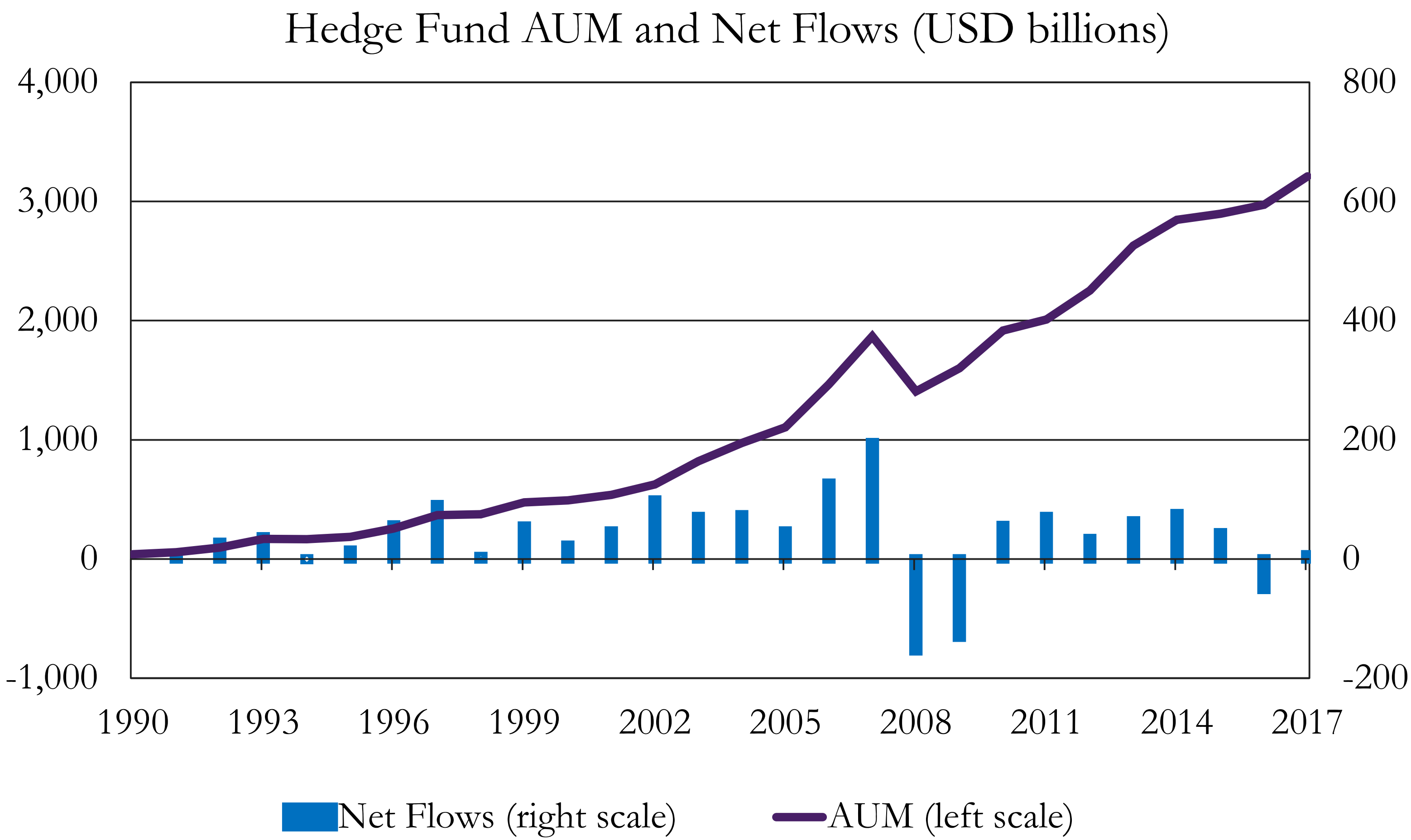
Source: Burgiss

Emergence of Private Fund Industry



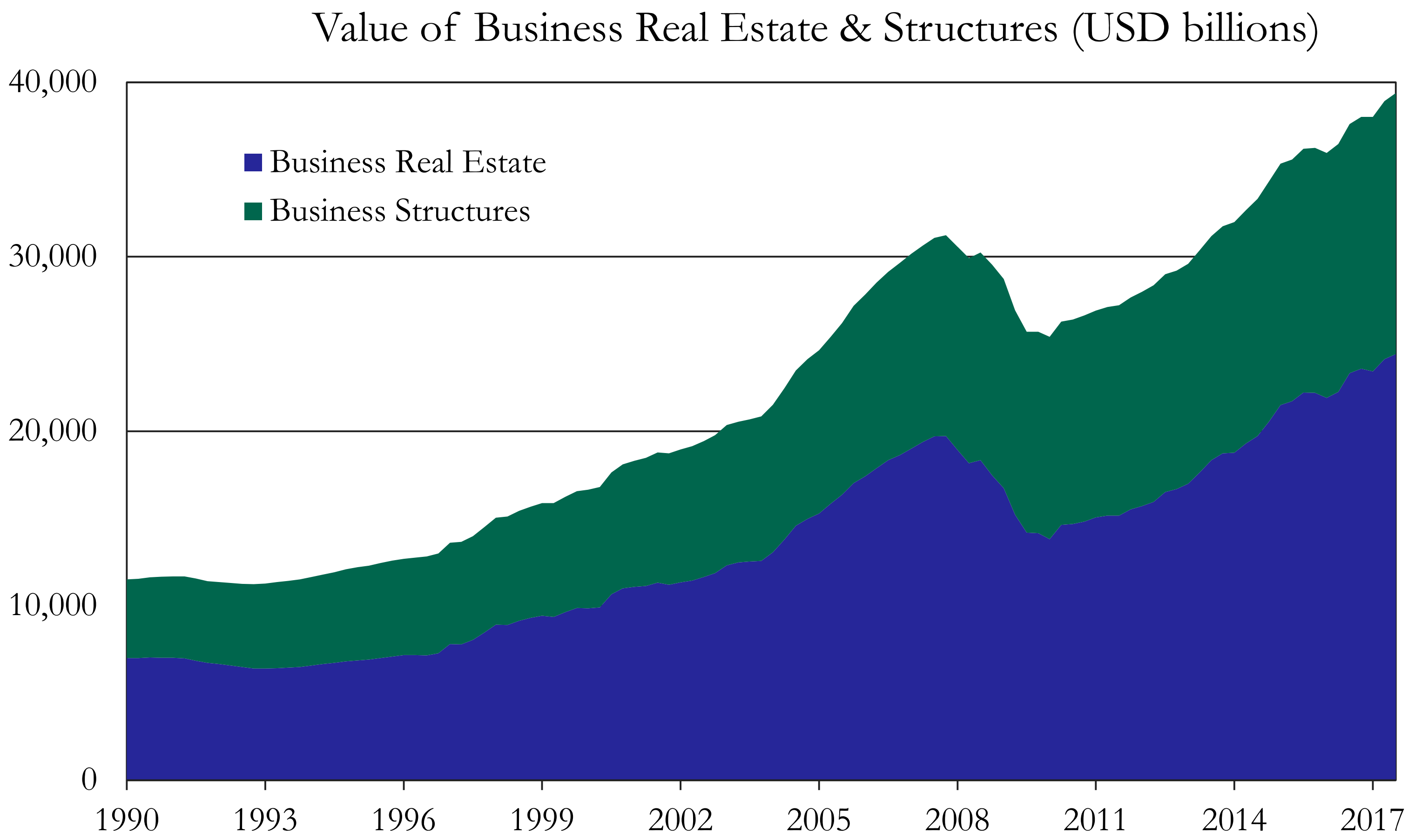
