WP/16/38

IMF Working Paper

Institutionalizing Countercyclical Investment: A Framework for Long-term Asset Owners

by Bradley A. Jones

INTERNATIONAL MONETARY FUND

 WP/16/38

IMF Working Paper

Monetary and Capital Markets Department

Institutionalizing Countercyclical Investment: A Framework for Long-term Asset Owners

Prepared by Bradley A. Jones[1]

Authorized for distribution by Daniel Hardy

February 2016

Abstract

Do portfolio shifts by the world's largest asset owners respond procyclically to past returns, or countercyclically to valuations? And if countercyclical investment (with both market-stabilizing and return-generating properties) is a public and private good, how might asset owners be empowered to do more of it? These two questions motivate this study. Based on analysis of representative portfolios (totaling $24 trillion) for a range of asset owners (central banks, pension funds, insurers and endowments), portfolio changes typically appear procyclical. In response, I suggest a framework aimed at jointly bolstering long-term returns *and* financial stability should: (i) embed governance practices to mitigate 'multi-year return chasing;' (ii) rebalance to benchmarks with factor exposures best suited to long-term investors; (iii) minimize principal-agent frictions; (iv) calibrate risk management to minimize long-term shortfall risk (not short-term price volatility); and (v) ensure regulatory conventions do not amplify procyclicality at the worst possible times.

JEL Classification Numbers: G11, G12, G23, G28.

Keywords: Asset Allocation, Financial Stability, Asset Owners, Momentum, Risk Management.

Author's E-Mail Address: bjones@imf.org

[1] The author is grateful for feedback from seminar participants at the University of California's Center for Analytical Finance (Santa Cruz), the UBS Asset Management Sovereign Investment Conference (Chicago), the IMF's Sovereign Asset Management seminar (Singapore), and the CFA Advisory Board Annual Meeting (Washington). The author is especially indebted for the detailed comments provided by Nicolas Arregui, Daniel Hardy, Miguel Savastano (all IMF), and Arun Muralidhar (George Washington University).

CONTENTS **PAGE**

I. INTRODUCTION

> *"It is the long-term investor, he who most promotes the public interest, who will in practice come in for most criticism, wherever investment funds are managed by committees or boards or banks. For it is in the essence of his behavior that he should be eccentric, unconventional and rash in the eyes of average opinion. If he is successful, that will only confirm the general belief in his rashness; and if in the short run he is unsuccessful, which is very likely, he will not receive much mercy."*
>
> - John Maynard Keynes, 1936

To the extent that the willingness to bear risk diminishes in periods of stress and increases in upturns, procyclical investment can amplify market movements and contribute to feedback loops that are potentially detrimental to financial stability and long-term economic growth. The Financial Stability Forum (2009, p. 8-10) notes that "mutually reinforcing interactions … between the financial and real sectors of the economy … tend to amplify business cycle fluctuations and cause or exacerbate financial instability." The Bank of England (hereafter, BoE, 2014, p. 4) suggests that procyclicality "can decrease the resilience of the financial system and thereby potentially contribute to serious interruptions in the vital functions which the financial system as a whole performs in the economy." Industry forums have pointed to the pernicious impact of "quarterly capitalism," arguing that "the relentless focus on short-term performance and hypersensitivity to the current news cycle … undermines corporate investment, holds back economic growth, and lowers returns for savers" (Focusing Capital on the Long-term Initiative, hereafter FCLTI, 2015, p. 3).

The World Economic Forum (2011, p. 9) cite three constituencies that stand to benefit from a greater emphasis on long-term countercyclical investment:[2] *asset owners* who might enjoy better returns by accessing risk premiums the rest of the market eschew; *corporations* who can more easily obtain financing for strategic initiatives with large upfront costs but significant long-term payoffs (i.e. infrastructure); and *broader society* by mitigating the volatility and dislocations wrought by boom-bust asset cycles. Narrowing the focus to the implications of the advancing tide of "short-termism" among large asset owners and corporations, Barton and Wiseman (2014) contend:

> "*Too many of these major players are not taking a long-term approach. They are failing to engage with corporate leaders to shape the economy's long-range course. They are using short-term investment strategies designed to track closely with benchmark indices. And they are letting their investment consultants pick external asset managers who focus mostly on short-term returns. To put it bluntly, they are not acting like asset owners. The result has been … herd behavior, excess volatility and bubbles. This in turn results in corporate boards and management making suboptimal decisions for creating long-term value*."

[2] For the purposes of this paper, reference to "countercyclical" investment is made in the general context of leaning against multi-year trends, possibly where asset valuations become stretched vis-à-vis historical norms. Reference to "long-term" investment is made in the context of liabilities maturing more than a year in advance (in practice, rebalancing needs, liquidity management, risk-management, and ensuring portfolios remain compliant with investment policy guidelines, can all result in a holding period shorter than originally intended).

Dampening procyclicality in the banking sector has emerged as a key area of focus for policy makers in recent years,[3] but the issue of procyclicality, as it relates to institutional investors, has received much less attention. Related analysis has tended to concentrate almost exclusively on asset *managers* rather than underlying asset *owners* and the consultants who advise them (see for example, Financial Stability Oversight Council, 2013; Feroli and others, 2014; IMF, 2015; Financial Stability Board, 2015).[4] As Papaioannou and others (2013, p. 5) acknowledge, "global and national financial sector regulation and supervision have yet to play a significant role in restraining such risks to the global financial system." In the context of financial stability, the paucity of attention paid to institutional (non-bank) asset owners—a group including pension funds, insurers, sovereign wealth funds, central banks, and endowments—is somewhat surprising given: asset owners have at their disposal a pool of assets larger than banks, and the gap is widening;[5] only 25 to 35 percent of financial (excluding real estate) wealth worldwide is estimated to be managed via asset management firms—the majority is invested directly by asset owners themselves (McKinsey & Company, 2013; Jones, 2015; IMF, 2015); and large strategic shifts in capital over multi-year periods are the purview of asset owners and the consultants advising them, not asset managers.

Indeed, often lost in the discussion of financial stability risks posed by asset managers is that most have limited input (especially relative to consultants) in the strategic asset allocation of asset owners. Much of the asset management industry is dedicated to providing implementation services, that is, vehicles through which institutional asset owners express their investment objectives formulated by investment committees pursuant with board directives (see Box 1). Funds in which asset managers are afforded considerable discretion over allocations to asset classes and geographies represent a minority of invested assets. In the open-end mutual fund industry for instance, which oversees almost eighty percent of worldwide assets invested through collective investment schemes,[6] asset managers typically have discretion over tactical adjustments vis-à-vis pre-set benchmarks pertaining to a single asset class and region. These tactical deviations are usually constrained by pre-agreed limits

[3] Because standard capital provisioning practices can lead banks to ease (tighten) lending standards in a boom (bust), the Basel Committee on Banking Supervision has, for instance, proposed measures (such as countercyclical capital buffers) explicitly designed to lean in the opposite direction.

[4] The World Economic Forum (2011), the G20-OECD Task Force on Institutional Investors and Long-term Financing (2012), and the Bank of England (2014) have each examined the issue in recent times. However the role of asset owner and asset manager in achieving this end is sometimes conflated, and no quantitative analysis of procyclical investment behavior is presented. Outside of the formal policy making community, the FCLT Initiative, jointly established by the Canada Pension Plan Investment Board and McKinsey & Company, has also discussed measures to catalyze more long-term investment by corporations and institutional asset owners.

[5] As of December 2013, assets held by the world's largest 500 banks stood at US$97.1 trillion. By comparison, non-bank asset owners—pension funds, insurers, central banks, sovereign wealth funds, endowments, foundations and retail—oversee almost double this amount. Since the global financial crisis, the stock of bank assets have grown at a considerably slower pace than that of invested financial assets (Jones, 2015).

[6] Collective investment schemes include mutual funds (closed and open-end), money market funds, exchange traded funds, hedge funds, private equity funds, and other alternatives; see Jones (2015) for a recent breakdown.

('tracking error').[7] It would therefore seem "inappropriate and ineffective for asset managers to be viewed as responsible for actions that are essentially just the passing through of end-investor decisions" (Elliott, 2014, p. 1). Furthermore, to the extent that asset managers amplify procyclicality in their tactical decisions, it can often be a response to the (short-term) performance appraisal terms imposed on them by asset owners and their consultants. Because asset owners and their consultants have imperfect knowledge about the ability of investment agents (as managers operate in a high-noise, low-signal environment which makes it difficult to distinguish skill from luck), they may interpret a period of underperformance vis-à-vis peers or a momentum-biased capitalization-weighted benchmark as a sign of manager incompetence: as the underperformance grows, principals are likely to conclude their agents are unskilled and thus terminate them in favor of outperforming peers holding securities with strong momentum. In short, distinguishing the actions of asset owners and asset managers is important to the formation of policies designed to ameliorate risks to economic and financial stability stemming from procyclical investment behavior.[8]

Box 1. Characteristics of Asset Owners, Consultants and Asset Managers

The role of asset owners and asset managers has often been conflated in discussions of financial stability and systemic risk, while that of consultants has barely been acknowledged. Unlike consultants and asset managers, asset owners are principals with legal ownership over assets and put their own balance sheet at risk. They have discretion over the strategic asset allocation of the portfolio, the frequency and mode of rebalancing, and the proportion of assets that are managed internally or through external managers.

	Asset Owners	Consultants	Asset Managers
Legal Ownership over Assets	Yes (Principal)	No (Agent)	No (Agent)
Legal Responsibilities	Required to represent the interests of stakeholders pursuant with board directives and/or regulatory guidelines	Required to act as a fiduciary to clients	Required to act as a fiduciary to clients - investment decisions are pursuant with guidelines in investment management agreement or fund constituent documents
Key Functional Responsibility	Discretion over strategic asset allocation, proportion of assets managed internally vs. externally, and manager selection	Advisory and due diligence services for asset owners on manager selection, risk management and strategic asset allocation	Funds management on behalf of asset owners, usually tactical deviations vs. predetermined benchmarks
Solvency risk	Yes	No	Not usually (aside from hedge funds and private equity)

Source: Author and Novick and others (2014).

[7] Just eight percent of assets under management (or $1.2 trillion) in the U.S. mutual fund industry are invested through 'hybrid funds' (a mix of stocks and bonds), some of which have fixed or predetermined asset allocation weights independent of market conditions (i.e. target date retirement funds, which increasingly allocate capital to bonds as the maturity date approaches). Even in the hedge fund industry, which accounts for five percent of worldwide assets managed via collective investment vehicles, funds operating across multiple asset classes and regions collectively oversee just $450 billion, around one fifth of hedge fund assets under management.

[8] For a recent discussion of financial stability implications associated with collective investment vehicle design (such as the first mover advantage embedded in money market funds with a constant NAV), see IMF (2015).

The relatively small literature on asset owner investment characteristics has often had a qualitative and anecdotal flavor, concentrated on high frequency money flows around specific events (i.e. crises). Papaioannou and others (2013) and Ang and Kjaer (2011) discuss selected examples of herding behavior by asset owners during the global financial crisis. Pihlman and van der Hoorn (2010) find central bank reserve managers to have pulled more than US$500 billion of deposits from the banking sector between December 2007 and March 2009, thus putting strain on major central banks at the worst possible time. BoE (2014) qualitatively infer procyclical investment among life insurers in the U.S., UK and France. Ang and Kjaer (2011, p. 94) broadly suggest that while "long-horizon investors have an edge … unfortunately, the two biggest mistakes of long-horizon investors—procyclical investments and misalignments between asset owners and managers—negate the long-horizon advantage."[9]

Although 'procyclical return-chasing at multi-year horizons' has been labeled one of the "premier vices" of long-term investors (Ang and Kjaer, 2011; AQR, 2014),[10] there has been little formal analysis of style biases across different types of asset owners. Ang and others (2014) find evidence of procyclicality based on surveys of investment intentions of U.S. corporate pension funds. Blake and others (2015) find that UK defined-benefit pension funds display strong peer-group herding behavior, consistent with the notion of 'reputational' herding. Other studies have documented the timing of hiring and firing decisions of external managers by institutional plan sponsors to be procyclical, and that after termination, managers tend to perform at least as well as those that replaced them (Heisler and others, 2007; Goyal and Wahal, 2008; Stewart and others, 2009). Nonetheless, key questions remain. As Ang and others (2014) note, while there have been many studies of return attribution, almost none have directly examined the impact of past returns on asset allocation. Do changes in asset allocations reflect passive drift in response to current year returns, active performance chasing after multi-year outperformance, or countercyclical rebalancing? Do valuations determine changes to the portfolio mix? And are these patterns consistent across different classes of asset owners? This study attempts to shed some light on these questions.

Even if the investment behavior of asset owners might amplify procyclicality, the broader policy question is what, if anything, should and could be done about it. To the extent such behavior reflects a market failure and gives rise to clear negative externalities, policy intervention might be warranted. Alternatively, it may be more appropriate for remedial action to be industry-led. One precedent in the pursuit of a 'double bottom line' by investors (i.e. where the objective function is to advance the private and public interest) can be found in the 'socially responsible investment' movement: without prodding from regulators, many asset owners are now examining how best to refine investment practices in order to mitigate

[9] Related studies have alluded to procyclicality based on investors earning much lower dollar-weighted returns than time-weighted returns, but without revealing their identity (Dichev, 2007; Friesen and Sapp, 2007).

[10] Procyclical return chasing in this context refers to investors shifting portfolio allocations toward (away from) asset classes that have performed strongly (poorly) over recent years. For analysis of the long-term reversal patterns in asset class returns that can result in multi-year performance chasing impairing investment returns, see most recently, Moskowitz and others (2012), Ang and others (2014), and Baltas and Kosowski (2015).

externalities from an environmental or governance perspective, without sacrificing investment performance. Moreover, an implicit dual mandate already exists for a number of central banks and macro stabilization-based sovereign wealth funds. In such instances, the objective function includes generating sufficient returns to cover liabilities, and contributing to stability (or at least not contributing to instability) in the financial system.

This paper is structured along two dimensions, empirical and policy-related. The point of departure for the empirical analysis is Ang and others (2014), who examine patterns in U.S. corporate pension fund asset allocations. I build on this research by: examining the behavior of many types of asset owners (global central banks, U.S. private and public pension funds, U.S. life insurers, and U.S. endowment funds) who collectively oversee a large pool of assets ($24 trillion as of December 2014); analyzing actual portfolio shifts rather than intended shifts based on investor surveys; mapping changes (rather than levels) in asset allocation weights onto relative (rather than absolute) asset returns; and adjusting for valuations when examining the response of asset class weights to contemporaneous and past returns.

Based on almost a quarter century of annual data, the main findings of the empirical analysis are as follows. First, the asset allocation decisions of various types of asset owners appear to be procyclical at a multi-year horizon. Second, this procyclicality takes two forms of roughly equal importance—a failure to rebalance in the current year (i.e., allowing portfolio weights to drift in line with relative returns), and longer-term performance chasing. Third, among asset classes, procyclical investment behavior appears most evident for equities.

In the second part of the paper, I outline a framework to catalyze more market-stabilizing investment behavior among long-term asset owners. The ability to invest long-term is often considered an advantage *ex-ante*, but asset owners often do not have an effective set of processes in place to help them realize this aim. As a recent survey of private and public pension funds concluded, asset owners believe "conceptually and aspirationally (that) long-horizon investing is a valuable activity for both society and their own fund; however, there is a significant gap between aspiration and reality to be bridged" (Ambachtsheer and McLaughlin, 2015, p. 3). The OECD (2014, p. 1) has similarly attributed the inability of institutional investors to provide the type of long-term countercyclical financing that would benefit the private and public interest to "structural and policy barriers" requiring "a transformational change in both government and investor behaviors".

