ARIZONA STATE RETIREMENT SYSTEM

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Paul Matson
Director

NOTICE AND AGENDA OF PUBLIC MEETING AND POSSIBLE EXECUTIVE SESSION OF THE ARIZONA STATE RETIREMENT SYSTEM INVESTMENT COMMITTEE

3300 North Central Avenue
14th Floor Conference Room
Phoenix, Arizona 85012

April 25, 2016
2:30 p.m.

Pursuant to A.R.S. § 38-431.02, notice is hereby given to the members of the Arizona State Retirement System (ASRS) Investment Committee (IC) and to the general public that the IC will hold a public meeting April 25, 2016 beginning at 2:30 p.m., in the 14th Floor Conference Room of the ASRS office, 3300 North Central Avenue, Phoenix, Arizona. As indicated in the following agenda, the IC may vote to go into executive session, which will not be open to the public, to discuss certain matters. IC Trustees may attend either in person or by telephone conference call.

Pursuant to A.R.S. § 38-431.03(A)(3), the IC may vote to go into executive session, which will not be open to the public, for the purpose of obtaining legal advice on any item on the agenda.

This is a regularly scheduled meeting of the IC; however, due to possible attendance by other ASRS Board Trustees, this meeting may technically become a meeting of the Board or one of its Committees. Actions taken will be consistent with IC governance procedures. Actions requiring Board authority will be presented to the full Board for final decision.

The Chair may take public comment during any agenda item. If any member of the public wishes to speak to a particular agenda item, they should complete a Request to Speak form indicating the item and provide it to the Committee Administrator.

This meeting will be teleconferenced to the ASRS office in Tucson, 4400 E. Broadway Blvd., Suite 200, Tucson, AZ 85711. The conference call to Tucson will be disconnected after 15 minutes if there are no attendees in the Tucson audience.

The Agenda for the meeting is as follows:

1. Call to Order; Roll Call (estimated time 4 min.) ..... Mr. Tom Connelly
   Chair, Investment Committee

2. Approval of Minutes of the February 22, 2016 IC Meeting (Action item; estimated time 1 min.) .... Mr. Tom Connelly

The IC may vote to discuss the following agenda item involving personnel matters in executive session pursuant to A.R.S. § 38-431.03(A)(1).

3. Presentation, Discussion, and Appropriate Action Regarding the ASRS Investment Management Division's (IMD) Reorganization and Work Processes (Informational and discussion item; estimated time 15 min.) ..... Mr. Karl Polen
Chief Investment Officer, ASRS

   Objective:
   Mr. Polen will present, and the IC will discuss information about the reorganization of IMD and the implementation of new work processes. No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.

4. Presentation, Discussion, and Appropriate Action Regarding the ASRS House Views and General Discussion (Informational and discussion item; estimated time 20 min.) .... Mr. Karl Polen
..... Ms. Kerry White
Assistant Chief Investment Officer for Reporting, Compliance & Administration, ASRS
..... Mr. Al Alaimo
Sr. Portfolio Manager of Fixed Income, Cash, and Liquid Alternatives, ASRS
..... Mr. Eric Glass
Sr. Portfolio Manager of Private Markets, ASRS
..... Mr. Cole Smith
Portfolio Manager of Equities, ASRS
..... Mr. John Kwon
Portfolio Manager of Equities, ASRS
..... Mr. Micheal Copeland
Assistant Portfolio Manager of Real Estate, ASRS
..... Ms. Lupita Breland
Sr. Portfolio Analyst, ASRS
..... Mr. John Doran
Assistant Portfolio Manager of Cash and Liquid Alternatives, ASRS

   Objective:
   The IC and ASRS team will discuss house views and other matters of interest. No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.

The IC may vote to discuss the following matter in executive session pursuant to A.R.S. §§ 38-431.03(A)(2) and 38-718(P) to consider specific manager data that is deemed proprietary information.

5. Presentation, Discussion, and Appropriate Action Regarding Portfolio Position, Performance, and Risk Report (Informational and discussion item; estimated time 15 min.)..... Mr. Paul Matson
Director, ASRS
..... Mr. Karl Polen
..... Mr. Al Alaimo
..... Mr. Eric Glass
..... Ms. Kerry White
..... Mr. Kien Trinh
Assistant Vice President, Risk Services, State Street Investment Analytics

   Objective:
   The IC will discuss portfolio positioning, current tactical views, investment performance and the State Street risk report. No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.