Source: Burgiss

Hedge Funds



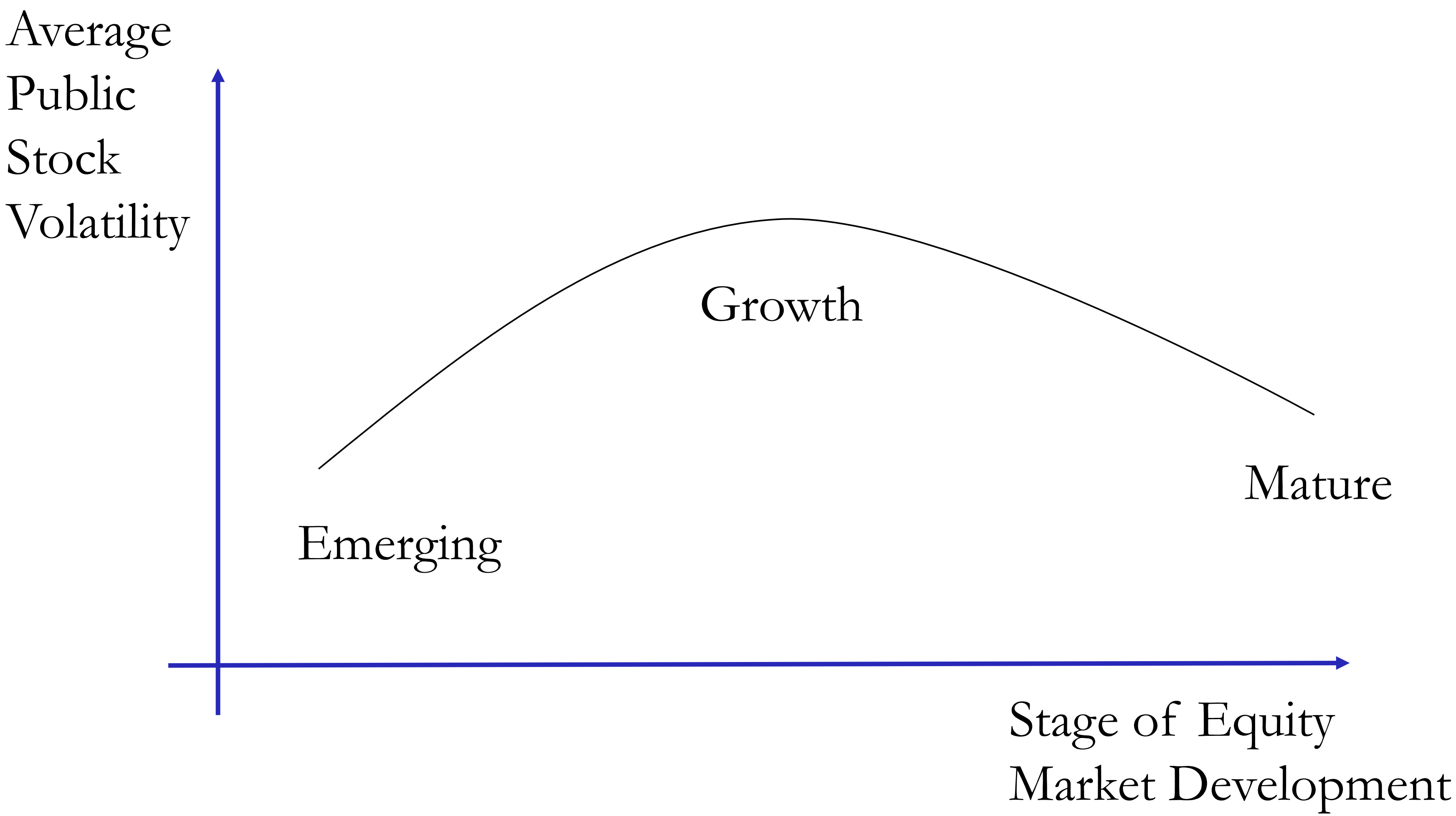
Source: HFR 2017 Global Hedge Fund Industry Report