The framework I propose comprises five main elements (four of which are to be industry-led). First, governance practices could be strengthened by imposing minimum financial literacy accreditation standards for trustee appointments, ensuring there is accountability over the implementation (not just the articulation) of the policy statement, and educating stakeholders on the motivation behind (and range of likely interim losses associated with) accepting certain types of risks in order to mitigate costly 'knee-jerk' reactions. Second, benchmarks should be heterogeneous (based on the unique liability and risk factor profile of asset owners), and enable asset owners to add value by tilting portfolios toward the types of risk premia for which they are best suited (i.e., illiquidity, volatility and distressed value) and would also be market-stabilizing. Third, the impact of principal—agent frictions should be minimized, by ensuring long-term incentives are appropriately aligned. Fourth, risk

management should be focused on minimizing long-term shortfall risk (rather than short-term price volatility),[11] which can arise from taking too much risk as too little. Finally, regulatory conventions must ensure they do not amplify procyclicality at the worst times.

The rest of the paper is organized as follows. Section II provides a taxonomy of long-term institutional asset owner characteristics. Section III presents the empirical analysis designed to shed light on the factors determining asset allocation shifts. The framework aimed at encouraging more countercyclical investment is outlined in Section IV. Section V concludes.

II. Institutional Asset Owners – Taxonomy and Data Description

The analysis in this study is based on a diverse set of non-bank institutional asset owners overseeing a combined total of $24.2 trillion in assets (as of December 2014), namely global central banks ($6.6 trillion), U.S. private pension funds ($7.0 trillion), U.S. public (state and local) pension funds ($3.8 trillion), U.S. life insurers ($6.3 trillion), and U.S. endowments and foundations ($0.5 trillion). Institutional differences are reflected in various ways: overarching investment objectives and charters, risk tolerance, liability structure, liquidity needs, regulatory constraints, accounting conventions, performance assessment, and financial stability responsibilities, among other considerations (Table 1).

Table 1. Taxonomy of Long-term Institutional Asset Owners

Asset Owners:	Nature of Liabilities	Short-term Liquidity Needs	Regulatory Constraints	Peer Pressure	Financial Stability Responsibilities
Central Banks	Explicit	Med/High	Low	Med/High	High
Macro-Stabilization SWFs	Contingent	Medium	Low	Low	High
Intergenerational-Savings SWFs	Implicit	Low	Low	Medium	Med/Low
Defined-Benefit Pension funds	Explicit	Low	High	Med/High	Low
Defined-Contribution Pension funds	Implicit	Med/Low	Med/High	Med/High	Low
Life Insurers	Explicit/ Contingent	Med/Low	High	Medium	Low
Endowments	Implicit	Low	Low	Med/High	Low

Source: Author
Notes: Sovereign Wealth Funds are not explicitly discussed in this paper, but are included in the table for reference purposes to round out the universe of long-term, non-bank institutional asset owners. For a recent discussion of regulatory and asset allocation trends across asset owners, see Papaioannou and others (2013), Novick and others (2014), and BoE (2014).

For each class of asset owner, the analysis uses aggregate data (time series of comparable length for individual owners are unavailable). Asset class weights, benchmark returns and investment yields are compiled for each asset owner as per below.

[11] Shortfall risk refers to the risk that realized investment returns fall below the asset owner's ultimate objective.

- *Global central banks*—asset allocation data are based on foreign official portfolio holdings of long-term U.S. securities sourced from the US Treasury Department's International Capital (TIC) System, covering the period June 1989 to June 2014. Official sector gold holdings are sourced from the IMF's International Financial Statistics database, covering the period June 1983—June 2014. Benchmark returns and investment yields are based on the following: Barclays 7-10 year maturity Treasury index (fixed income), Barclays U.S. Aggregate Agency index (agency debt), Barclays U.S. Aggregate Credit index (corporate debt), S&P500 index (equities), and the London gold fix in $/troy ounce (gold);[12]
- *Private and public U.S. pension funds, and U.S. life insurers*—asset allocation data from December 1989 to December 2014 are sourced from the U.S. Federal Reserve's Z.1 'Financial Accounts of the United States' publication. Pension data includes both defined contribution and defined benefit funds.[13] Benchmark returns and investment yields are based on the Barclays U.S. Aggregate Index (fixed income), and the MSCI All Country World index (equities);
- *U.S. Endowment Funds*—asset allocation data from June 1993 to June 2014 are sourced from the National Association of College and University Business Officers—Common fund survey of endowment funds. Benchmark returns and investment yields are based on the following: the Barclays Global Aggregate index (fixed income), the MSCI All Country World index (equities), the National Council of Real Estate Investment Fiduciaries Property index (real estate), the Cambridge Associates Private Equity index (private equity), and the Hedge Fund Research Fund-Weighted Composite index (hedge funds).[14]

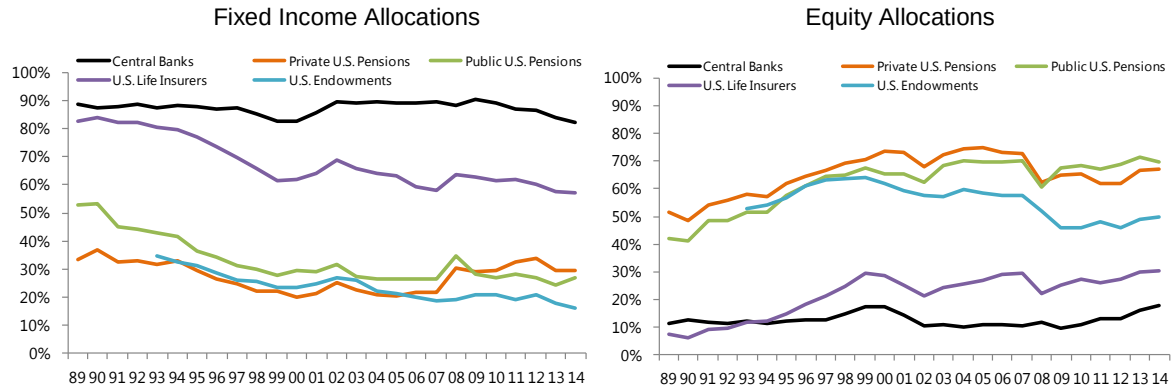
Figure 1 shows the evolution of portfolio weights for the two major asset classes (fixed income and equity) for each asset owner covered in this study. Descriptive statistics for annual changes in portfolio weights for a full set of asset classes are presented in Annex 1.

[12] For the investment yield on gold, the 12-month gold forward offered rate (a proxy for lease rates) recorded by the London Bullion Market Association is used. It represents an international standard rate at which dealers lend gold on a swap basis against US dollars, providing the foundation for the pricing of gold swaps, forwards and leases. Broadly speaking, it tends to track LIBOR over time.

[13] As at end-2014, defined contribution plans comprised 64 percent of private U.S. pension fund assets, vis-à-vis 10 percent of public (state and local government) pension fund assets.

[14] Only two asset classes in the data set—the hedge fund and private equity allocations of endowment funds—do not have observable data for investment yields. In the case of hedge funds, these were computed using a rolling regression (based on five years of monthly returns) of Hedge Fund Research Fund-Weighted Index returns on a constant and world equity and bond returns. The constant terms captures 'hedge fund alpha,' while the coefficients on the terms for world equity and bond returns are multiplied by the expected real yield for the respective asset class. Prospective yields are re-estimated each year. In the case of the private equity yield, we follow a similar methodology using the Cambridge Associates Private Equity index, where the explanatory variable is the U.S. equity risk premium (capturing the difference in the cost of leverage and return on equity).

Figure 1. Asset Owner Portfolio Weights, 1989—2014



Source: US Treasury Department, U.S. Federal Reserve, NACUBO—Commonfund.

III. Asset Owners and Asset Allocation Changes: Pro—or Countercyclical?

The empirical analysis attempts to shed light on the extent to which representative portfolio weights of large asset owners change from one year to the next in response to relative asset returns (measured across different periods) and relative valuations. Portfolio weights that respond positively to asset returns could reflect the impact of either 'passive drift'—where a fund eschewing rebalancing its portfolio by year-end will have asset class weights that inherit relative asset class returns during the year[15]—or 'active return chasing' in response to past returns. Alternatively, where portfolio allocations respond directionally to relative valuations (expressed in real yield terms), it may be evidence of countercyclical investment behavior.

To ascertain the impact on portfolio allocations of contemporaneous relative returns, past relative returns, and relative valuations, the following time series regression is estimated (with annual data) for each individual asset class and asset owner:

$$d(Asset\ Allocation\ Weight)_{a,t:t-1} = \beta_0 + \beta_1\left(BM_{a,t:t-1} - \frac{1}{\mathrm{N}}\sum_{\mathrm{j=b}}^{\mathrm{n}} BM_{j,t:t-1}\right) + \beta_2\left(BM_{a,t-1:t-2} - \frac{1}{\mathrm{N}}\sum_{\mathrm{j=b}}^{\mathrm{n}} BM_{j,t-1:t-2}\right) + \beta_3\left(BM_{a,t-2:t-5} - \frac{1}{\mathrm{N}}\sum_{\mathrm{j=b}}^{\mathrm{n}} BM_{j,t-2:t-5}\right) + \beta_4\left(BM_{a,t-5:t-10} - \frac{1}{\mathrm{N}}\sum_{\mathrm{j=b}}^{\mathrm{n}} BM_{j,t-5:t-10}\right) + \beta_5\left(Yield_{a,t-1} - \frac{1}{\mathrm{N}}\sum_{\mathrm{j=b}}^{\mathrm{n}} Yield_{j,t-1}\right) + e_{a,t}$$

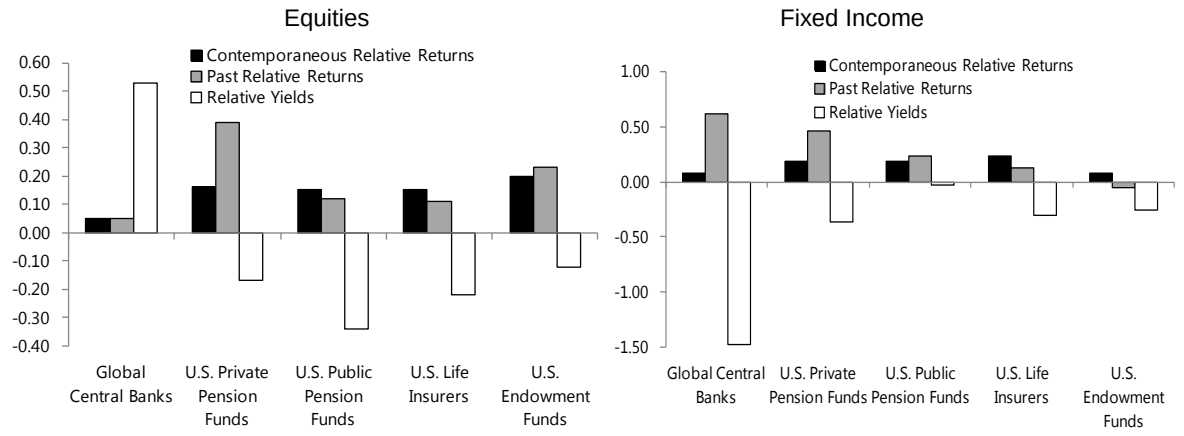
where $d(Asset\ Allocation\ Weight)_{a,t:t-1}$ is the annual change in portfolio weight for asset class *a* between year *t* and *t-1*; β_0 is a constant. The terms associated with the coefficients

[15] The impact of the 'drift' will be constrained by institutional rebalancing bands that trigger automatically.

$\beta_1, \beta_2, \beta_3$ and β_4 represent the relative return between asset class *a* and the average of other *j* asset classes in the portfolio, measured over different time horizons (β_1 picks up contemporaneous relative returns; β_2 picks up relative returns with a lag of one year, i.e., from year *t-1* to *t-2*; β_3 picks up relative returns from year *t-2* to *t-5*, and β_4 picks up relative returns from year *t-5* to *t-10*).[16] Finally, the coefficient β_5 captures the effect of real yield differentials between asset class *a* and the average yield across other *j* asset classes at year *t-1*.[17] Intuitively, a positive β_1 term suggests that portfolio weights move directionally with contemporaneous relative asset class returns (i.e., the asset owner does not rebalance back to previous year weights); the terms β_2 to β_4 reflect the impact of past relative returns (measured with different lags) on changes in portfolio weights; and the term β_5 indicates whether relative real yields drive subsequent changes in portfolio weights.

The key results from the above regression are summarized in Figures 2 and 3, and presented in more detail in Tables 2—4. The results reported in Figure 2 suggest that directional changes in asset allocation weights (both for equities, left hand panel, or fixed income, right hand panel) are positively related to contemporaneous and past relative returns, and negatively related to relative yields. Irrespective of investor type, the asset allocation weight for stocks tends to rise when equities outperform other asset classes in the portfolio in the current and prior years (black and grey bars respectively), but is inversely related to the real yield on equities vis-à-vis other asset classes (with the sole exception for central banks). A broadly similar pattern is evident in fixed income allocations: portfolio weights respond positively to contemporaneous and past relative returns, but inversely to relative real yields.

Figure 2. Coefficients from Regression of Asset Allocation Shifts on Past Returns and Yields



Notes: Black bars depict the β_1 coefficient in the regression of annual changes in asset class weights on contemporaneous relative returns (see page 11). Grey bars depict the sum of the β_2, β_3 and β_4 coefficients which measure the impact of past relative returns (from year *t-1* to *t-2*, *t-2* to *t-5*, and *t-5* to *t-10* respectively) on annual changes in asset class weights. White bars depict the β_5 coefficient measuring the impact of relative asset valuations (real yields) on changes in asset class weights.

[16] Long look-back periods are included to capture the notoriously slow-acting nature of investment committees.

[17] Real prospective yields are defined as the nominal yield less 10-year ahead measure of inflation expectations from the median Consensus Economics forecast. For equities, the cyclically adjusted earnings yield is used. Real yields for other asset classes are based on their nominal yield, minus 10-year ahead inflation expectations.