The IC may vote to discuss the following matter in executive session pursuant to A.R.S. §§ 38-431.03(A)(2) and 38-718(P) to consider specific manager data that is deemed proprietary information.

6. Presentation, Discussion, and Appropriate Action Regarding Asset Class Committee Reports (Informational and discussion item; estimated time 20 min.) ..... Mr. Karl Polen
   ..... Mr. Paul Matson

   Objective:
   The chairs of the asset class committees will report on any activity since the last investment committee meeting. No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.

The IC may vote to discuss the following matter in executive session pursuant to A.R.S. §§ 38-431.03(A)(2) and 38-718(P) to consider specific manager data that is deemed proprietary information.

7. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight of the ASRS Investment Program (Informational and discussion item; estimated time 10 min.) ..... Mr. Allan Martin
   Partner, NEPC
   ..... Mr. Dan LeBeau
   Consultant, NEPC

   Objective:
   NEPC will report on their monitoring of the ASRS investment program. No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.

8. Presentation, Discussion, and Appropriate Action Regarding Working Group Reports (Informational and discussion item; estimated time 15 min.) ..... Ms. Lupita Breland
   ..... Mr. John Doran

   Objective:
   Members of the cash management working group will describe to the IC its work in optimizing methods of cash management and assetization in order to minimize transaction costs and performance drag. No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.

The IC may vote to discuss the following matter in executive session pursuant to A.R.S. §§ 38-431.03(A)(2) and 38-718(P) to consider specific manager data that is deemed proprietary information.

9. Presentation, Discussion, and Appropriate Action Regarding Public Equities Asset Class Presentation (Informational and discussion item; estimated time 40 min.) ..... Mr. Cole Smith
   ..... Mr. John Kwon

   Objective:
   The public equities team will update the IC on the public equities asset class. No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.

The IC may vote to discuss the following matter in executive session pursuant to A.R.S. §§ 38-431.03(A)(2) and 38-718(P) to consider specific manager data that is deemed proprietary information.

10. Presentation, Discussion, and Appropriate Action Regarding Private Equities Asset Class Presentation (Informational and discussion item; estimated time 40 min.)..... Mr. Eric Glass

    Objective:
    Mr. Glass will update the IC on the private equities asset class. No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.

11. Request for Future Agenda Items (Informational and discussion item; estimated time 5 min.) .....
    ..... Mr. Tom Connelly
    ..... Mr. Karl Polen

12. Call to the Public ..... Mr. Tom Connelly

Those wishing to address the IC are required to complete a Request to Speak form before the meeting indicating their desire to speak. Request to Speak forms are available at the sign-in desk and should be given to the IC Administrator. IC Trustees may not discuss items that are not specifically identified on the agenda. Therefore, pursuant to A.R.S. § 38-431.01(H), action taken as a result of public comment will be limited to directing staff to study the matter, responding to any criticism or scheduling the matter for further consideration and decision at a later date.

13. The next ASRS IC Meeting is scheduled for Monday, June 20, 2016 at 2:30 p.m., at 3300 N. Central Avenue, 14th Floor Conference room, Phoenix, Arizona.

14. Adjournment of the ASRS IC Meeting

A copy of the agenda background material provided to IC Trustees (with the exception of material relating to possible executive sessions) is available for public inspection at the ASRS offices located at 3300 North Central Avenue, 14th Floor, Phoenix, Arizona, and 4400 E. East Broadway Boulevard, Suite 200, Tucson, Arizona 85711. The agenda is subject to revision up to 24 hours prior to meeting. These materials are also available on the ASRS website (https://www.azasrs.gov/web/BoardCommittees.do) approximately 48 hours prior to the meeting

Persons with a disability may request a reasonable accommodation such as a sign language interpreter or alternate formats of this document by contacting Tracy Darmer, ADA Coordinator at (602) 240-5378 in Phoenix, at (520) 239-3100, ext. 5378 in Tucson or 1-800-621-3778, ext. 5378 outside metro Phoenix or Tucson. Requests should be made as early as possible to allow time to arrange the accommodations

Dated April 13, 2016

ARIZONA STATE RETIREMENT SYSTEM

SIGNED COPY ON FILE	*SIGNED COPY ON FILE*
Gloria Montiel	Karl Polen
Committee Administrator	Chief Investment Officer

Agenda Item #2

ARIZONA STATE RETIREMENT SYSTEM

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Paul Matson
Director

MINUTES OF THE PUBLIC MEETING OF THE
ARIZONA STATE RETIREMENT SYSTEM
INVESTMENT COMMITTEE

HELD ON
Monday, February 22, 2016
2:30 p.m.