Commercial Real Estate



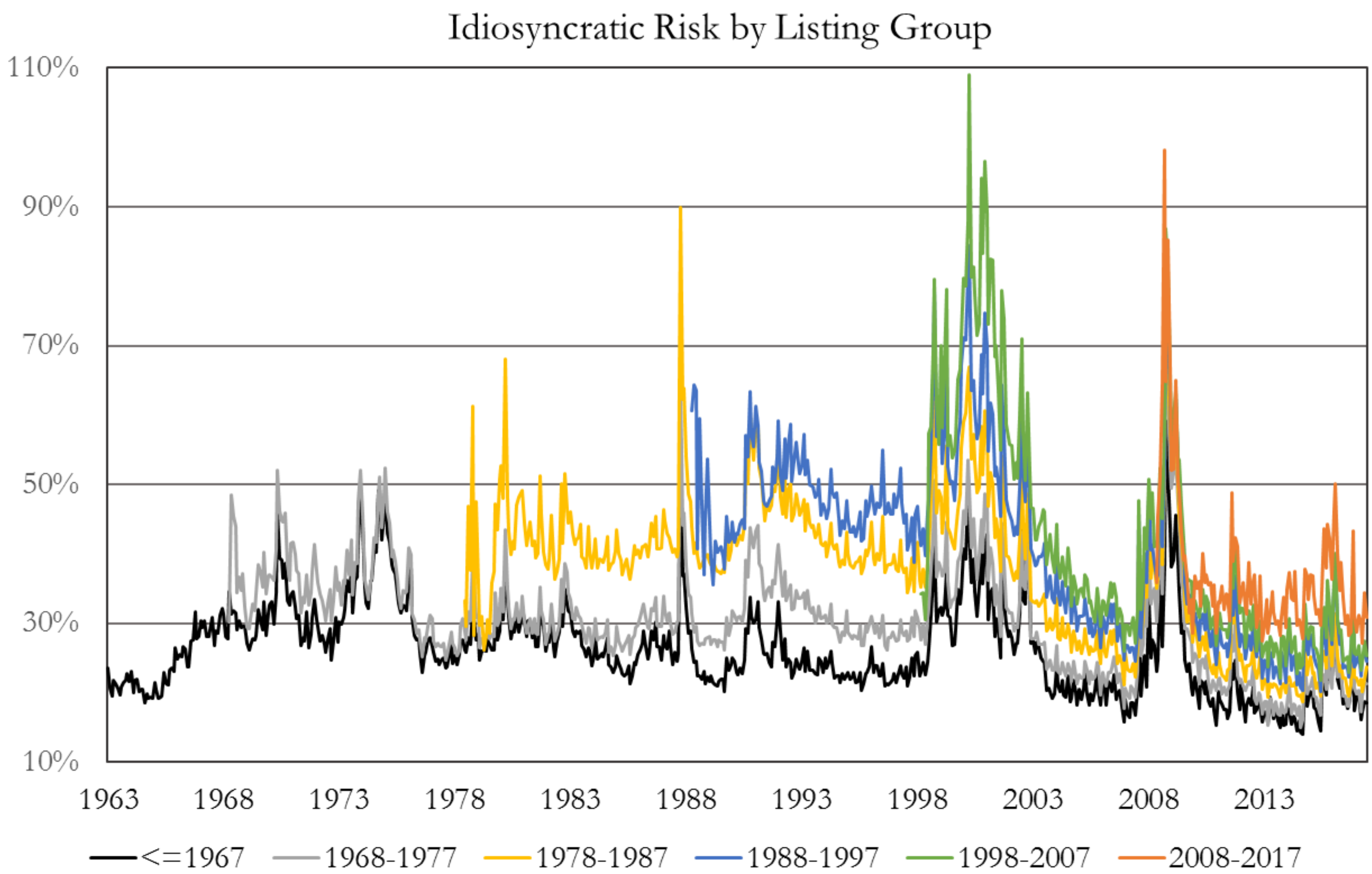
Source: FRB Flow of Funds Balance Sheet Tables B.100-B.103.

Arc of Public Company Risk



Bartram, Brown, and Stulz, Why Are U.S. Stocks More Volatile?, Journal of Finance, 2012, 67(4), 1329-1370.

U.S. Public Market Idiosyncratic Risk



Brown and Kapadia, Firm-Specific Risk and Equity Market Development, Journal of Financial Economics, 2007, 84(2), 358-388.
Bartram, Brown, and Stulz, Why Has Idiosyncratic Risk Been Historically Low in Recent Years?, ssrn.com/abstract=3107798.