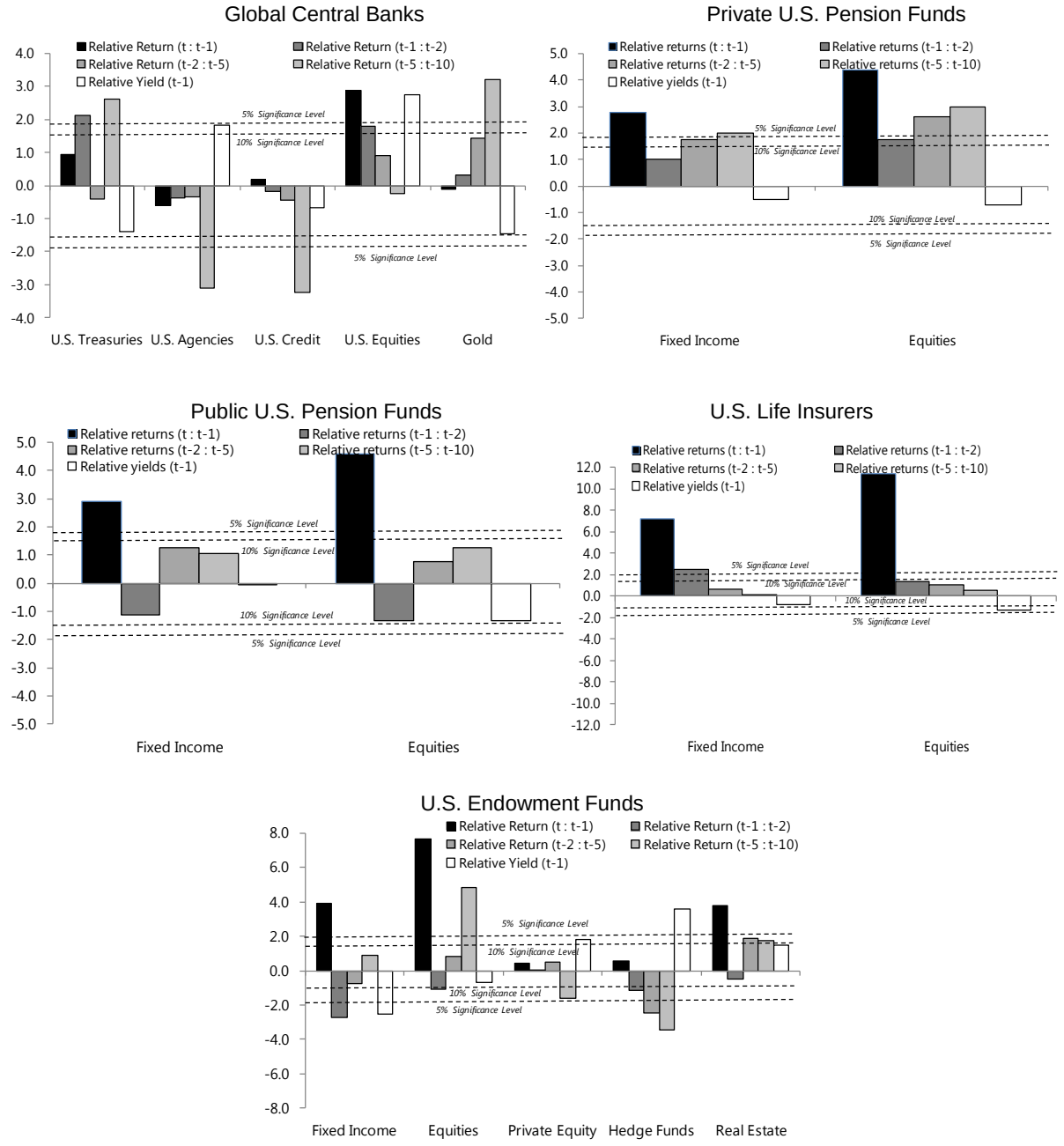
A more complete set of results for the full range of asset classes are reported in Figure 3, Tables 2—4, and Annex 2. Figure 3 plots the Newey-West adjusted t-statistics for each regression coefficient across asset owners and asset classes (to aid in the visual interpretation, negative t-statistics reflect negative coefficients). Tables 2—4 report the regression results in more detail. Annex 2 displays scatter plots of the actual vis-à-vis model-fitted annual changes in portfolio weights for each investor type and asset class**.** The main results are as follows:

- *Relative Returns.* Of the 56 estimated coefficients associated with relative returns as a driver of portfolio changes, 22 are statistically significantly positive (at higher than the 10 percent level), broadly evenly divided between contemporaneous and past year returns. By contrast, just 4 estimated coefficients are statistically significant and negative. These results suggest both a passive and active dimension to changes in asset allocation—that is, portfolio weights drift directionally with relative returns in the current year, with more active return chasing occurring in response to prior year relative returns.
- *Relative Valuations.* Of the 16 estimated coefficients measuring the impact of real yield differentials (i.e. relative valuations) on changes in portfolio weights, 5 are positive (4 of which are statistically significant at higher than 10 percent), while 11 are negative (though only 1 is statistically significant). These results, in conjunction with those for the relative return coefficients, suggest countercyclical motives are not a key determinant of portfolio changes for large asset owners.
- *Asset Owner Differences.* Procyclicality appears strongest for: treasuries, equities and gold for global central banks; fixed income and equities for U.S. private pension funds, U.S. public pension funds, and U.S. life insurers; and fixed income, equities and real estate for U.S. endowment funds.
- Although the relatively small sample size (between 21 and 32 years of annual data) makes the statistical results somewhat suggestive and tentative, the regression models do appear useful in explaining the aggregate asset allocation shifts of large asset owners.[18]Across the sixteen regressions (representing five asset classes for central banks, two each for private pension, public pension, and life insurers, and five for endowment funds), thirteen produce F-statistics that are statistically significant (at higher than 5 percent), and the adjusted-R^2's are relatively high, ranging from an average of 0.41 across the different asset classes for global central banks, up to an average of 0.79 for the asset classes in U.S. life insurance portfolios.[19]

[18] As a robustness check, the Breusch-Godfrey serial correlation LM test was performed on the residuals up to the third order. The null hypothesis of no serial correlation could not be rejected (at the 5 percent or higher level) in any of the sixteen regressions (see also the Durbin-Watson statistics reported in Tables 2—4). Regressions were also re-estimated with autogressive terms (up to the third order) but were not found to add value on any consistent basis.

[19] For a visual interpretation, see also the scatter plots presented in Annex 2.

Figure 3. T-statistics from Regressions of Asset Allocation Changes on Returns and Yields



Notes: The Newey-West corrected t-statistics for the slope coefficients pertaining to the regression of annual changes in asset class weights on past relative returns and valuations (see page 11) are displayed above. To aid in the visual interpretation, negative t-statistics reflect negative coefficients.

Table 2. Time Series Regression Results—Global Central Bank Portfolio Drivers

Global Central Banks						
		U.S. Treasuries	U.S. Agencies	U.S. Credit	U.S. Equities	Gold
Explanatory Variables for Annual Changes in Asset Allocation:						
Intercept	β_0	-0.01	0.01	0.00	-0.01*	-0.01**
	t-stat	*(0.57)*	*(0.36)*	*(0.84)*	*(1.72)*	*(2.52)*
Relative Return (t : t-1)	β_1	0.08	-0.07	0.00	0.05***	0.00
	t-stat	*(0.93)*	*(0.61)*	*(0.19)*	*(2.89)*	*(0.10)*
Relative Return (t-1 : t-2)	β_2	0.22**	-0.05	0.00	0.03*	0.00
	t-stat	*(2.13)*	*(0.36)*	*(0.19)*	*(1.79)*	*(0.31)*
Relative Return (t-2 : t-5)	β_3	-0.10	-0.06	-0.01	0.02	0.02
	t-stat	*(0.41)*	*(0.35)*	*(0.45)*	*(0.91)*	*(1.42)*
Relative Return (t-5 : t-10)	β_4	0.50***	-0.43***	-0.08***	-0.01	0.05***
	t-stat	*(2.62)*	*(3.10)*	*(3.23)*	*(0.25)*	*(3.21)*
Relative Yield (t-1)	β_5	-1.48	1.94*	-0.13	0.53***	-0.13
	t-stat	*(1.39)*	*(1.84)*	*(0.69)*	*(2.74)*	*(1.47)*
R^2		0.68	0.62	0.29	0.56	0.48
Adjusted R^2		0.59	0.51	0.11	0.44	0.38
Probability (F-statistic)		0.00	0.00	0.21	0.01	0.00
Durbin Watson Statistic		2.28	1.98	2.19	2.84	1.10
Total Observations		25	25	25	25	32
Start of Sample		Jun-1989	Jun-1989	Jun-1989	Jun-1989	Jun-1989
End of Sample		Jun-2014	Jun-2014	Jun-2014	Jun-2014	Jun-2014

Notes: Table 2 reports the slope coefficients and their Newey-West corrected t-statistics in parenthesis pertaining to the regression for each separate asset class on page 11. Coefficients marked with stars indicate significance at 1 percent (***), 5 percent (**) and 10 percent (*) respectively. With respect to the relative return coefficients ($\beta_1, \beta_2, \beta_3$ and β_4), a positive sign indicates the asset class weighting increases (decreases) when that asset class generates a higher (lower) return than the average of other asset classes in the portfolio. With respect to the β_5 coefficient, a positive (negative) sign indicates the asset class weight increases with the relative yield differential between the asset class and the average of other asset classes in the portfolio. In the regression for gold, the independent variable is the annual percentage change in official sector gold holdings (in tonnes) rather than the percentage point change in the overall portfolio weight for gold as per the other asset classes – this slight difference reflects data limitations associated with aggregate data on central bank gold holdings.

Table 3. Time Series Regression Results—Pension Fund and Life Insurer Portfolio Drivers

		U.S. Private Pension Funds		U.S. Public Pension Funds		U.S. Life Insurers	
		Fixed Income	Equities	Fixed Income	Equities	Fixed Income	Equities
Explanatory Variables for Annual Changes in Asset Allocation:							
Intercept	β_0	0.00	-0.01	-0.01	0.01	-0.01***	0.00
	t-stat	*(0.66)*	*(0.94)*	*(1.60)*	*(0.68)*	*(3.61)*	*(0.61)*
Relative Return (t : t-1)	β_1	0.19***	0.16***	0.19***	0.15***	0.23***	0.15***
	t-stat	*(2.76)*	*(4.38)*	*(2.91)*	*(4.57)*	*(7.23)*	*(11.40)*
Relative Return (t-1 : t-2)	β_2	0.07	0.05*	-0.08	-0.05	0.09**	0.03
	t-stat	*(1.02)*	*(1.74)*	*(1.14)*	*(1.33)*	*(2.47)*	*(1.33)*
Relative Return (t-2 : t-5)	β_3	0.15*	0.15***	0.15	0.07	0.04	0.05
	t-stat	*(1.76)*	*(2.63)*	*(1.25)*	*(0.78)*	*(0.63)*	*(1.07)*
Relative Return (t-5 : t-10)	β_4	0.24**	0.19***	0.16	0.10	0.00	0.03
	t-stat	*(2.00)*	*(3.00)*	*(1.07)*	*(1.24)*	*(0.03)*	*(0.54)*
Relative Yield (t-1)	β_5	-0.36	-0.17	-0.03	-0.34	-0.30	-0.22
	t-stat	*(0.53)*	*(0.74)*	*(0.03)*	*(1.35)*	*(0.84)*	*(1.29)*
R^2		0.43	0.65	0.48	0.73	0.77	0.89
Adjusted R^2		0.28	0.56	0.34	0.66	0.71	0.86
Probability (F-statistic)		0.04	0.00	0.02	0.00	0.00	0.00
Durbin Watson Statistic		2.39	2.10	2.17	1.94	1.88	1.25
Total Observations		25	25	25	25	25	25
Start of Sample		Dec-1989	Dec-1989	Dec-1989	Dec-1989	Dec-1989	Dec-1989
End of Sample		Dec-2014	Dec-2014	Dec-2014	Dec-2014	Dec-2014	Dec-2014

Notes: Table 3 reports the slope coefficients and their Newey-West corrected t-statistics in parenthesis pertaining to the regression for each separate asset class on page 11. Coefficients marked with stars indicate significance at 1 percent (***), 5 percent (**) and 10 percent (*) respectively. With respect to the relative return coefficients ($\beta_1, \beta_2, \beta_3$ and β_4), a positive sign indicates the asset class weighting increases (decreases) when that asset class generates a higher (lower) return than the average of other asset classes in the portfolio. With respect to the β_5 coefficient, a positive (negative) sign indicates the asset class weight increases with the relative yield differential between the asset class and the average of other asset classes in the portfolio.

Table 4. Time Series Regression Results—Endowment Fund Portfolio Drivers

U.S. Endowment Funds						
		Fixed Income	Equities	Private Equity	Hedge Funds	Real Estate
Explanatory Variables for Annual Changes in Asset Allocation:						
Intercept	β_0	-0.02***	0.01	0.00	0.00	0.00***
	t-stat	*(3.13)*	*(1.34)*	*(0.19)*	*(1.00)*	*(3.99)*
Relative Return (t : t-1)	β_1	0.08***	0.20***	0.00	0.01	0.04***
	t-stat	*(3.90)*	*(7.67)*	*(0.46)*	*(0.56)*	*(3.79)*
Relative Return (t-1 : t-2)	β_2	-0.08***	-0.03	0.00	-0.05	0.00
	t-stat	*(2.71)*	*(1.06)*	*(0.06)*	*(1.12)*	*(0.48)*
Relative Return (t-2 : t-5)	β_3	-0.03	0.05	0.01	-0.07**	0.02*
	t-stat	*(0.74)*	*(0.85)*	*(0.52)*	*(2.46)*	*(1.90)*
Relative Return (t-5 : t-10)	β_4	0.06	0.21***	-0.03	-0.11***	0.03*
	t-stat	*(0.90)*	*(4.84)*	*(1.58)*	*(3.42)*	*(1.72)*
Relative Yield (t-1)	β_5	-0.25**	-0.12	0.06*	0.37***	0.17
	t-stat	*(2.51)*	*(0.69)*	*(1.80)*	*(3.62)*	*(1.49)*
R^2		0.68	0.86	0.28	0.39	0.63
Adjusted R^2		0.58	0.81	0.04	0.18	0.51
Probability (F-statistic)		0.00	0.00	0.37	0.15	0.01
Durbin Watson Statistic		2.45	1.38	1.92	1.56	2.80
Total Observations		21	21	21	21	21
Start of Sample		Dec-1993	Dec-1993	Dec-1993	Dec-1993	Dec-1993
End of Sample		Dec-2014	Dec-2014	Dec-2014	Dec-2014	Dec-2014

Notes: Table 4 reports the slope coefficients and their Newey-West corrected t-statistics in parenthesis pertaining to the regression for each separate asset class on page 11. Coefficients marked with stars indicate significance at 1 percent (***), 5 percent (**) and 10 percent (*) respectively. A positive sign on the relative return coefficients (β_1,β_2,β_3 and β_4) indicates the asset class weighting increases (decreases) when it generates a higher (lower) return than the average of other asset classes in the portfolio. With respect to the β_5 coefficient, a positive (negative) sign indicates the asset class weight increases with the relative yield differential between the asset class and the average of other asset classes in the portfolio.

IV. A FRAMEWORK FOR LONG-TERM, COUNTERCYCLICAL INVESTMENT

To the extent that long-term, market-stabilizing investment constitutes both a public and private good, it raises the question as to what, if anything, can be done to encourage more of it. While a discussion of highly calibrated policies for each type of asset owner is beyond the scope of this paper, this section sets out the elements of a normative five-pillar framework with broad-based applicability. Underlying the following discussion is the concept that investment practices are often constrained by institutional barriers (as they relate to internal governance, incentives, etc.), rather than just poor investment judgment owing to irrationality and behavioral errors.

A. Strengthening Governance

Good governance is a critical enabler, offering the first line of defense against investment short-termism and procyclicality. A 'shortfall' in governance best practice has been associated with an annual 0.66 percentage point drag on the performance of U.S. pension funds (Ambachtsheer and others, 2008), with poor internal processes cited far more frequently than 'difficult markets' (i.e. external issues) by senior U.S. pension fund executives as the main barrier to investment excellence (Ambachtsheer and others, 1995). Moreover, barriers to good governance appear persistent—the most acute issues identified by U.S. pension fund CEOs in surveys in 1997, 2005, and 2014 were remarkably similar (Ambachtsheer and McLaughlin, 2015). As Swenson (2009, p. 297) points out,

> *"Two important tenants of investment management—contrarian thinking and long-term orientation—pose challenges for governance. Because large bureaucratic organizations use groups of people (investment committees) to oversee other groups of people (investment staff), consensus building behavior permeates the investment process. Unless carefully managed, group dynamics frequently thwart contrarian activities and impose shorter than optimal time horizons. Creating a governance process that encourages long-term, independent, contrarian thinking represents a critical undertaking."*

Three measures stand to assist asset owners better organize themselves in this regard. First, minimum accreditation standards should be considered in order to equip fund fiduciaries with the appropriate level of financial literacy. Minimum accreditation standards are already in effect throughout the securities industry, but remain conspicuously absent among the trustees overseeing what can be substantial sums of long-term capital. Among certain asset owners, notably pension funds, a desire to ensure 'constituent representativeness' often trumps investment experience in the appointment of trustees. Higher levels of financial literacy among fund stewards would lend greater support to investment staff who might otherwise have difficulty in advancing the case for increasing exposure to asset classes that have performed poorly in the recent past (i.e. where risk premia have widened), and vice versa.