The Arizona State Retirement System (ASRS) Investment Committee (IC) met at 3300 N. Central Avenue, 14th Floor, Phoenix, AZ 85012. The meeting was also teleconferenced to the ASRS office at 4400 E. Broadway Boulevard, Suite 200, Tucson, Arizona 85711.

Mr. Tom Connelly, Chair, called the meeting to order at 2:37 p.m.

1. Call to Order; Roll Call; Opening Remarks

Present: Mr. Tom Connelly, Chair
Prof. Dennis Hoffman
Mr. Robert Wadsworth

Absent: Mr. Lorenzo Romero

A quorum was present for the purpose of conducting business.

2. Approval of Minutes of the October 26, 2015 Investment Committee Meeting Minutes

Motion: Mr. Robert Wadsworth moved to approve the minutes of the November 30, 2015 public meeting. Prof. Dennis Hoffman seconded the motion.

By a vote of 3 in favor, 0 opposed, 0 abstention, and 1 excused, the motion was approved.

3. Presentation, Discussion, and Appropriate Action Regarding ASRS Investment Program Updates

Mr. Gary Dokes, Chief Investment Officer (CIO), introduced himself and turned the meeting over to IMD Portfolio Managers (PM) to discuss their perspectives on the market, House Views and provide an update on their respective asset classes.

Mr. Underwood, Sr. Portfolio Manager of Public Equities, provided an update on Public Equities; Mr. Al Alaimo, Fixed Income Portfolio Manager, provided and update on Fixed Income, and Mr. Eric Glass, Private Markets Portfolio Manager, provided an update on Private Equity and Commodities.

Mr. Kien Trinh, State Street Investment Analytics, presented the State Street Risk Report. He discussed the monthly reallocation summary, month-end risk profile and total plan overview exposure.

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4. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight of the ASRS Investment Program – Includes Total Fund and Investment Performance Report Q4-15

Mr. Allan Martin, NEPC Consultant, provided the Committee with a brief overview of NEPC's oversight of the ASRS Investment Program.

Performance results: (as of December 30, 2015)

- 7.5% (20-year annualized net return) vs. 8% (actuarial assumed interest rate)

	Quarter	**1 Year**	**3 Years**	5 Years	10 Years	Since Inception 06/30/75
Total Fund	2.7%	**1.83%**	**8.3%**	7.8%	6.1%	9.7%
Interim SAA Policy*	1.6%	**-0.4%**	**6.7%**	6.9%	5.6%	9.4%
Excess Return	1.1%	**1.7%**	**1.6%**	0.9%	0.5%	0.3%

***Interim SAA Policy:** 21% S&P 500/3% S&P 400/3% S&P 600/18% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/15% Barclays Capital Aggregate/4% Barclays Capital High Yield/6% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/8% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodity Index/5% Multi Asset Class Custom Index*

Note: Interim SAA Policy includes proration of 2% Real Estate and 4% Private Debt which are unfunded. Real Estate was prorated to equity and fixed income; Private Debt was prorated to fixed income. Recently approved Strategic Asset Allocation Policy effective April 1, 2015.

5. Presentation, Discussion, and Appropriate Action Regarding the Public Equity Portfolio Trade Analysis

Mr. Underwood, provided the Committee with a brief description of the trade cost analysis conducted by Elkins-McSherry. He noted such reports benefit the ASRS Investment Management Division (IMD) by serving as a managing tool designed to provide a full analysis of trading cost for both internal and externally managed public equity portfolios. He then turned the meeting over to John Papa, Client Service Representative with Elkins-McSherry.

Mr. Papa addressed the Committee with a comprehensive analysis of total transaction costs, commissions, fees and market impact, noting execution costs are scored relative to institutional universes that are maintained and continually updated in the Elkins-McSherry database.

6. Request for Future Agenda Items

There were no requests for future agenda items.

7. Call to the Public

No members of the public requested to speak.

8. Adjournment

The meeting adjourned at 4:35 p.m.