IPO Decline is Driving Shift

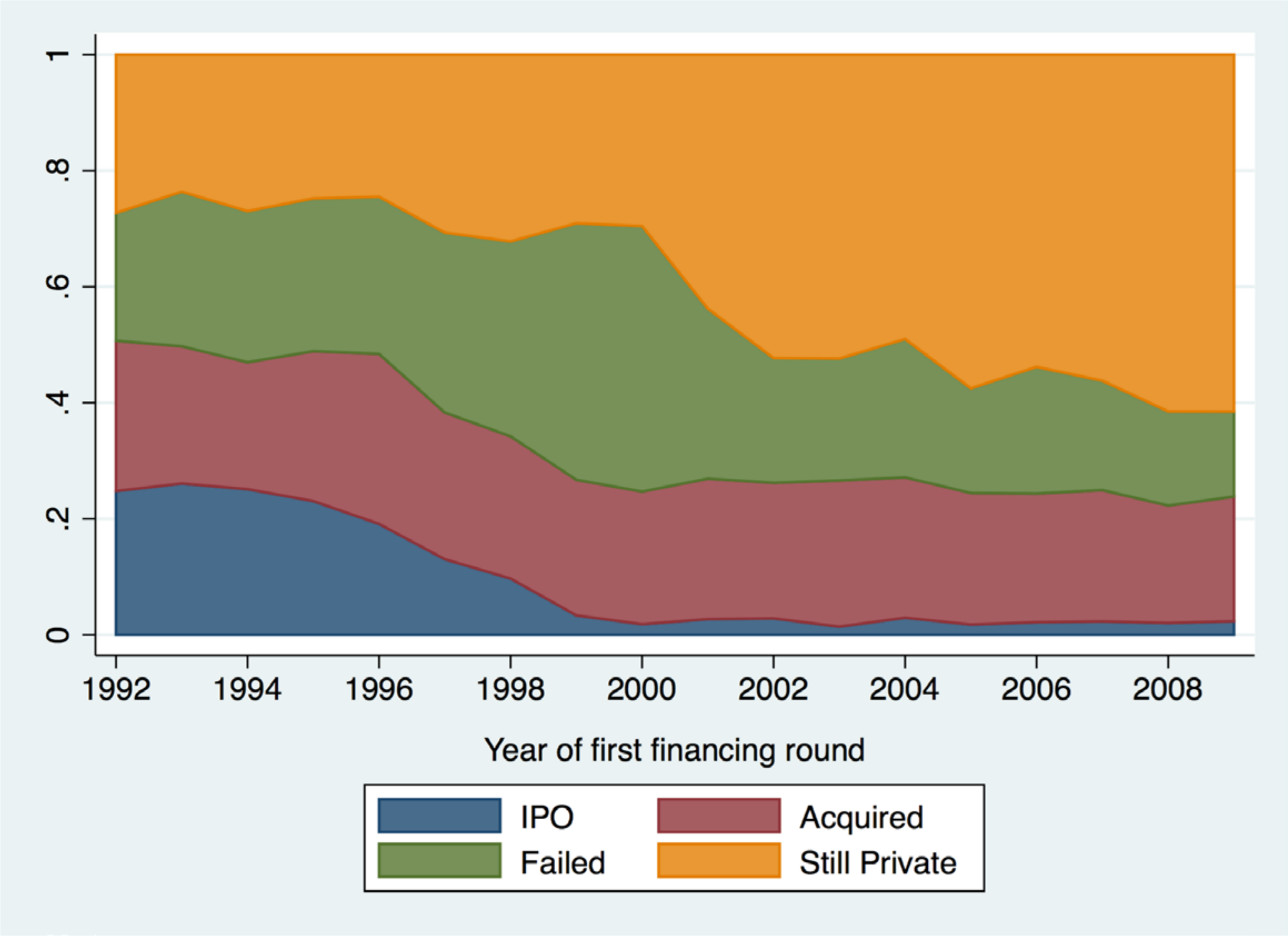