Second, communication to stakeholders should be conducted in such a way as to emphasize long-term return objectives and manage expectations of the types of interim (mark-to-market) losses that can be expected in the process of harvesting long-term risk premiums (Jones, 2013). This communication challenge implicitly requires disentangling recurring sources of return (investment income and expected trend cash flow growth) from non-recurring sources of return (i.e. one-off valuation changes) in the discussion of expected returns and shortfall risk. A policy of preemptive stakeholder education on the rationale for accepting certain types of risks can mitigate costly knee-jerk reactions (and in some cases, threats to political independence) when the portfolio inevitably endures a bout of volatility. Many intergenerational savings-based sovereign wealth funds publicly report quarterly or annual returns, but emphasize these returns in the context of the long-term target.[20]

[20] In practice, a wide range of approaches are used. The Government of Singapore Investment Corporation (GIC) reports performance on the basis of rolling 5-year, 10-year and 20-year real returns; the Abu Dhabi Investment Authority reports on a rolling 20- and 30-year basis. At the other extreme, Norway's 'Government Pension Fund-Global' reports the value of its portfolio in real time on an accessible website.

Third, the investment policy statement, which sets out the institutional objectives, beliefs, responsibilities, and risk tolerance terms, can only be effective if there is accountability over implementation. It is much easier to formulate a policy statement that aspires to encourage countercyclical investment, than it is to implement such a policy in the heat of battle.

B. Benchmarks, Factor Tilts and Rebalancing

Benchmarks can serve a valuable purpose for asset owners, even when capital is not managed directly against them (for instance, where an uninvestable long-term 'CPI+' return target guides the strategic asset allocation). Yet benchmarks are often rigidly set on the basis of the same capitalization—weighted indices to make performance reporting and peer group measurement a straightforward exercise.[21] It is less often the case that asset owners: (i) construct and follow benchmarks in a manner that adequately hedges their unique liability structure and/or risk factors;[22] or (ii) attempt to create value by tilting portfolios toward risk factors in which they have a comparative advantage accessing, many of which are also market-stabilizing (Ilmanen, 2011; Jones, 2012).

While liability and risk factor profiles differ considerably from one asset owner to the next, this diversity is rarely reflected in investment benchmarks. Moreover, procyclicality is an inherent feature of the market capitalization—weighted benchmarks that dominate the investment industry.[23] Ceteris paribus, securities with the strongest price (and issuance) momentum will, irrespective of fundamentals, attract larger weights and thus induce captive buying from investors. With large pools of capital tracking the same benchmarks, and these benchmarks attaching higher weights to securities with the strongest price momentum, system-wide herding is inevitable.

By severing the mechanical link between market prices and index weights, a new generation of financial benchmarks have raised the prospect of supporting financial stability and generating returns that are at least on par with those on conventional cap—weighted benchmarks. Prominent among these are benchmarks with an intrinsic countercyclical rebalancing focus, where security weights are based on measures of risk premia (value weighted indices) or economic scale (fundamental weighted indices, Figure 4). Other strategies well suited to volatility-agnostic investors with long horizons—the purchase of stocks in periods where the equity risk premium is elevated (Figure 5), the sale of equity index volatility in high volatility regimes (Figure 6, left panel), and distressed value strategies (Figure 6, right panel)—are inherently market stabilizing. Payoffs to these types of

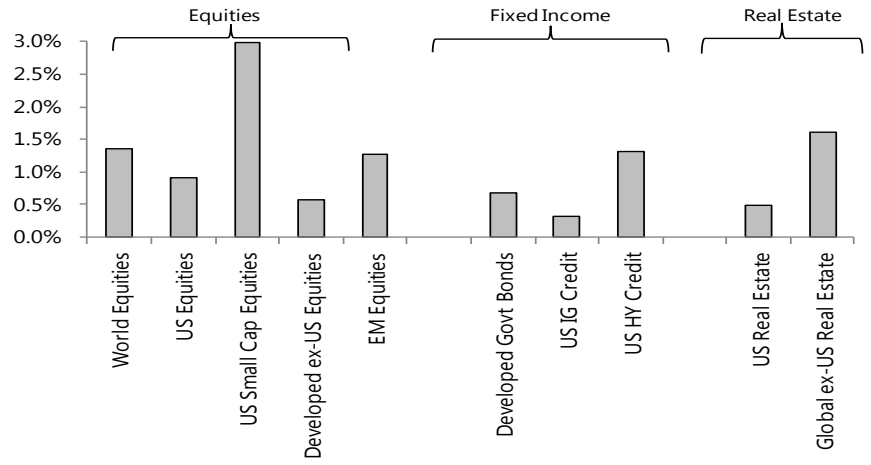
[21] Capitalization—weighted benchmarks also appeal to advocates of the efficient markets doctrine: other weighting schemes should not outperform them on a risk-adjusted basis.

[22] Defined benefit pension funds utilizing liability driven strategies, and guaranteed life insurance products, are the main exceptions in this regard.

[23] By way of illustration, worldwide assets under management in non-capitalization weighted exchange traded products has been estimated at $396 billion as of June 2014, less than one fifth of total assets in exchange traded products (Morningstar, 2014).

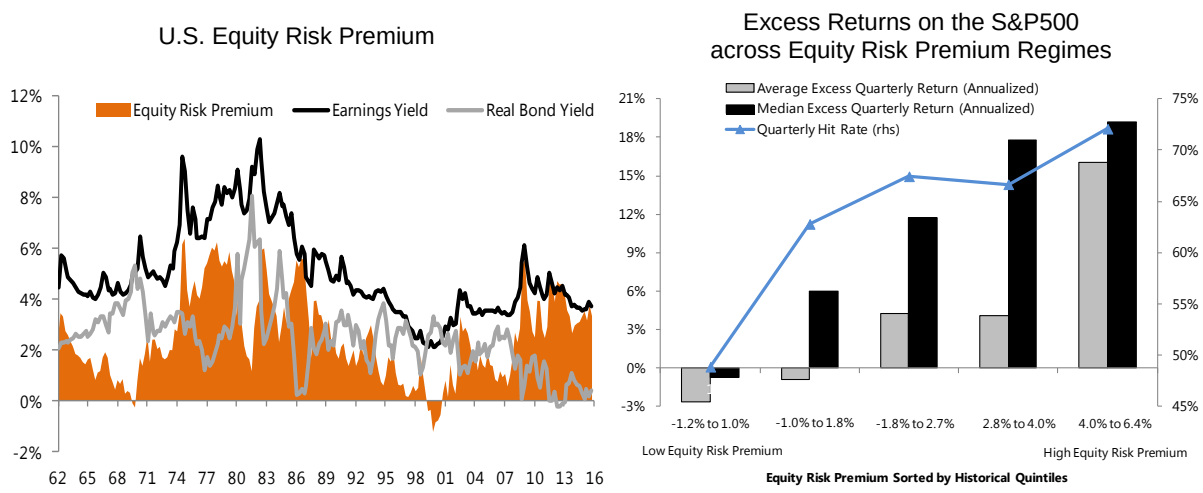
strategies—which can be noisy in the short-run, covary with systemic risk, and rely on the slow mean reversion in risk premia—tend to persist through time because they cannot be harvested by short-term, drawdown-averse investors. This is the basis of the countercyclical 'strategic tilting' program successfully developed by the New Zealand Superannuation Fund.

Figure 4. Relative 10-year Annualized Outperformance of Fundamental-based (Non-Price) Indices vs. Industry Standard Market Capitalization-based Indices



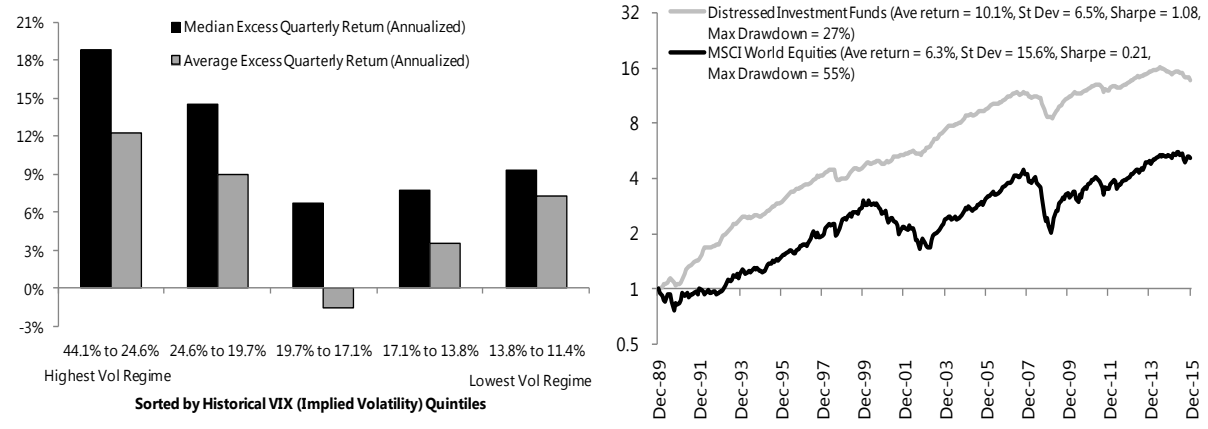
Source: Research Affiliates, Arnott and others (2008), Author.
Notes: Average annualized return differential between fundamental-based indices and industry standard market capitalization-weighted benchmarks. Fundamental Index constituents are weighted using a composite of fundamental factors, including cash payouts, free cash flow, sales and book value of asset (prices and market values are not determinants of index weights). The 10-year performance assessment period ends June 2015.

Figure 5. Harvesting Mean Reversion in the U.S Equity Risk Premium



Source: Author, Haver.
Notes: The equity risk premium is defined as the difference between the (real) earnings yield and real bond yield. The earnings yield is measured as the average of 10-year trailing reported earnings per share for the S&P500 index (i.e. cyclically-adjusted), divided by the S&P500 price index. The real bond yield is defined as the constant maturity 10-year treasury yield, deflated by a 10-year trailing annual average of core inflation (as a proxy for expected inflation). In the right hand side panel, subsequent quarterly excess returns (vs. 3-month bills) for the S&P500 are shown across quintile readings for the equity risk premium in the previous quarter. The hit rate is defined as the percentage of quarters in which the signal generated a positive excess return. A regression of subsequent excess quarterly returns on the equity risk premium (not shown here but available upon request) yields a beta of 1.0 that is statistically significant at the 1 percent level. Data from March 1962–December 2015, yielding a sample of 214 quarterly observations.

Figure 6. Countercyclical Strategies Suited to Long-term Asset Owners



Source: Author, Hedge Fund Research, MSCI, Bloomberg.
Notes: Figures in the left hand side panel report quarterly (annualized) median and average excess returns (vs. 3-month bills) from selling 3-month collateralized at-the-money S&P500 put options, based on the prior quarter implied volatility (VIX) regime. Data from June 1986-December 2015 (producing a sample of 118 quarterly observations). In the right hand side panel, the gray line depicts the cumulative net total returns (in $US) to hedge funds specializing in purchases of distressed investments, while the black line depicts the cumulative net total returns (in $US) to a buy and hold strategy in the MSCI World Index. Data from December 1989-December 2015, yielding a sample of 312 monthly observations.

C. Risk Management—A Symmetric Approach to Shortfall Risk

The process for managing investment risk necessarily differs across investor types (Table 5). An asset manager with runnable (i.e., liquid) liabilities, whose portfolio is leveraged and mark-to-market at high frequencies, is highly exposed to short-term volatility, illiquidity and 'left tail' events.[24] These can quickly result in redemptions and even insolvency if the balance sheet of the manager is comingled with client funds. Procyclical risk management, where leverage is slashed and risky positions cut whenever volatility rises, is a direct consequence. Risk management is therefore asymmetrically focused on protecting the downside (i.e. the left tail of the return distribution). But for asset owners with little or no leverage and long duration liabilities, the central concern is long-term shortfall risk—the risk of failing to achieve a desired return objective far into the future—rather than short-term volatility. Importantly, long-term shortfall risk can arise in two ways: by taking too little or too much risk. For long-term asset owners, foregoing large positive returns can be just as problematic (from the perspective of shortfall risk) as experiencing large negative returns. The risk management of long-term investment capital must therefore have a more symmetric focus.

[24] Put another way, these investors have significant path dependency risk and a small 'distance to fire.' In conceptual terms, such investors are short a knock-out option, with the strike price set only a little below spot.

Table 5. Risk Management Framework for Different Investor Types

	No leverage & Long-duration liabilities (i.e. Savings-based SWF, Endowment fund)	**Leverage & Short-term liabilties** (i.e. Hedge Fund)
Primary risk factor	Long-term shortfall risk	Short-term volatility
Frequency of marked-to-market	Quarterly / Annual / Multi-year	Daily
Exposure to illiquidity risk	Indifferent	Averse
Part of the return distribution that drives the risk management process	Left and right tail equally (symmetric)	Left tail

Source: Author.

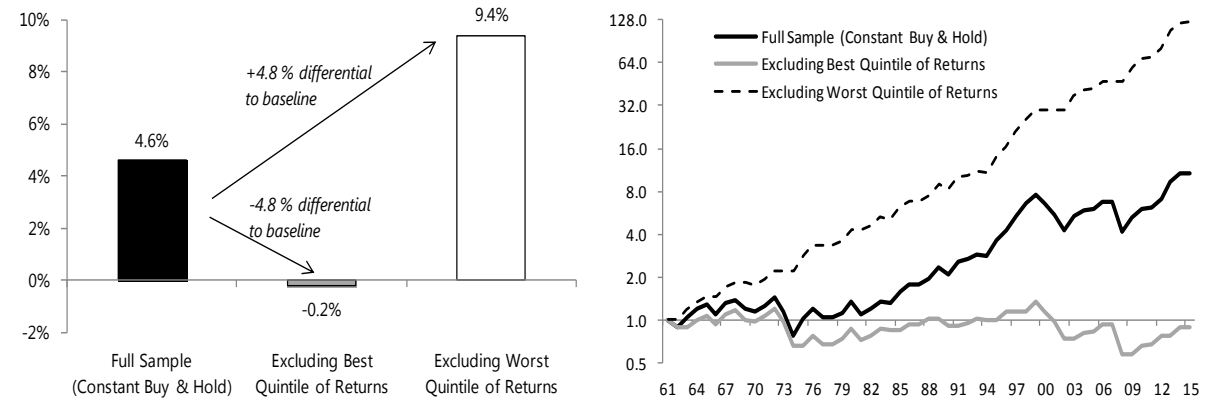
Figure 7 provides an illustration of the impact on long-term returns associated with incurring large losses vis-à-vis foregoing large gains. Had an investor with perfect foresight successfully avoided the bottom quintile of annual returns on the S&P500 between 1962—2015, the compound excess annual return would have been 9.4 percent, relative to a 4.6 percent baseline return for a constant buy-and-hold strategy. However, had the investor adopted too conservative a stance and foregone the top quintile of returns, the compound annual excess return would have been -0.2 percent. The return differential vis-à-vis the constant buy-and-hold benchmark is symmetrical: in both cases, 4.8 percentage points per annum. The implication is that risk management for long-term asset owners should focus on both the left and right hand tail of the distribution of returns—that is, equally seek to minimize the risk of incurring large losses and foregoing large gains.[25]

In practical terms, forward-looking estimates of expected returns (based on measures of risk premia) can usefully guide the operation of a risk management framework intent on mitigating risks of excessive pessimism and optimism (Jones, 2013).[26] Because asset valuations tend to mean revert slowly over a multi-year horizon, the time period relevant to long-term investors, shortfall risk is likely to be higher when risk premia are lower, and vice versa. All else equal, risk management should dictate reducing exposure to assets with low risk premia (and vice versa), particularly where these assets offer few portfolio diversification benefits. For long-term investors, valuation risk, rather than volatility risk, should be the principle concern.