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Respectfully submitted,

ARIZONA STATE RETIREMENT SYSTEM

Gloria Montiel Date	Paul Matson Date
Investment Committee Administrator	Director

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Agenda Item #3

IMD Reorganization

Karl Polen

Arizona State Retirement System

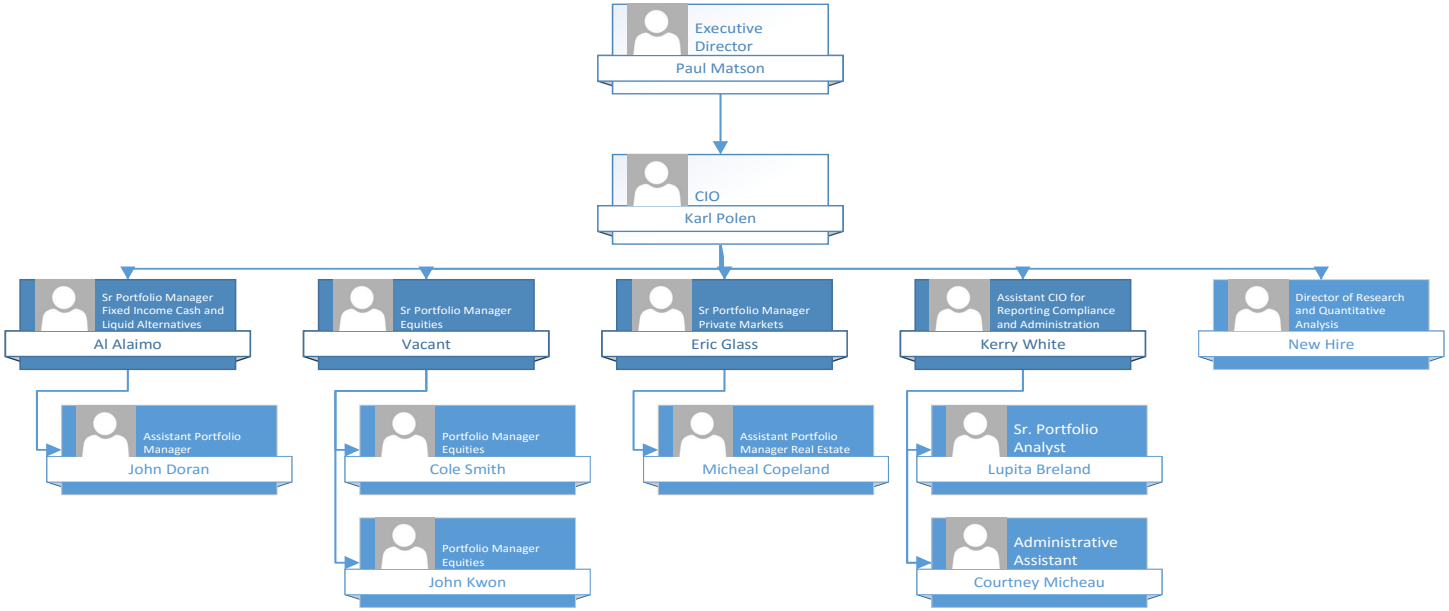
April 25, 2016

New Organization Chart

- The ASRS has adopted a new organization chart (found on the following page)
- We have retained functional organization around asset classes with Sr. Portfolio Managers responsible for equities, fixed income (including cash and liquid alternatives) and private markets
- We have refocused the Assistant CIO role to manage reporting, legal and compliance matters

IMD Organization Chart

Investment Management Organization



Notes:
1. The Investment Strategy Committee is a committee of the whole co-chaired by the Exec. Director and CIO. It decides policy matters and refers investments for decision to asset class committees for review pursuant to SIP006.
2. The Tactical Positioning Committee makes tactical and rebalance decisions. Its members are the Exec. Director, CIO, Asst. CIO and each of the Sr. Portfolio Managers.
3. Asset Class Committees include the Exec. Director, CIO, Asst. CIO and relevant portfolio managers. They are established pursuant to SIP006 and make investment decisions in accordance with the requirements of SIP006.
4. Various working groups are established for projects and continuing processes. Working groups report to the Investment Strategy Committee. The Exec. Director and CIO are active participants on various working groups.