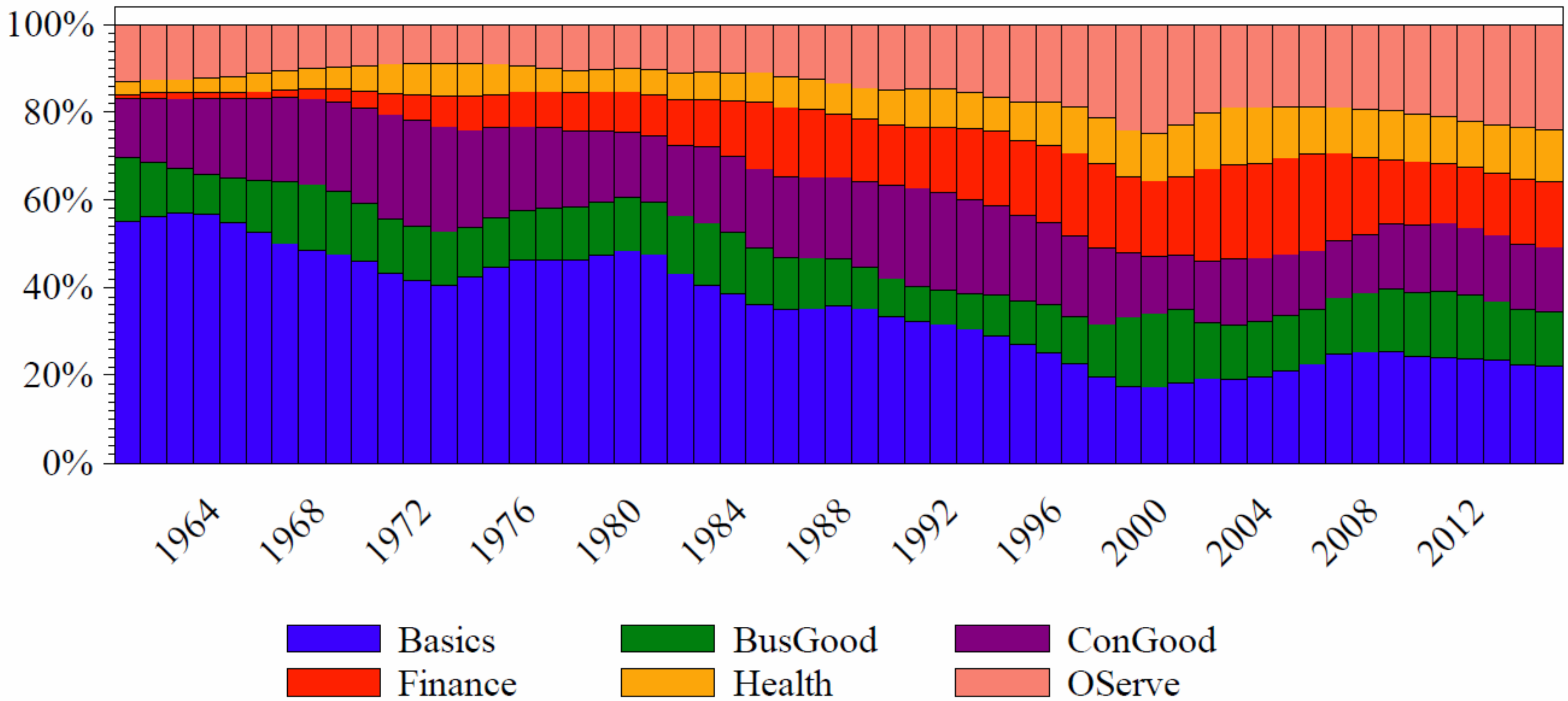