[25] The non-linear mathematics of compounding losses vis-à-vis gains (where, for instance, a 20 percent loss requires a 25 percent subsequent return just to return to the previous high watermark) typically means investors with runnable liabilities defend more against the risk of incurring large losses than foregoing large gains. But as the investment horizon lengthens, the impact of drift (relative to volatility) in the return generating process becomes more pronounced (while drift grows linearly with time, volatility grows at the root of time). Because prices are approximately log-normally distributed, the largest percentage gains exceed the largest percentage losses as the holding period lengthens (i.e. it is not possible to incur a loss in excess of 100 percent, but it is possible to earn a gain of this magnitude), thus offsetting the effects of non-linear compounding.

[26] Strictly speaking, risk premiums can reflect rational factors, irrationality, and/or the limits to arbitrage.

Figure 7. Long-term Performance Impact of Incurring Large Losses vs. Foregoing Large Gains



Source: Author, Bloomberg
Notes: In the left hand panel, the first column (black bar) displays the constant exposure (buy-and-hold) average annual excess total return on the S&P500 from December 1961—December 2015. The second (third) column displays the average annualized excess total return, excluding years where annual returns were in the top (bottom) 20th percentile of the sample. The risk-free rate (from which excess returns are calculated) is the 3 month treasury bill. The right hand panel displays the results in time series form.

D. Realigning the Principal—Agent Relationship

For many asset owners (principals), utilizing the services of external fund managers (agents) is the only practical solution to a lack of internal investment capacity and expertise, particularly for resource-constrained asset owners in the public sector. However, in addressing one problem others can arise,[27,28] notably the tendency for principals to: (i) hire and fire agents in a procyclical manner on the basis of recent performance (often on the recommendation of external consultants); and (ii) compensate external managers on the basis of unrealized accounting gains, including where agents retain the upside but not the downside of subsequent performance. These behaviors can amplify procyclicality and drive a substantial wedge between market returns and the ultimate value of asset owner portfolios.

Procyclical Hiring and Firing

Acting as agents, institutional fund managers are likely to lean against the wind only to the extent they have confidence in their ability to withstand redemptions from principals while waiting for a fundamental mispricing to correct. But because principals have imperfect knowledge about the ability of their investment agents—reflecting that managers operate in a

[27] As van Binsbergen and others (2008) argue, while principal—agent incentive misalignments can take many forms and lead to large utility costs on the part of the asset owner, decentralized investment management remains an inevitable and stylized fact of the investment industry.

[28] A two-layered principal—agent problem often exists in funds management: the chief investment officer and investment staff are agents to the board of the asset owner; and third party asset managers are agents to the asset owner itself. The author is grateful to Arun Muralidhar for this observation.

high-noise, low-signal environment which makes it difficult to distinguish skill from luck—they may interpret a period of short-term underperformance against peers as a sign of manager incompetence.[29] As the relative underperformance grows, principals are likely to conclude that their manager is unskilled and thus terminate them in favor of peers demonstrating outperformance by holding securities with strong momentum.[30] As Jin (2005, p. 1) points out, the "output short-termism" of investment agents can largely be explained by the "heat" they feel from the "input short-termism" of principals.[31] The high costs of underperforming peers can introduce an important element of short-termism in the market that generates negative spillover effects. As Feroli and others (2014, p. 10) note: "the concern of relative rankings in the payoff by delegated agents injects an element of coordination in their portfolio choice that has the outward appearance of herding behavior." The associated distortion of agent incentives can lead to highly inefficient and socially undesirable portfolios (Brennan, 1993; Maug and Naik, 1996; Stein, 2004; Brennan and Li, 2008).

Ironically, the pressure from principals to redeem on agents who are long/overweight cheap but underperforming securities and short/underweight expensive but outperforming securities will typically be most intense just when the mispricing—and hence prospective return—is greatest. 'Buying high, selling low' by asset owners in the fund manager domain has been documented across both equity and fixed income markets. In an authoritative study of two decades of data documenting the hiring and firing decisions of investment managers by more than 3000 U.S. plan sponsors, Goyal and Wahal (2008) found that while managers who were hired (fired) generated positive (negative) excess returns in the years preceding the date of initiation (termination), recently fired investment managers tended to produce relatively higher excess returns post-termination than recently hired managers (Figure 8).[32]

---

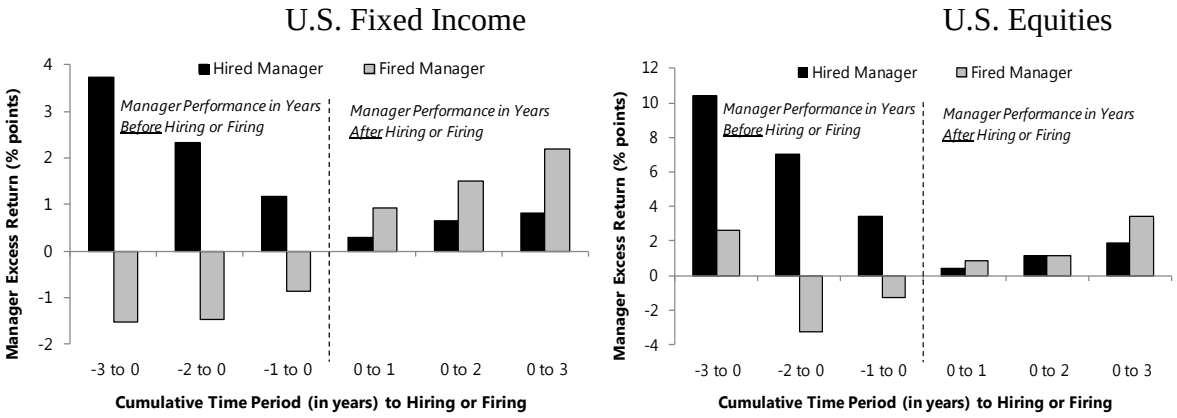
[29] While such action has been justified on the basis of 'rational learning,' this is unpersuasive given the amount of noise in short-term estimates of both absolute and relative manager performance.

[30] This point was underscored most dramatically by the fund inflows and growth experienced by technology fund managers (as the counterpart to redemptions from traditional sector agnostic value-based funds) during the late 1990s bubble. The number of technology-based mutual funds exploded from 23 to 170 between 1993 and 2000, with 82 new funds launched in 1999 alone; as of 2015, two-thirds of those funds no longer exist (Lauricella, 2015).

[31] More broadly, performance chasing has been established among mutual and hedge funds. For mutual funds, see Ippolito (1992), Chevalier and Ellison (1997), Sirri and Tufano (1998), Sapp and Tiwari (2004), Goyal and Wahal (2008), Bailey and others (2011), and Lou (2012). For hedge funds, see Agarwal and others (2002, 2005), Baquero and Verbeek (2005), and Dichev and Yu (2011).

[32] As Ellis notes (2012, p. 17),"The easiest time to 'buy' investment managers is at the peak of their firms' investment performance … Investment consultants learned to present (to asset owners) at selection finals only those managers who had compelling recent performance records and not to lose points by defending a 'disappointing' investment manager. Has any consultant ever presented a manager by saying, 'While this manager's recent performance record certainly does not look favorable, our professional opinion is that this manager has weathered storms in a market that was not hospitable to her style and has a particularly strong team that we believe will achieve superior results in the future'?"

Figure 8. Manager Performance in the Years Before and After Hiring and Firing Decisions



Source: Figures from Goyal and Wahal (2008).
Notes: The performance differentials between hired and fired managers are statistically significant prior to year 0 (the date after hiring or termination), but not after.

Market-stabilizing, valuation-based investment styles typically require a long investment horizon that closed-end funds can readily accommodate (Stein, 2004). While closed-end funds offer intraday trading on the secondary market, the fund manager enjoys 'locked up' capital after the primary issuance of fund shares, and thus is immune to redemption risk. However closed-end funds have declined in relative terms, and as of 2014 comprise just 1 percent of the assets placed with delegated agents in collective investment vehicles. This compares to 41 percent in the case of open-end mutual funds (IMF, 2015). Since value-based strategies rely on the gradual mean reversion of risk premiums (a process that can take many years), while momentum strategies tend to be most profitable with holding and look-back periods of 6 to 12 months, 'leaning against the wind' can entail too much business risk for most fund managers (Lakonishok and others, 1992; Lux, 1995; Dasgupta and others, 2011; Vayanos and Woolley, 2013).

Further, if principals appraise their agents on performance vis-à-vis a momentum-biased (market capitalization-weighted) benchmark, it can be entirely rational—from the perspective of business and compensation risk—for agents to herd and knowingly participate in bubbles. Momentum has featured prominently as an investment style of fund managers (Carhart, 1997). Even if they suspect their benchmark to be overvalued, managers can take comfort in the belief they will be excused from poor absolute performance so long as their benchmark and peer group also perform poorly (Scharfstein and Stein, 1990; Rajan, 2005; Porter and Trifts, 2014). Herding and bubble-riding allows one to minimize career risk by the 'sharing the blame.'[33] As Grantham (2012, p.1) observed:

[33] As Keynes (1931) outlined: "A sound banker, alas, is not one who foresees danger and avoids it, but one who, when he is ruined, is ruined in a conventional and orthodox way along with his fellows, so that no one can really blame him."

> *"The central truth of the investment business is that investment behavior is driven by career risk. The prime directive, as Keynes knew so well, is first and last to keep your job. To do this, he explained that you must never, ever be wrong on your own. To prevent this calamity, professional investors pay ruthless attention to what other investors in general are doing. The great majority 'go with the flow,' either completely or partially. This creates herding, or momentum, which drives prices far above or far below fair price. There are many other inefficiencies in market pricing, but this is by far the largest … Ignoring (long-term fundamental value) may be the correct response on the part of most market players, for ignoring the volatile up and down market moves and attempting to focus on the slower burning long-term reality is simply too dangerous in career terms. Missing a big move, however unjustified it may be by fundamentals, is to take very high risk of being fired. Career risk and the resulting herding it creates are likely to always dominate investing."*

External Manager Compensation

Another principal—agent friction with financial stability implications can arise when external fund managers derive compensation from principals on the basis of unrealized capital gains, where they retain the upside but not the downside. This asymmetry in manager compensation generates a call option-like payoff structure, and may induce a preference for procyclical risk taking and 'bubble riding' (Allen and Gorton, 1993; Allen and Gale, 2000; Rajan, 2005; Stein, 2013; Ma and others, 2015). If fund managers participate in the formation of a bubble, large fees can be earned on both absolute performance and the management of a swelling asset pool. If the bubble deflates while they remain invested, managers are rarely required to repay earlier performance fees, and continue to earn management fees (albeit off a lower base).[34] Alternatively, managers may chose to close down the existing fund and re-open another, thus lowering the hurdle level on which future compensation will be based (analogous to 're-striking' a call option).[35]

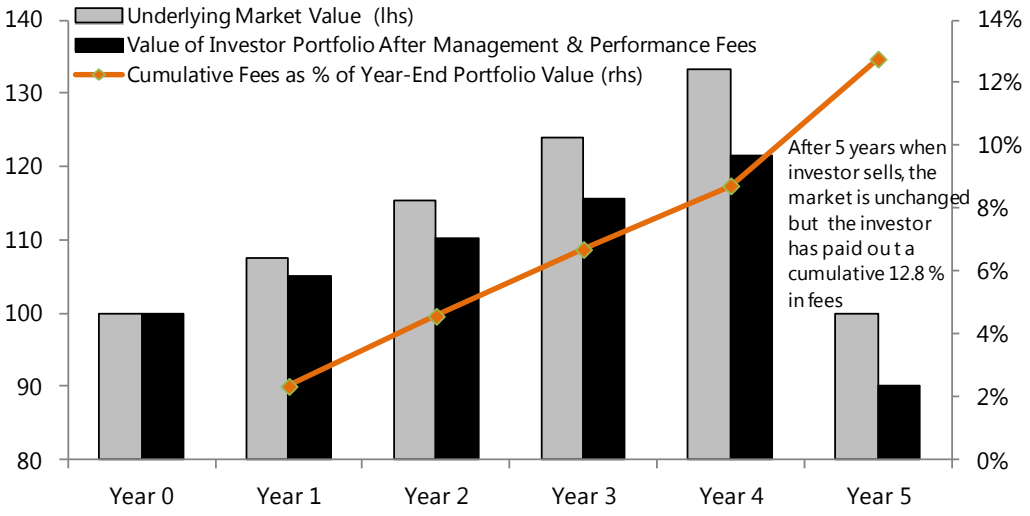
To examine how fees paid on unrealized capital gains can drive a wedge between market returns and the final value of the asset owner's portfolio at redemption, Figure 9 presents the results of a hypothetical scenario. In this scenario, the asset owner and fund manager agree to a five-year commitment whereby the manager extracts an annual 1 percent management fee and an annual performance fee of 20 percent of the excess return over a 1 percent hurdle rate (if returns fail to exceed this hurdle rate, no performance fee is paid to the manager). If the manager allocates the asset owner's capital in a portfolio of securities generating returns of 7.5 percent per annum from years 1—4, and a negative return of 25 percent in the final year,

[34] In this sense, the worst case scenario is a manager foregoes earning a performance fee as the bubble unwinds, until such time that cumulative returns recover back above some high watermark.

[35] Although there is some degree of reputational risk in closing an underwater fund only to reopen another shortly thereafter, if performance has dropped so far below the previous high watermark (upon which performance-linked compensation will be based) and redemptions have also lowered assets under management (further increasing the percentage returns needed to restore fund value back to the high watermark), it may still be 'rational' for the manager to do so.

the market value of the portfolio would be unchanged (gray bars). However the asset owner would be substantially worse off (to the tune of 12.8 percent) as a result of paying performance fees in the first four years, but receiving no compensation for the large negative return in the final year that more than wiped out previous (unrealized) capital gains.

Figure 9. The Fee-Based Wedge—Paying Performance Fees on Unrealized Gains



Source: Author.
Notes: Assumes asset returns of 7.5% in years 1-4; a return of -25% in year 5, an annual performance fee of 20%, a hurdle rate on performance of 1%, an annual management fee of 1 %, no upfront sales load, and no tracking error. Fees extracted on the basis of year-end portfolio values.

Remedying the Principal—Agent Relationship

A number of adjustments could be made to the principal—agent relationship to better align interests and encourage more stabilizing long-term investment. Responsibility in this regard resides with both principals and agents.

First, the external manager performance appraisal process, typically conducted by asset owners in conjunction with their consultants, should deemphasize recent performance which can be heavily influenced by cycle-specific style biases and one-off windfall gains. Distinguishing investment skill from luck is notoriously difficult in a noisy environment with a small number of observations, but the high frequency evaluation of external manager performance is an inadequate solution for asset owners. Longer appraisal windows provide a firmer foundation to distinguish skill from luck, and more opportunity for fundamental mispricings to correct given the process of mean reversion in risk premia can take years to play out. External managers are stripped of the incentive to lean against the wind if they fear redemptions on the basis of short-term performance assessments. Although the most recent 1–3 years of past performance continue to feature heavily in manager hiring decisions, Donoho and others (2010) also show that asset owners relying on longer performance horizons (5–10 years) are more likely to find and remain with more talented managers, and that short-term appraisal windows tend to be associated with the newly chosen manager undershooting both their own previous performance and also that of manager they replaced. Similarly, Ma and others (2015) document a positive relationship between evaluation period

and U.S. mutual fund performance that remains statistically and economically significant after controlling for various advisor, fund, and manager characteristics.