Committees

- Investment Strategy
  - Committee includes all members of IMD
  - Meets weekly
  - Co-Chaired by CIO and Executive Director
  - Considers all investment and policy matters
  - Refers investments to Asset Class committees when required under SIP006
- Tactical Positioning
  - Members include the Executive Director, CIO, Assistant CIO and the Sr. Portfolio Managers
  - Reviews portfolio positioning and makes rebalance and tactical repositioning decisions
- Asset Class Committees
  - Established pursuant to and operate as required under SIP006
  - Members include the Executive Director, CIO, Assistant CIO and applicable portfolio managers
  - Meet as needed, generally monthly

Working Groups

- Working groups are established to deal with various investment, policy and administrative matters
- Working groups can be standing or temporary
- They tend to be interdisciplinary for coordination and cross-training opportunities
- A list of working groups and their membership is on the following page

Working Groups

	Active Management	ASRS Market Value Report	Bridgewater	Cash Mgmt/Assetization	Compliance	Data Services and Subscriptions	Enterprise Risk Managemetn	Facilities and Technology	Factors and Smart Beta	FX for Tactical Positioning	IMD Master Calendar	IMD Web Pages and IQ	Internal Portfolio Review	Legal Process	LTD	Performance Measurement	Reporting Content	Risk Management	Securities Litigation	Tactical Positionins
Al Alaimo	X									X				X						X
Cole Smith			X			X				X			X			X				
Courtney Micheau								X			X	X		X			X			
Eric Glass	X		X			X			X	X										X
John Doran		X	X	X		X				X		X	X		X	X				
John Kwon	X			X					X									X	X	
Karl Polen	X	X						X	X				X			X	X			
Kerry White					X		X	X			X	X		X			X			X
Lupita Breland				X	X		X						X		X		X	X	X	
Micheal Copeland		X			X	X		X								X				
Paul Matson									X				X							

Culture

- Emphasis on cross-disciplinary approach – No Silos
- Evidence based with commitment honest, respectful communication
- Soft boundaries on job descriptions – emphasize cross-disciplinary collaboration and cross-training opportunities

Agenda Item #4

ARIZONA STATE RETIREMENT SYSTEM
INVESTMENT MANAGEMENT HOUSE VIEWS

(Notable changes from the previous month are highlighted in RED)

APRIL 2016

U.S. EQUITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **NEUTRAL**
   - Economic data still shows stable, sub-trend growth in 2015.
   - U.S. unemployment, is displaying sustained improvement. Income growth has not, although some localized instances of upward pressure has begun to surface.
   - Inflation remains generally subdued; disinflation may surface as the greater risk.
   - Liquidity remains generally available; Federal Reserve policy is accommodative even without the asset purchases program.
   - Overall U.S. corporate profits growth has decelerated, mostly due to the impact of lower energy prices; revenues are still in a modest uptrend; high profit margins are no longer expanding.

2. Valuations: **NEUTRAL**
   - U.S. equity markets have been more volatile, with a downward bias since year-end 2015. The mixed macro data, downward revisions to corporate growth estimates, apprehension over the timing of upward resets to interest rates, more volatile foreign exchange markets and anxieties that negative spill-overs may emanate from the energy sector issues have weighed heavily on equities.
   - Though marginally rich, price/earnings multiples remain near historic averages: S&P 500, 13.8x- 15.9x; S&P MID, 15.7x-16.6x; S&P SC600, 16.7x-19.4x.
   - Historic P/Es imply advances of 13-19% for mid and small caps; 10-15% for S&P 500.
   - Still rising earnings and low yields on 10-Yr Treasury notes combine for equity risk premiums that are favorably above the 4.0% long-range average for large caps, whereas those of mid- and small-caps are around 4.0%.

3. Sentiment: **NEUTRAL**
   - Higher short-term caution as heightened and prolonged volatility has imparted a downside bias to what had formerly been an essentially trendless equity market late in 2015.
   - Investors appear to have a reduced demand for risk-oriented assets.
   - The strong U.S. Dollar no longer appears to be attracting asset flows from offshore into U.S. equities.

Commentary:

The "NEUTRAL" opinions for Fundamentals Valuations and Sentiment are unchanged.

Staff continued reducing the allocation to U.S. Equities through moving USD750MN or 2.25% of the Total Fund to the non-U.S. Equities category - EAFE asset sub-class during the first week of April. U.S. equities in the Total Fund are now underweight marginally versus the interim SAA policy targets. This reflects both an increasingly cautious intermediate-term stance should capital market volatility as well as a more clouded outlook over the intermediate term for U.S. equity returns, in general; more modest returns seem likeliest yet there are some offsets.