Figure is from, Ewens and Farre-Mensa, The Deregulation of the Private Equity Markets and the Decline in IPOs, ssrn.com/abstract=3017610

Changing Industry Composition of Public Companies



What Does this Mean for Investors?

- The facts raise some important questions & issues:
  1. Where are we in the evolution of "alternatives"?
  2. What does this mean for value (returns) and portfolio management?
  3. How do we allocate in an environment that is not like anything we have experienced for alternatives recently (ever really)?

- Even if "alpha" is zero, still beneficial to invest in assets that provide additional diversification
  - Hedge Funds, Private Equity, Private Credit, Real Assets, etc.

What Does this Mean for Investors?

Harder to do traditional portfolio allocation and optimization because market portfolio is unobservable and illiquid

1. Fully diversified portfolios require private component to access certain types of investments: size, growth, quality, etc.
    - Public market risk (especially industry and idiosyncratic volatility) driven by market development trends
    - Also other asserts: especially real assets.
2. Likely requires a rethinking of allocation that is more focused on <u>sectors</u> (at a minimum) and <u>factors</u> including private market / illiquidity risk
3. Delegation of investment timing with closed-end drawdown funds introduces additional source of uncertainty

The Case of Endowments

- University endowments were early adopters of alternatives
  - Many have high allocations: 50% for large endowments and 25% overall