Second, closed-end funds and other lockup arrangements reduce the asset owner's incentive and ability to engage in short-term, procyclical redemptions. They also empower external managers to invest with a longer term bias, thereby better aligning the horizon of the investment approach with the duration of the asset owner's liabilities. To encourage asset owners to forego liquidity in this manner, external managers may need to offer rebates in some form. A tiered exit fee structure, whereby fees decrease as the length of the capital commitment period increases, is one such possibility. Pension funds have recently begun offering to lock up capital with public equity fund managers for more than three years, paying low base fees but higher performance fees, and deferring a significant portion of performance-based cash payments while a longer-term track record builds (Barton and Wiseman, 2014).

Third, while performance fees paid to active managers can help align the interests of principal and agent (by incentivizing effort), the asymmetry in manager compensation (in which they keep the upside but not the downside) can work in the opposite direction. Symmetrical fees, in which the manager is exposed to the downside, have been shown to yield closer alignment in risk and effort than their asymmetric equivalents (Starks, 1987).[36] In effect, the manager's compensation structure would shift from a call option to a forward-like payoff. Multi-year clawback provisions, such as those increasingly used in the banking and private equity industry, could supplant or at least complement the use of high watermarks for active funds. Similarly, industry bodies have called on asset managers to commit a meaningful portion of their own wealth to the funds they manage in order to bring their personal interests into better alignment with principals (CFA Institute, 2006).

Fourth, because of the well documented difficulty associated with predicting the future excess returns of external managers, the hiring and firing of agents and their compensation should be based on other sources of value added for the asset owner. This includes network building and staff training programs designed to increase financial literacy (and thus decision making capacity) within asset owning institutions.

Finally, to take better control of governance outcomes, ensure the strongest possible alignment of interests, and rationalize fees, asset owners should advocate more strongly for capital to be managed 'in-house' where capacity building is a realistic prospect. This has proven particularly difficult in public sector institutions, where oversight committees often balk at paying the types of salaries required to attract a competitive in-house investment team, without having conducted a holistic cost—benefit analysis.

[36] Such an arrangement would require capital based provisioning and thus significant changes to the regulatory environment for some types of fund managers, notably in the mutual fund space. This approach would need only to apply to active funds, not passive funds acting as pure pass-through vehicles to underlying indices.

E. Mitigating Procyclical Regulation

Fair value ('mark-to-market') accounting is widely recognized to enhance the transparency of financial information provided to the public. Yet the difficulties encountered by the banking industry during the global financial crisis raised questions as to whether, in a risk-based capital regulatory environment, the transparency benefits conferred by fair value accounting are exceeded by the potential costs associated with a self-reinforcing cycle of lower prices, fire sales, asset write downs, and capital impairments.[37] Forced regulatory action to shore up capital ratios in illiquid markets can amplify procyclicality at the worst possible time—when the economy needs the financial system to extend rather than contract credit. However, opposing arguments have likened a suspension of timely information in a period of stress to 'shooting the messenger,' and have suggested obfuscating the true economic condition of financial institutions risks weakening investor confidence and contributing to further instability in financial markets.

Risk-sensitive capital or funding requirements and fair value accounting conventions can also result in procyclical investment among non-bank asset owners, principally life insurers[38] and defined benefit pension funds.[39] If a reduction in the ratio of risk-adjusted assets to equity threatens to fall below regulatory levels, asset owners (or plan sponsors) face the choice of raising new equity or selling risky assets and replacing them with safer assets. Given that the scope for raising new capital may be limited due to the very market conditions that led to the reduction in portfolio value, selling risky assets in illiquid markets at depressed prices can often be the only practical recourse. In the defined benefit pension plans of large listed firms in the U.S., UK, Europe and Japan, funding ratios experienced significant swings from surplus to deficit around the crisis (Figure 10).

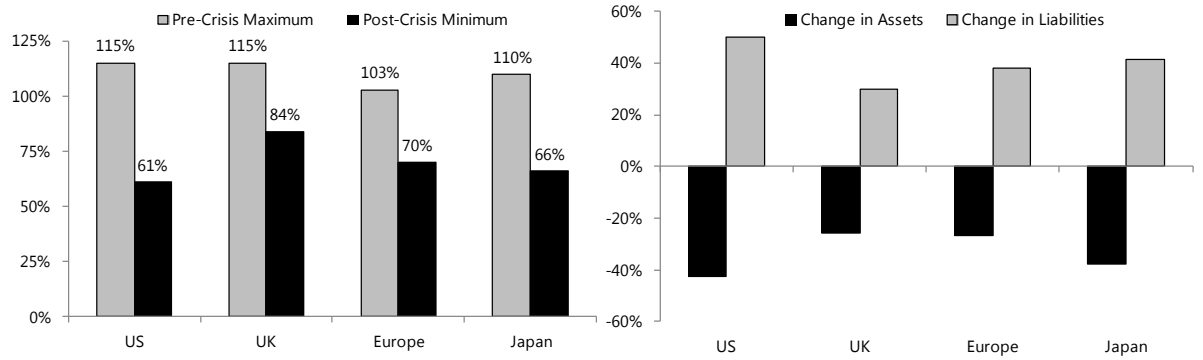
---

[37] As part of the Emergency Economic Stabilization Act signed into U.S. law in October 2008, Section 133 required the U.S. Securities and Exchange Commission (SEC) to conduct a study examining the implications of mark-to-market accounting. The subsequent SEC report (2008, p. 4) concluded, "Fair value measurements were used to measure a minority of the assets (45%) and liabilities (15%) included in financial institutions' balance sheets. The percentage of assets for which changes in fair value affected income was significantly less (25%) … Fair value accounting did not appear to play a meaningful role in bank failures occurring during 2008. Rather, bank failures in the U.S. appeared to be the result of growing probable credit losses, concerns about asset quality, and, in certain cases, eroding lender and investor confidence. For the failed banks that did recognize sizable fair value losses, it does not appear that the reporting of these losses was the reason the bank failed."

[38] As yet, there is no global standard for insurance company accounting and no global framework of minimum solvency (capital) standards. International Financial Reporting Standards are applicable to insurance companies but the framework covers mainly financial instruments (i.e., broadly the assets side) and disclosures, but not yet insurance contracts themselves (broadly the liability side), where national standards generally continue to apply. The International Accounting Standards Board has undertaken an initiative to provide a single principle-based standard to account for the various types of insurance contracts held by insurers, and to enhance comparability of financial reporting between entities, jurisdictions and capital markets.

[39] In the U.S. for instance, private and public sector defined benefit pension plans use different accounting standards and liability valuation methods. Under the influence of standards set by the Financial Accounting Standard Board, corporate plans can value liabilities based on a two year average simplified yield curve based on AA-rated corporate bonds of appropriate duration, while public plans, following the Government Accounting Standard Board standards, typically use a fixed rate to value liabilities (Impavido and Tower, 2009).

Figure 10. Corporate Defined Benefit Pension Plan Funding Status Metrics, 2007-2009



Source: Impavido and Tower (2009)
Notes: The left hand panel reports the funding ratios (measured as the ratio of assets to liabilities) for defined benefit pension plans run by companies listed on the S&P500 (U.S.), FTSE350 (UK), EURSTOXX50 (Europe) and TOPIX (Japan) respectively. The pre-crisis maximum occurs in September 2007 for U.S. and Japanese corporates, and October 2008 for UK and European corporates. The post-crisis minimum occurs in March 2009 for all four regions. The right hand panel displays the reported change in assets and liabilities over the corresponding period.

It has been suggested that regulatory and fair value accounting standards may have made it more difficult for asset owners to replenish market liquidity through the purchase of risky assets in periods of stress.[40] The key shift towards a mark-to-market regime with direct implications for company pension sponsors occurred around the same time in the U.S. and UK: the requirement that corporate defined benefit pension fund surpluses or deficits, as measured under the relevant accounting standards, had to be recorded on the balance sheet of the sponsor was introduced in the U.S. in 2006 (under the Statement of Financial Accounting Standard 158) and in the UK in 2001 (under accounting standard FRS 17). These pension funds were found to be net sellers of equity over the global financial crisis (Papaioannou and others, 2013; BoE, 2014). U.S. insurance companies that became more capital constrained because of recognized fair value losses over the 2006-09 period were also found to have sold residential mortgage backed securities at much lower prices than other insurance companies through the crisis (Merrill and others, 2012). Impavido and Tower (2009, p. 43) point to evidence that during the equity market fall of 2001–03, "life insurance companies contributed to a downward spiral in markets when equity disposals by major insurers seeking to bolster balance sheets led to further declines in the market requiring further disposals to prevent solvency margins from coming under pressure," and that in the 2008–09 crisis, "sales of equities and other instruments were more widespread."[41]

[40] Structural derisking by insurers and pension funds, a result of regulation encouraging a shift from equity-like risk to fixed income since the late 1990s, is a related but separate concept beyond the scope of this paper.

[41] Non-life insurance companies are less dependent on investment returns than life insurance companies and tend to have lower risk investment profiles. In general, life companies (other than those with mostly unit-linked business where policyholders bear the market risk) are most naturally exposed to a falling interest rate environment (by reducing the return on assets and increasing the present value of liabilities), and periods of high market volatility (by increasing the costs of guarantees) (Impavido and Tower, 2009). Derisking/hedging activities are therefore typically focused on extending duration.

Transparency and Stabilizing Investment Can Coexist

The trend toward greater accounting transparency need not necessarily translate into procyclical investment behavior—the twin goals of transparency and financial stability are not mutually exclusive. Key in this regard is a regulatory framework with inbuilt stabilizers. Procyclicality will result only when accounting methods generate a large wedge between the reported value of liabilities and assets that must then be remedied immediately by derisking in falling markets. Put differently, it is the investment *actions* required by regulation in response to accounting metrics, not high levels of accounting transparency *per-se,* that raise the spectre of procyclical stress transmission.

Through a combination of ad hoc measures, insurance and pension regulators have demonstrated a willingness to temper procyclical responses to rapidly declining asset prices (Table 5). Ideally, a clearly defined countercyclical framework for capital (in the case of insurers) and funding (in the case of pension funds), drawing on the spirit of the rule-based countercyclical capital charges now in effect in the banking industry, would supplant ad hoc discretionary approaches in the future. In essence, the framework would seek to ensure resilience is accumulated in good times, so constraints can be safely relaxed in periods of stress—and do so in a consistent and transparent manner. This would help to reduce uncertainty over the conditions under which a regulatory response might occur, ensure such measures are timely (as automatic stabilizers deploy more quickly than discretionary measures), and also ensure the regulatory response is symmetric rather than only ever relaxed in a crisis (to address moral hazard concerns). The following concepts should be considered in such a framework:

- Automatic de-risking in response to a shift in funding status from surplus to deficit should be resisted in favor of an approach that incorporates expectations of (time-varying) forward returns in the 'glide path' plan back to fully funded status. Where investment actions are guided by forward rather than backward looking metrics, this would help alleviate pressure to conduct asset fire sales at a time where asset prices are already low relative to fundamentals (i.e. where risk premia are wide);
- Conversely, funds that are comfortably in surplus should be required to lock-in their funding status (i.e. derisk) by matching liabilities with assets as closely as practicable (the objective of defined benefit plans should not be to maximize returns *per-se*);
- Given small changes in discount rates can result in very large movements in the valuation of liabilities maturing many years into the future, there is a strong case for funding status to be reported on the basis of spot (real time), smoothed (i.e. moving average) and constant discount rate assumptions. This would also provide greater clarity to the public and regulators. (In the event of a deflationary shock for instance, funding status estimates based on a real time sovereign yield curve are likely to generate a more troubling assessment than a trailing moving average or constant discount rate assumption, and vice versa). Further, for the purposes of undertaking remedial investment actions as required by regulation, some flexibility could be provided to asset owners in the choice of discount rate used to value liabilities.

- Credit rating changes should trigger internal reviews rather than involuntary investment actions that could amplify procyclicality.[42] Eliminating statutory references to credit ratings has been a key focus of regulators and the Financial Stability Board in the aftermath of the global financial crisis. At a minimum, a simple rating corridor with different thresholds for asset allocation changes could reduce the magnitude of forced adjustment in response to credit upgrades and downgrades, especially when securities move between the investment grade—high yield rating classifications; and
- Clarity should be provided as to the circumstances under which a plan sponsor can use assets other than cash to temporarily cover funding deficits, and the types of assets eligible for such treatment.

Table 6. Examples of Ad hoc Measures to Mitigate Regulatory—Induced Procyclicality

Measure	Example
Pension Funds:	
Extension of solvency recovery plan	Canada (2008), UK (2009), Netherlands (2009), Ireland (2012)
Flexibility/smoothing in discount rates used to value liabilities	Denmark (2008), Netherlands (2010)
Changes to benefits	Switzerland (2008)
Increased range of assets eligible to be used in place of sponsor cash contributions	UK (2006-)
Changes to funding requirements	Finland (2008), Japan (2009), Canada (2010)
Insurers:	
Changes to solvency requirements	UK (2001-04; 2008-09), US (2007-09), Switzerland (2013)
Changes to valuation methods	UK (2001-04), US (2007-09)
Changes to discount rates	Sweden (2001-12), UK (2001-04), Denmark (2008, 2012), Netherlands (2012)
Extension of solvency recovery plan	Sweden (2011)

Source: Bank of England (2014), Author

V. CONCLUSION

Investment with a patient, countercyclical focus holds out the prospect of jointly bolstering returns for individual asset owners,[43] and contributing broadly to a more stable financial system. In this regard, the pursuit by long-term asset owners of a 'double bottom line' would appear to be in both the private and public interest. However the asset allocation patterns documented in this study suggest that the tendency for procyclical investment at the multi-year horizon is even more widespread than first documented in Ang and others (2012), who examined this issue for U.S. corporate pension plans.

[42] Credit ratings are used in different ways by different investors. For instance, they form the basis of capital charges for insurers, while central banks use credit ratings to determine the eligibility of collateral in lending and monetary policy operations. Standardized indices that are composed on the basis of credit ratings, against which asset managers are benchmarked, can also amplify herding.

[43] Multi-year return chasing (i.e. shifting portfolios in response to returns beyond the past 12 months) is likely to be a drag on long-term performance in lieu of the tendency for asset return reversal effects to be most pronounced at this frequency (see most recently, Moskowitz and others, 2012; Ang and others, 2014; and Baltas and Kosowski, 2015).

The creation of an enabling environment more conducive to market-stabilizing, long-term investment cannot rest on the actions of policy makers alone. For the most part, change will need to be driven by large asset owners themselves. As Barton and Wiseman (2014) conclude, "The single most realistic and effective way to move forward is to change the investment strategies and approaches of the players who form the cornerstone of our capitalist system: the big asset owners … until these organizations radically change their approach, the other key players—asset managers, corporate boards, and company executives—will likely remain trapped in value-destroying short-termism." Though the related constraints facing asset owners are many and varied, potential remedies include several common elements, namely: strengthening governance practices; refining the construction and use of benchmarks; minimizing principal—agent frictions; calibrating risk management to lean against the wind of excessive pessimism and optimism; and ensuring regulatory conventions do not amplify procyclicality at the worst possible times.