The equity markets have been undergoing "risk off" corrections, driven primarily by deteriorating market sentiment stemming mainly from mounting concerns that the U.S. economy is nearing recession. The secular rising U.S. equity market (i.e., "bull-market") that has been in place since the 2008-2009 Global Financial Crisis is certainly maturing, yet still appears to have further to run over the longer term despite intermittent selloffs. There simply isn't the number of warning signs, nor the magnitudes, present as there were at this stage in the 2000 and 2007 ("bear") market declines. To cite just a few: Federal Reserve January 2016 forecasting models estimate less than 4% probability of recession in the next 12 months, whereas they estimated greater than 40% probability of such in 2007; only 25% of U.S. manufacturing sectors are currently experiencing anything near to recession conditions; personal mortgage debt outstanding is less than 25% of total debt, versus 30%+ in 2007; wages and the number of jobs are rising but they plateaued, and then fell, in 2009.

Certainly, some conditions that are more associated with late-stage market/business cycles – flattening of both profit margin expansion and revenue growth, primarily – have surfaced and do present head winds to the secular trend for stocks. However, much of that impairment is due to a strong USD as well as collateral effects from the imbalances within the energy sector. USD strength is a function of a reasonably solid economy and valid monetary policy. As the latter shifts slowly toward neutrality, it remains lenient and quite unlike pre-recession restrictive policy; cessation of QE purchases is not tightening monetary policy. More irrational is that nearly all financial markets, but those of equities in particular, are currently being driven in large part by fluctuating market sentiment based on the direction of oil prices, which are now down more than 30% over the past 18 months. The financial stress on companies sensitive to weak energy prices is still at an early stage; however it appears that it will have negative impacts on lenders as well as operators and suppliers. Even so, it is unlikely that duress will affect a wider swath of the economy, case market participants.

CURRENT PORTFOLIO POSTURE: EQUAL/MODEST UNDERWEIGHT WEIGHT vs. SAA target

NON – U.S. EQUITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **NEUTRAL**
   - Central bank policies fare positive for the Eurozone and Japan; economic conditions remain weak in many of the lesser-developed economies.
   - Although relatively inexpensive, liquidity continues to shift away from the developing, U.S. Dollar-sensitive economies.
   - Monetary and economic policies that are focused on promoting economic growth and stemming disinflation seem to be blunted by the collateral impact of the change in drivers of the Chinese economy.

2. Valuations: **POSITIVE**
   - Reasonable global valuations relative to the U.S.; price-to-book values of 1.3x - 1.4x; P/Es of 10.0x – 13.1x on trend earnings.
   - Dividend yields are incrementally more favorable -ranging from 1.4x to 2.0x that of the S&P500.

3. Sentiment: **NEUTRAL**
   - Excepting the Emerging Markets, and short-term volatility, money flows continue toward developed non-U.S. market counterparts.
   - The anxiety and accompanying volatility since late 2015 has undermined investors' previously overall constructive attitude toward global equities.
   - Until recently, major non-U.S. markets performance had mostly strengthened; a slower or postponed normalization of U.S. monetary policy is supportive for the markets.

Commentary:

The "POSITIVE" opinion on Valuations is unchanged, as are the "NEUTRAL" opinions on Fundamentals and Sentiment. Overall, the non-U.S. Equities category is marginally underweight to the Interim SAA policy weight. The early April reallocation of USD750MN U.S. equity assets to the non-U.S. Equities-EAFE brought the asset sub-class to an overweight versus the interim SAA policy weight. The weight of EAFE-SmallCap sub-class is equal to the interim SAA; the Emerging Markets sub-class remains underweight relative to its interim SAA policy weight.

Developed economies (DM) equities still present reasonably favorable return vs. risks tradeoffs and are likely to play a greater role in the worldwide quest for return/yield. Reflation efforts are ongoing, so liquidity flow-driven major markets are still capable of posting high, single digit advances (in USD terms). Liquidity fostered by simulative monetary policy has historically dominated other market influences. It is abundant currently.