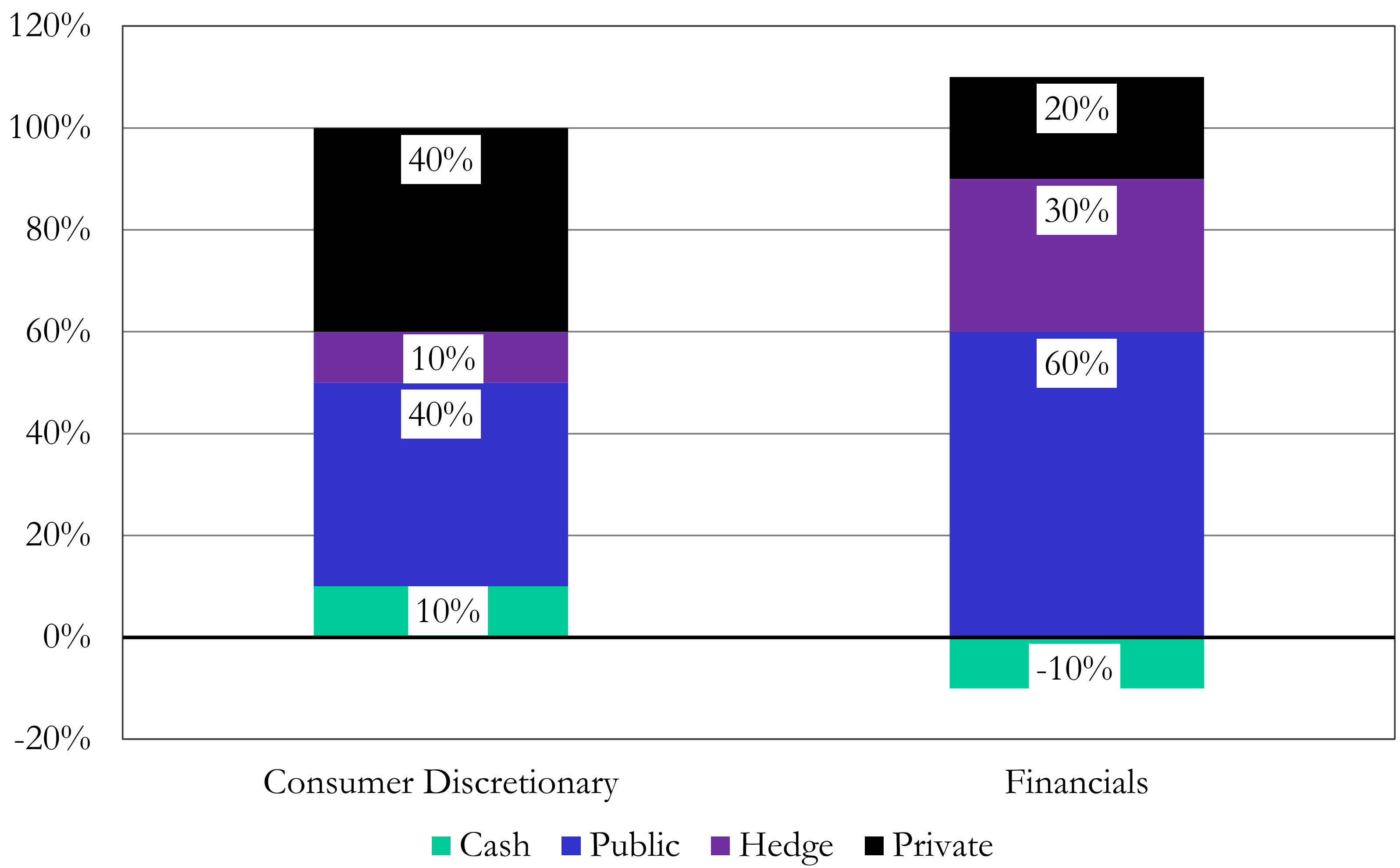
- Evidence using data for 12 years ending 2015 suggests:
  - Higher returns from larger allocation to alternatives
    - 1-2% per year more, true for large and medium endowments
  - Portfolios with more alternatives have lower risk and higher Sharpe ratios
    - Even after adjusting for illiquidity
  - Expert staff and knowledgeable boards help returns and Sharpe ratios
  - Caveat: Much of the higher return is attributable to venture capital where access is limited and scale is hard.
    - Alternatives lower risk for all sub-groups

See, "How do Financial Expertise and Networks Affect Investing? Evidence from the Governance of University Endowments," by Binfare, Brown, Harris, and Lundblad. ssrn.com/abstract=3187280

What's Needed for Implementation?

- A model for expected returns
- Sector attribution of investments
- Risk measures for each sector-group:
  - Liquid – e.g., public equities
  - Semi-liquid – e.g., hedge funds
  - Illiquid – e.g., private equity funds, co-invests and directs
- This is a well-posed (solvable) optimization problem
  - Though making it dynamic and explicitly modeling liquidity risk complicates it.

Revised Approach to Portfolio Optimization & Asset Allocation



For example, L'Her et al., A Bottom-Up Approach to the Risk-Adjusted Performance of the Buyout Fund Market, Financial Analysts Journal 72(4) discusses public and private sector allocations in buyouts.

Conclusions

- Evolution of financial intermediation mandates a rethinking of the portfolio management process

  ➔ Good reasons to be in private markets

  – And this doesn't rely on superior returns

- Feasible (but potentially complicated) implementation