The findings and analysis in this paper raise a number of possible avenues for future research. On the empirical side, examination of a longer (and higher frequency) time series of individual asset owner portfolios could permit a richer understanding of institutional investment behavior, including how some of the characteristics documented in this study have evolved (if at all) over time. That is, has procyclicality become more or less pronounced over the past one or two decades, and if so, what have been the contributing factors?[44] Analysis of cross country experiences would be similarly valuable. In the effort to encourage more stabilizing, long-term investment, further analysis of optimal incentive structures in the investment community is likely required. Principal—agent issues pertain not just to asset owners and asset managers, but within asset owners themselves (i.e. between the investment staff and trustees, and trustees and the ultimate stakeholders). The role of consultants in amplifying procyclical investment behavior (an issue that looms larger in the United States than most countries) might also warrant closer examination. On the regulatory side, additional emphasis on initiatives designed to stimulate greater direct investment from long-term asset owners would be desirable—the application of capital relief and the judicious use of government guarantees with respect to greenfield infrastructure investment is a notable example. Finally, a more granular appraisal of the institutional and regulatory impediments to market stabilizing, long-term investment, as they reflect the idiosyncrasies of each class of asset owner, would be similarly welcome.

[44] For instance, increasing foreign participation in domestic markets has been shown to amplify procyclicality (see most recently, IMF, 2014)

Annex 1. Descriptive Statistics for Annual Changes in Asset Allocation Weights

Global Central Banks					
	Annual Changes in Asset Allocation Weights for:				
	U.S. Treasuries	U.S. Agencies	U.S. Credit	U.S. Equities	Gold
Average	-0.5%	0.2%	0.1%	0.3%	-0.3%
Median	-0.6%	0.5%	0.0%	0.4%	-0.3%
Standard Deviation	3.3%	3.0%	0.5%	1.6%	1.0%
Maximum	8.9%	5.5%	1.1%	2.7%	1.8%
Minimum	-5.2%	-6.7%	-1.0%	-3.7%	-1.9%
Skew	0.85	0.03	0.03	-0.74	0.28
Kurtosis	3.87	2.78	3.56	3.24	2.53
Jarque-Bera	3.82	1.21	0.33	2.35	0.72
P-value	0.15	0.55	0.85	0.31	0.70
Total Observations	25	25	25	25	32
Start of Sample	Jun-89	Jun-89	Jun-89	Jun-89	Jun-82
End of Sample	Jun-14	Jun-14	Jun-14	Jun-14	Jun-14

	U.S. Private Pensions		U.S. Public Pensions		U.S. Life Insurers	
	Annual Changes in Asset Allocation Weights for:					
	Fixed Income	Equities	Fixed Income	Equities	Fixed Income	Equities
Average	-0.2%	0.6%	-1.0%	1.1%	-1.0%	0.9%
Median	-0.1%	1.3%	-1.2%	0.5%	-1.5%	1.5%
Standard Deviation	2.9%	3.5%	3.3%	3.6%	2.5%	2.7%
Maximum	8.7%	5.7%	8.2%	7.5%	5.9%	5.0%
Minimum	-4.3%	-10.4%	-8.2%	-9.4%	-4.5%	-7.4%
Skew	0.99	-1.30	0.36	-0.55	1.10	-1.31
Kurtosis	4.41	5.26	4.59	4.41	4.03	4.66
Jarque-Bera	6.18	12.30	3.16	3.34	6.14	10.07
P-value	0.05	0.00	0.21	0.19	0.05	0.01
Total Observations	25	25	25	25	25	25
Start of Sample	Dec-89	Dec-89	Dec-89	Dec-89	Dec-89	Dec-89
End of Sample	Dec-14	Dec-14	Dec-14	Dec-14	Dec-14	Dec-14

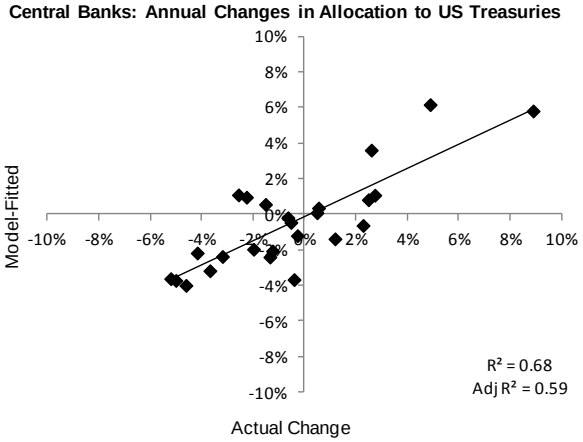
U.S. Endowments					
	Annual Changes in Asset Allocation Weights for:				
	Fixed Income	Equities	Private Equity	Hedge Funds	Real Estate
Average	-0.9%	-0.1%	0.3%	0.5%	0.1%
Median	-1.3%	0.0%	0.2%	0.5%	0.0%
Standard Deviation	1.7%	2.7%	0.5%	0.8%	0.4%
Maximum	2.0%	4.0%	1.9%	2.3%	0.8%
Minimum	-3.8%	-5.9%	-0.4%	-0.8%	-1.0%
Skew	0.39	-0.59	1.54	0.17	-0.58
Kurtosis	2.15	2.82	5.11	2.96	4.74
Jarque-Bera	1.17	1.26	12.23	0.10	3.83
P-value	0.56	0.53	0.00	0.95	0.15
Total Observations	21	21	21	21	21
Start of Sample	Jun-93	Jun-93	Jun-93	Jun-93	Jun-93
End of Sample	Jun-14	Jun-14	Jun-14	Jun-14	Jun-14

Notes: See Section II for a description of the underlying data series for each class of asset owner.

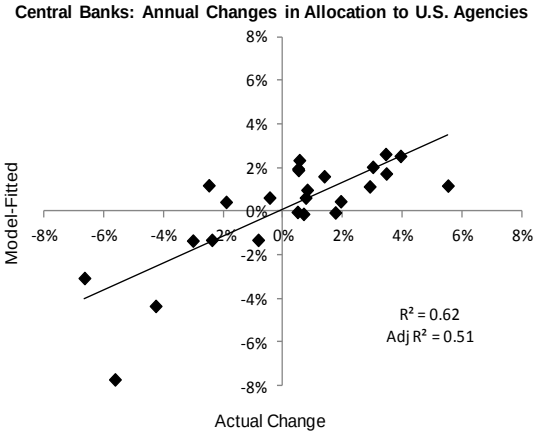
Annex 2. Actual vs. Model-Fitted Annual Changes in Asset Allocation Weights

Global Central Banks

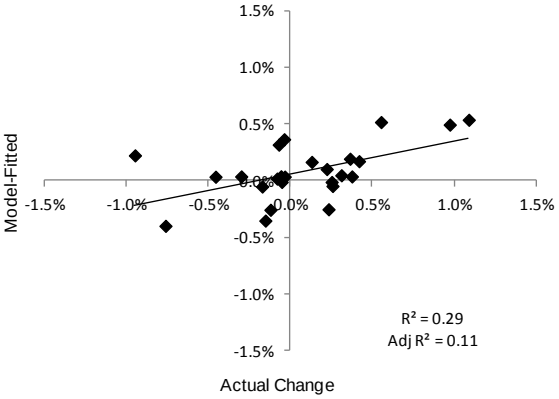
U.S. Treasuries



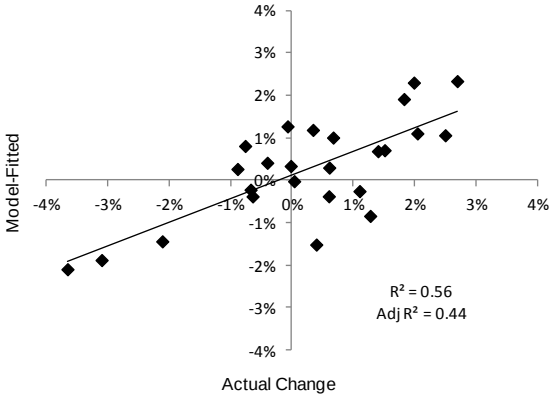
U.S. Agencies



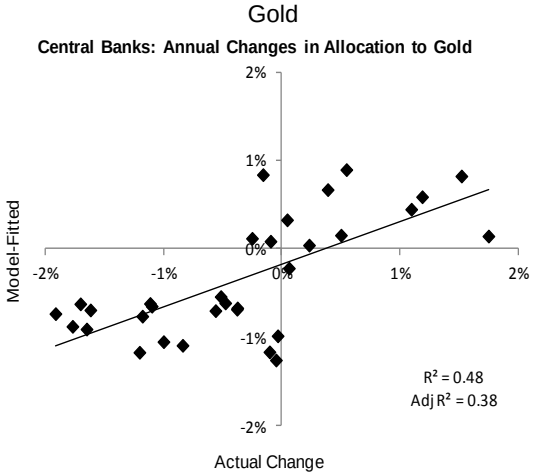
U.S. Credit



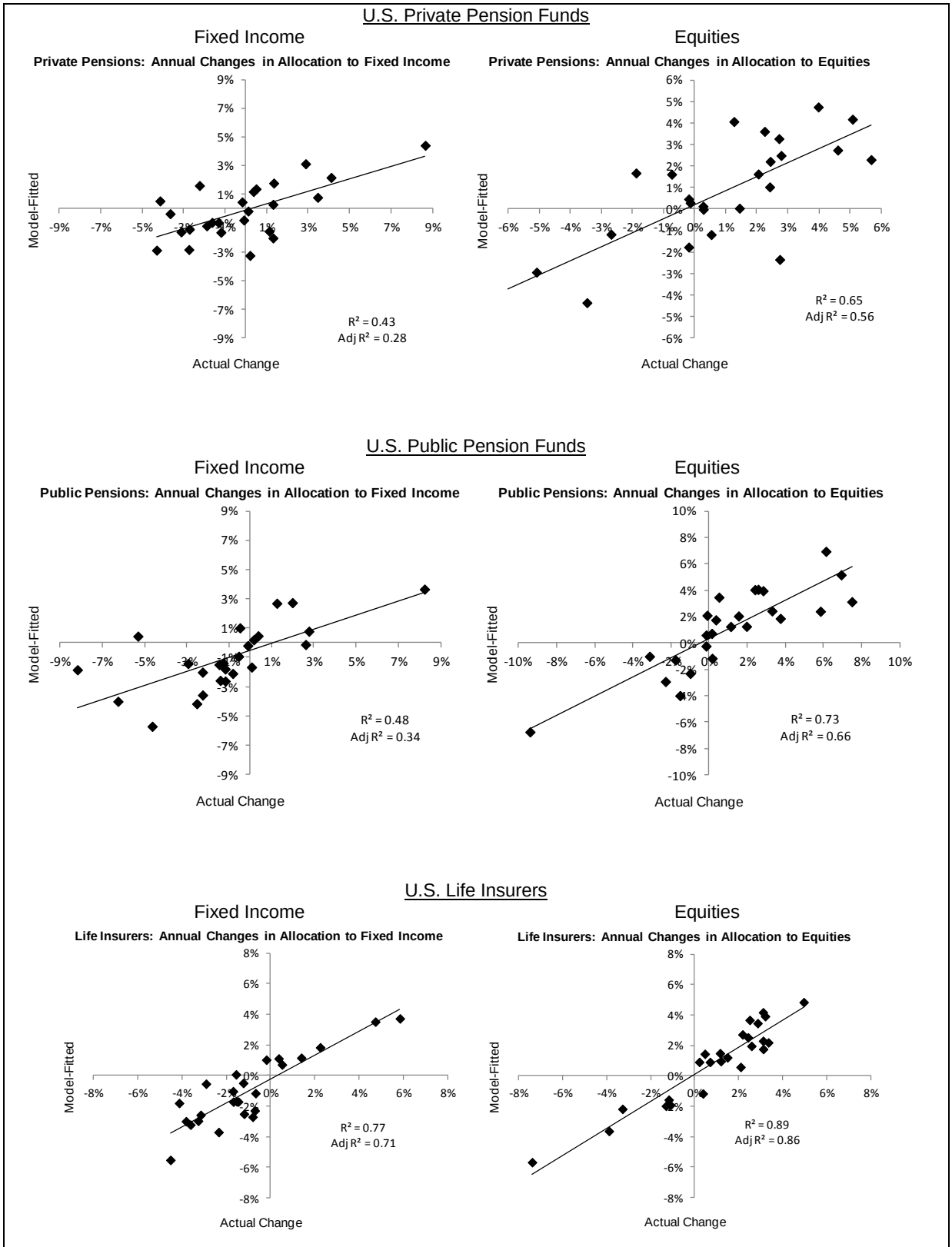
U.S. Equities



Gold



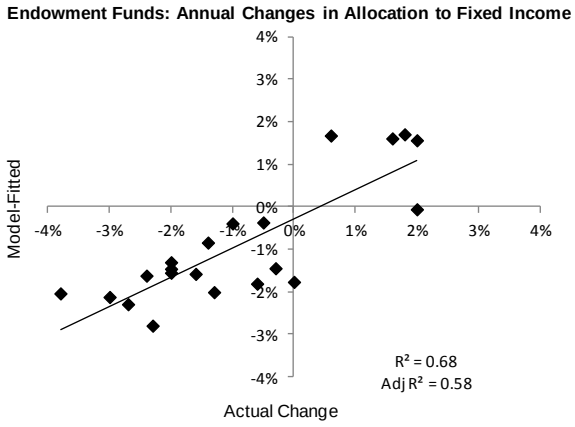
Notes: Model coefficients and standard errors presented in Table 2.



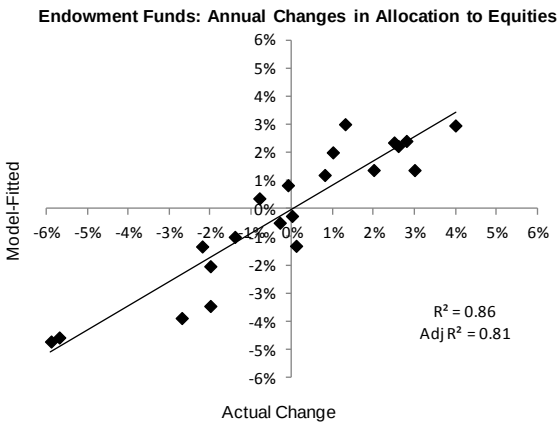
Notes: Model coefficients and standard errors presented in Table 3.

U.S. Endowment Funds

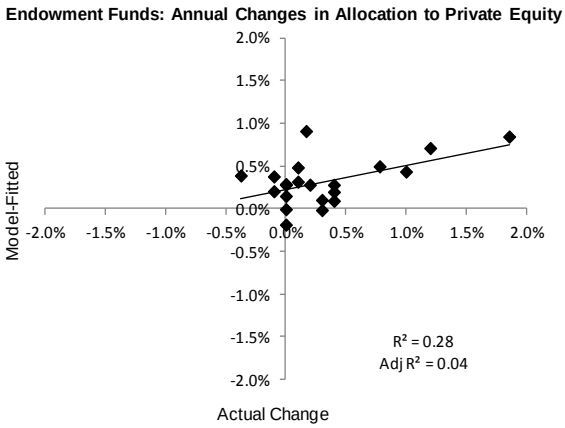
Fixed Income



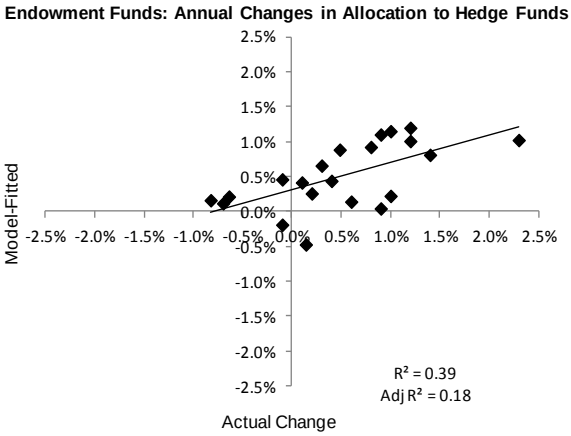
Equities



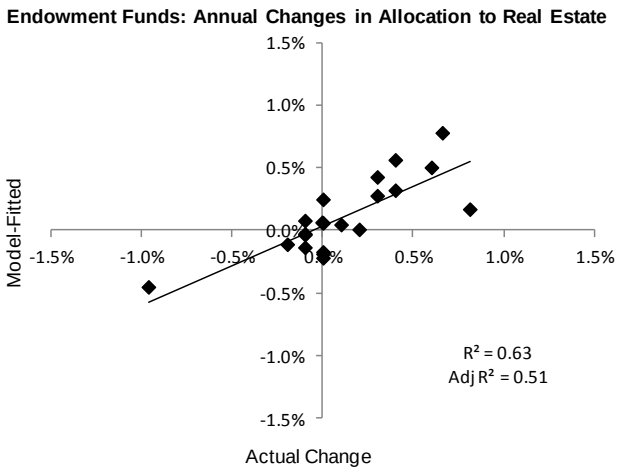
Private Equity



Hedge Funds



Real Estate



Notes: Model coefficients and standard errors presented in Table 4.