The current global macro backdrop supporting the current cycle differs from previous cycles in which the Federal Reserve increased short-term interest rates. Most other central banks are instead loosening monetary policies; the ECB is disposed toward even more Quantitative Easing. Economic growth, though sluggish overall, is mixed across most of the developed economies.

Historically, central banks' initial interest rate increases have had negligible impact on DM equities markets. Not presently in the picture, lengthy rate increase/tightening programs have proved otherwise, however. The economic cycle in the Euro area is a phase behind that of the U.S.; labor cost pressures are less there. European Central Bank easing against the opposite in the U.S., coupled with a weaker EURO versus the U.S. Dollar, makes for relatively attractive risk premiums for European shares, and those of most non-U.S. developed markets. For reasons set forth above, risk premiums among the EM equity markets are justifiably high. Even so, sustained, widespread appreciation is therefore, less likely until those fundamentals improve.

The Emerging Economies (EM), on the whole, are still contending with persistently weak demand, resultant over-capacity, high debt and follow-on disinflation. In past periods preceding the advent of FOMC rate increases, global economic growth was accelerating. It is not in the present cycle, suggesting a protracted period until those economic hindrances dissipate. However, the EM equity markets and companies that are less exposed those trends offer a somewhat more optimistic picture. They will still be vulnerable to volatility from occasional short run "risk-off" market events, but are capable of increasing value over the balance of the current cycle.

CURRENT PORTFOLIO POSTURE: EQUAL/MODEST UNDERWEIGHT WEIGHT vs. SAA target

FIXED INCOME

Primary Markets Metrics & Indicators:

1. Fundamentals: **NEUTRAL**
   - Global fundamentals are mixed. While the economy in the U.S. is generally improving, many international economies that influence U.S. fixed income markets are struggling to grow (Japan, Europe), facing a slowdown (China) or experiencing recessionary conditions (many emerging market countries). Following a selloff in risky assets earlier this year as well as in 2015, a number of factors have led to a rally in the past several weeks in equities, high yield bonds, investment-grade bonds and other areas of the credit markets. These factors include moderating expectations for interest rate increases by the Federal Reserve; a decline in the value of the U.S. dollar; more expansionary monetary policy in Europe and Japan; a rally in oil prices; and moderating fears of major currency devaluation in China. However, we are concerned that the recent rally in risk assets may reverse as the year progresses. Global growth may sputter and China risk issues may resurface.

- We believe that long-term U.S. interest rates may remain relatively low by historical standards for a number of reasons. These include slowing growth and disinflationary (or deflationary) pressures in many regions of the world including Europe and China, accommodative monetary policies in other countries and very low competing long-term interest rates in other developed markets.

2. Valuations: **NEUTRAL**

- Valuations as measured by credit spreads in both the investment-grade and high yield bond markets may seem attractive relative to the tighter levels experienced in recent years; however, the wider spreads may primarily reflect deteriorating credit quality. Over the coming years, we expect both a rise in corporate defaults and an increase in the number of bond issuers that are likely to lose their investment-grade ratings. Initially, this deterioration in credit quality will be led by sectors that have been adversely affected by the severe decline in global commodity prices including energy, energy services, metals and mining. However, as we may be in the later stages of credit cycle (that began with an upturn in 2009), credit ratings may decline and defaults may increase in other sectors as well. We believe this may lead to further spread widening. With this view, we are underweight High Yield vs. the SAA target.
- Private debt offers the most attractive opportunity in the fixed income markets with double-digit yields readily available for investors willing to accept illiquidity. We believe the market opportunity has recently improved due to a number of factors including the piecemeal sale of GE Capital, a leading provider of capital to the middle market; a reduced capacity to lend by business development companies; the enforcement of leveraged lending guidelines by banking regulators which further restricts the ability of banks to provide leveraged loans and underwrite high yield bonds; and a materially less receptive new issuance market for high yield bonds and tradable leveraged loans. In 2015, we expanded our commitments to take advantage of the attractive opportunities in the private debt asset class.
- The core fixed income market is likely to generate low returns due to low overall yields as Treasury rates remain at low levels. That being said, core fixed income remains a safe haven in times of market turbulence and tends to perform well when risky assets such as equities sell off. While we are slightly underweight Interest Rate Sensitive fixed income vs. the interim SAA target, we have more interest rate duration in our portfolio than the benchmark due to an allocation made in August 2015 to the Treasuries (Long Duration) asset class. This allocation has performed well when risky assets have sold off.