REFERENCES

Agarwal, Vikas, Naveen D. Daniel, and Narayan Y. Naik, 2002, "Determinants of MoneyFlow and Risk-Taking Behavior in the Hedge Fund Industry," Working Paper (London: London Business School).

Agarwal, Vikas, Naveen D. Daniel, and Narayan Y. Naik, 2005, "Role of Managerial Incentives, Flexibility, and Ability: Evidence from Performance and Money Flows in Hedge Funds," Working Paper (London: London Business School).

Allen, Franklin, and Douglas Gale, 2000, "Bubbles and Crises," *Economic Journal*, Vol. 110, No. 460, pp. 236-255.

Allen, Franklin, and Gary Gorton, 1993, "Churning Bubbles," *The Review of Economic Studies*, Vol. 60, No.4, pp. 813-836.

Ambachtsheer, Kevin, Craig Boice, Don Ezra, and John McLaughlin, 1995, "Excellence Shortfall in Pension Fund Management: Anatomy of a Problem," Ambachtsheer & Associates Working Paper (Toronto: Ambachtsheer & Associates).

Ambachtsheer, Kevin, Ronald Capelle, and Hubert Lum, 2008, "The Pension Governance Deficit: Still With Us," *Rotman International Journal of Pension Management*, Volume 1, Issue 1 (Fall), pp. 14-22.

Ambachtsheer, Kevin, and John McLaughlin, 2015, "How Effective is Pension Fund Governance Today, and Do Pension Funds Invest for the Long-term?" KPA Advisory Services Ltd. Working Paper.

Ang, Andrew, Amit Goyal, and Antti Ilmanen, 2014, "Asset Allocation and Bad Habits," *Rotman International Journal of Pension Management*, Vol. 7, Issue 2, pp. 16-27.

Ang, Andrew, and Knut Kjaer, 2011, "Investing for the Long Run," in *A Decade of Challenges: A Collection of Essays on Pensions and Investments*, edited by Tomas Franzen, pp. 94-111 (Stockholm: Andra AP-fonden, Second Swedish National Pension Fund).

AQR, 2014, "Bad Habits and Good Practices," White Paper (Greenwich: AQR Capital Management).

Arnott, Robert D., Jason C. Hsu, and John M. West, 2008, *The Fundamental Index: A Better Way to Invest* (New Jersey: John Wiley & Sons, Inc.).

Bailey, Warren, Alok Kumar, and David Ng, 2011, "Behavioral Biases of Mutual Fund Investors," *Journal of Financial Economics*, Vol. 102, Issue 1, pp. 1–27.

Baltas, Nikolaos, and Robert Kosowski, 2015, "Demystifying Time-Series Momentum Strategies: Volatility Estimators, Trading Rules and Pairwise Correlations," Imperial College Business School Working Paper (London: UK).

Bank of England, 2014, "Procyclicality and Structural Trends in Investment Allocation by Insurance Companies and Pension Funds," Discussion Paper (London: UK).

Baquero, Guillermo, and Marno Verbeek, 2005, "A Portrait of Hedge Fund Investors: Flows, Performance and Smart Money," Working Paper (Rotterdam: Erasmus University Research Institute of Management).

Barton, Dominic, and Mark Wiseman, 2014, "Focusing Capital on the Long-term," *Harvard Business Review*, January.

van Binsbergen, Jules H., Michael W. Brandt, and Ralph S.J. Koijen, 2008, "Optimal Decentralized Investment Management," *Journal of Finance*, Vol. 63, No. 4, August, pp. 1849-1895.

Blake, David, Lucio Sarno, and Gabriele Zinna, "The Market for Lemmings: The Investment Behavior of Pension Funds," The Pensions Institute Cass Business School Working Paper No. 1367-580X (London: City University).

Brennan, Michael, 1993, "Agency and Asset Pricing," Finance Working Paper No. 6-93 (Los Angeles: University of California at Los Angeles).

Brennan, Michael, and Feifei Li, 2008, "Agency and Asset Pricing," UCLA Working Paper, March (Los Angeles: University of California at Los Angeles).

Carhart, Mark, 1997, "On Persistence in Mutual Fund Performance," *The Journal of Finance*, Vol. 52, No. 1 (March), pp. 57-82.

CFA Institute, 2006, "Breaking the Short-term Cycle," CFA Center for Financial Market Integrity White Paper (New York: CFA Institute).

Chevalier, Judith, and Glenn Ellison, 1997, "Risk-Taking by Mutual Funds as a Response to Incentives," *Journal of Political Economy*, Vol. 105, Issue 6, pp. 1167-1200.

Dasgupta, Amil, Andrea Prat, and Michela Verardo, 2011, "The Price Impact of Institutional Herding," *Review of Financial Studies*, Vol. 24, Issue 3, pp. 892-925.

Dichev, Ilia D., 2007, "What are Stock Investors' Actual Historical Returns? Evidence from Dollar-Weighted Returns," *American Economic Review*, Vol. 97, Issue 1, pp. 386-401.

Dichev, Ilia D., and Gwen Yu, 2011, "Higher Risk, Lower Returns: What Hedge Fund Investors Really Earn," *Journal of Financial Economics*, Vol. 100, Issue 2, pp. 248-263.

Donoho, David L., Robert A. Crenian, and Matthew H. Scanlan, 2010, "Is Patience a Virtue? The Unsentimental Case for the Long View in Evaluating Returns," *The Journal of Portfolio Management*, Vol. 37, No. 1, Fall, pp. 105-120.

Elliott, Douglas J., 2014, "Systemic Risk and the Asset Management Industry," Brookings Working Paper (Washington: Brookings Institute).

Ellis, Charles D., 2012, "Murder on the Orient Express: The Mystery of Underperformance," *Financial Analysts Journal*, Vol. 68, No. 4, pp. 13-19.

Feroli, Michael, Anil K. Kashyap, Kermit Schoenholtz, and Hyun Song Shin, 2014, "Market Tantrums and Monetary Policy," Working Paper presented at the 2014 U.S. Monetary Policy Forum, New York, February 28.

Financial Stability Board, 2015, "Assessment Methodologies for Identifying Non-Bank Non-Insurer Global Systemically Important Financial Institutions: Proposed High-Level Framework and Specific Methodologies," Second Consultative Document (Basel: Switzerland).

Financial Stability Forum, 2009, "Report of the Financial Stability Forum on Addressing Procyclicality in the Financial System," April (Basel: Switzerland).

Financial Stability Oversight Council, 2013, "Asset Management and Systemic Risk," White Paper (Washington: U.S. Department of the Treasury).

Focusing Capital on the Long-term Initiative, 2015, "A Roadmap for Focusing Capital on the Long-term," Working Paper, March.

Friesen, Geoffrey, and Travis Sapp, 2007, "Mutual Fund Flows and Investor Returns: An Empirical Examination of Fund Investor Timing Ability," *Journal of Banking & Finance*, Vol. 31, Issue 9, pp. 2796-2816.

Goyal, Amit, and Sunil Wahal, 2008, "The Selection and Termination of Investment Management Firms by Plan Sponsors," *Journal of Finance*, Vol. 63, Issue 4, pp. 1805-1847.

Grantham, Jeremy, 2012, "My Sister's Pension Assets and Agency Problems: The Tension Between Protecting Your Job and Your Client's Money," GMO Quarterly Letter, April (Boston: GMO).

G20-OECD, 2012, "High-level principles of Long-term Investment Financing by Institutional Investors," White Paper (Paris: OECD).

Heisler, Jeffrey, Christopher Knittel, John Neumann, and Scott Stewart, 2007, "Why Do Institutional Plan Sponsors Fire Their Investment Managers?" *Journal of Business and Economic Studies,* Vol. 13, Issue 1, pp. 88-115.

Ilmanen, Antti, 2011, Expected *Returns: An Investor's Guide to Harvesting Market Rewards* (New York: John Wiley & Sons).

Impavido, Gregorio, and Ian Tower, 2009, "How the Financial Crisis Affects Pensions and Insurance and Why the Impacts Matter," IMF Working Paper 09/151 (Washington: International Monetary Fund).

International Monetary Fund, 2014, "How Do Changes in the Investor Base and Financial Deepening Affect Emerging Market Economies," Global Financial Stability Report, April (Chapter 2), (Washington: International Monetary Fund).

International Monetary Fund, 2015, "The Asset Management Industry and Financial Stability," Global Financial Stability Report, April (Chapter 3), (Washington: International Monetary Fund).

Ippolito, Richard A., 1992, "Consumer Reaction to Measures of Poor Quality: Evidence from the Mutual Fund Industry," *Journal of Law and Economics,* Vol. 35, Issue 1, pp. 45-70.

Jin, Li, 2005, "How Does Investor Short-termism Affect Mutual Fund Manager Short-termism?," Working Paper (Cambridge: Harvard Business School).

Jones, Brad, 2012, "Navigating the Long Run: A Strategic Asset Allocation Framework for Sovereign Wealth Funds, Pension Funds and Endowments," Global Macro Issues (London: Deutsche Bank).

Jones, Brad, 2013, "Leaning Against the Wind: Reflections on Institutionalizing Countercyclical Investment," *Journal of Wealth Management,* Vol. 16, No. 1, pp. 85-89.

Jones, Brad, 2015, "Asset Bubbles: Rethinking Policy for the Age of Asset Management," IMF Working Paper 15/27 (Washington: International Monetary Fund).

Keynes, John M., 1936, *The General Theory of Employment, Interest, and Money* (New York: Harcourt Brace).

Keynes, John M., 1931 (1963), "The Consequences to the Banks of the Collapse in Money Values," in *Essays in Persuasion*, edited by Keynes, John M. (London: Macmillan).

Lakonishok, Josef, Andrei Shleifer, and Robert Vishny, 1992, "The Structure and Performance of the Money Management Industry," *Brookings Papers on Economic Activity: Microeconomics,* pp. 339–391.

Lauricella, Tom, "Funds Struggle to Resist Bubble Mentality," Wall Street Journal, March 8. Available on the internet at: http://www.wsj.com/articles/mutual-funds-struggle-to-resist-bubble-mentality-1425870190.

Lou, Dong, 2012, "A Flow-Based Explanation for Return Predictability," *The Society for Financial Studies*, Vol. 25, No. 12, pp. 3457-3488.

Lux, Thomas, 1995, "Herd Behaviour, Bubbles and Crashes*," Economic Journal*, Vol. 105, No. 431, pp. 881–896.

Ma, L., Yuehua Tang, and Juan-Pedro Gómez, 2015, "Portfolio Manager Compensation in the U.S. Mutual Fund Industry," Working Paper (Atlanta: Georgia State University).

Maug, Ernst, and Narayan Naik, 1996, "Herding and Delegated Portfolio Management," Working Paper (London: London Business School).

McKinsey & Company, 2013, "Strong Performance but Health Still Fragile: Global Asset Management in 2013 – Will the Goose Keep Laying Golden Eggs?" White Paper.

Merrill, Craig B., Taylor D. Nadauld, Rene M. Stulz, and Shane Sherland, 2012, "Did Capital Requirements and Fair Value Accounting Spark Fire Sales in Distressed Mortgage-Backed Securities?" Working Paper No. 18270 (Cambridge: National Bureau for Economic Research).

Morningstar, 2014, "A Global Guide to Strategic-Beta Exchange-Traded Products," White Paper.

Moskowitz, Tobias J., Yao H. Ooi, and Lasse H. Pedersen, 2012, "Time Series Momentum," *Journal of Financial Economics*, Vol. 104, Issue 2, pp. 228-250.

Novick, Barbara, Ben Golub, Richard Kushel, Joanna Cound, Joanne Medero, and Alexis Rosenblum, 2014, "Who Owns the Assets?" Blackrock Viewpoint.

OECD, 2014, "Institutional Investors and Long-term Investment?" Project Report (Paris: OECD).

Papaioannou, Michael G., Joonkyu Park, Jukka Pihlman, and Han van der Hoorn, 2013, "Procyclical Behavior of Institutional Investors During the Recent Financial Crisis: Causes, Impacts, and Challenges," IMF Working Paper 13/193 (Washington: International Monetary Fund).

Pihlman, Jukka, and Han van der Hoorn, 2010, "Procyclicality in Central Bank Reserve Management: Evidence from the Crisis," IMF Working Paper 10/150 (Washington: International Monetary Fund).

Porter, Gary E., and Jack W. Trifts, 2014, "The Career Paths of Mutual Fund Managers: The Role of Merit," *Financial Analysts Journal*, Vol. 70, No. 4, pp. 55-71.

Rajan, Raghuram G., 2005, "Has Financial Development Made the World Riskier?" Working Paper 11728 (Cambridge: National Bureau of Economic Research).

Sapp, Travis and Ashish Tiwari, 2004, "Does Stock Return Momentum Explain the Smart Money Effect?" *Journal of Finance*, Vol. 59, No. 6, pp. 2605–2622.

Scharfstein, David S., and Jeremy C. Stein, 1990, "Herd Behavior and Investment," *American Economic Review*, Vol. 80, No. 3, pp. 465-79.

Securities and Exchange Commission, 2008, "*Report and Recommendations Pursuant to Section 133 of the Emergency Economic Stabilization Act of 2008: Study on Mark-To-Market Accounting*," Office of the Chief Accountant Division of Corporation Finance (Washington: U.S. Securities and Exchange Commission).

Sirri, Erik R., and Peter Tufano, 1998, "Costly Search and Mutual Fund Flows," *Journal of Finance*, Vol. 53, No. 5, pp. 1589-1621.

Starks, Laura, 1987, "Performance Incentive Fees: An Agency Theoretic Approach," *Journal of Financial and Quantitative Analysis*, Vol. 22, No. 1 (March), pp. 17–32.

Stein, Jeremy C., 2004, "Why Are Most Funds Open-End? Competition and the Limits of Arbitrage," Working Paper No. 10259 (Cambridge: National Bureau of Economic Research).

Stein, Jeremy C., 2013, "Overheating in Credit Markets: Origins, Measurement, and Policy Responses," At the "Restoring Household Financial Stability after the Great Recession: Why Household Balance Sheets Matter," Research Symposium, sponsored by the Federal Reserve Bank of St. Louis, St. Louis, Missouri, February 7.

Stewart, Scott, John Neumann, Christopher Knittel, and Jeffrey Heisler, 2009, "Absence of Value: An Analysis of Investment Allocation Decisions by Institutional Plan Sponsors," *Financial Analysts Journal*, Vol. 65, Issue 6, pp. 34-51.

Swenson, David, 2009, *Pioneering Portfolio Management: An Unconventional Approach to Institutional Investment* (New York: Free Press).

Vayanos, Dimitri and Paul Woolley, 2013, "An Institutional Theory of Momentum and Reversal," *The Review of Financial Studies*, Vol. 26, No. 5, pp. 1087-1145.

World Economic Forum, 2011, "The Future of Long-term Investing," Report in Collaboration with Oliver Wyman (Geneva).