3. Sentiment: **NEGATIVE**

- Sentiment has declined in the credit markets due to a combination of weakening fundamentals and diminished trading liquidity. U.S. Treasuries remain an attractive safe haven for investors looking to reduce risk particularly as interest rates in other safe haven countries such as Germany and Japan are extremely low or even negative depending on the maturity.

Commentary:

IMD views of the fixed income markets are bifurcated: positive on the return opportunities in the private markets (i.e. Private Debt) and less sanguine on the public markets (i.e. Interest Rate Sensitive fixed income and High Yield bonds).

CURRENT PORTFOLIO POSTURE: OVER WEIGHT vs. SAA target

REAL ESTATE

Primary Market Metrics & Indicators:

1. Fundamentals: POSITIVE
   - Property markets are generally moving out of a recovery phase to a mature phase. Excess inventory from the last cycle is largely absorbed and greater discipline in new supply delivery places property markets generally in reasonable supply/demand balance. The only property types that we consider to still be in a recovery phase are for-sale residential, suburban office and certain niche industrial property types.
   - Local conditions vary greatly with tight supply and rapidly accelerating rents in certain markets and a more normal recovery in other markets.
   - Our review of property market fundamentals leads us to emphasize apartments, industrial properties, medical office buildings, senior housing, self-storage, and student housing in our current investing efforts for demographic and macro policy reasons. We have entered in to separate account partnerships to pursue these opportunities.
   - The resolution of pre-global financial crisis CMBS structures continues to work its way through the system presenting opportunities in mezzanine and senior equity. We have retained managers well-positioned to pursue such opportunities.

2. Valuations: NEUTRAL
   - Values have recovered from the global financial crisis with stable properties in coastal markets priced at record values.
   - YTD in 2016 there has been a contraction in the pace of CMBS lending and an increase in the pricing of the underlying loans.
   - Recent increases in treasury rates do not appear to have affected commercial real estate valuations. Many observers believe that ~100bps of rate increase was already discounted into cap rates.
   - At March 31, REITs were trading at an average dividend yield of 3.7% (193bp above 10y treasury) and a 4% premium to NAV. The dividend yield spread is above the historical average of 127 while the historical difference to NAV is a 4% premium.

3. Sentiment: NEUTRAL
   - About 80% of real estate executives believe we will see a recessionary cycle in property sometime in the next several years.
   - Nevertheless, fund raising has been robust. The pace of U.S. focused real estate fund raising is around $100 billion per year with dry powder of around $200 billion. Additionally, there is evidence of high interest in U.S. property from foreign investors.
   - Consequently, there remains strong demand for good quality property and we have yet to see any softness in pricing as a result of recessionary or other concerns.

Commentary:

ASRS has become more cautious in property underwriting and requires its managers to consider a moderate recession in the next few years in property level underwriting. We continue to focus on niche property types and markets which receive less institutional focus. In new transactions, we will generally avoid construction risk except in the strongest locations with supply constraints and robust tenant demand. The 2016 implementation plan calls for about $300 million in new commitments to complete the separate account and net zero new investments in commingled product.

CURRENT PORTFOLIO POSTURE: UNDERWEIGHT vs. SAA target (in program funding/build-out phase)

PRIVATE EQUITY

Primary Market Metrics & Indicators:

1. Fundamentals: **POSITIVE**
   - The U.S. economy has moderated and inflation remains muted but the unemployment rate continues to fall.
     - ◊ Oil prices have settled in the $30 - $40 price range which has resulted in rig lay downs and reduced service costs, which has tempered production growth in the medium term. Debt markets have locked up and equity transactions will take time to sort out. We expect industry consolidation at the margin favoring low cost producers with less leverage and more hedged production.
     - ◊ Healthcare is being reshaped to implement the requirements of "Obamacare."
     - ◊ The U.S. continues to be a global leader in technology innovation.
   - Europe continues to struggle in recovering from the financial crisis with the ECB maintaining its stimulus efforts by buying €60B per month. Its problems are exacerbated by a unified currency without unified fiscal policy and it is expected to experience a very slow recovery.
   - Emerging markets have slowed while the largest emerging markets are transitioning to focus on domestic consumption.

2. Valuations: **NEUTRAL**
   - Current U.S. median purchase price multiples are 8.5x, down from 8.9x a year ago.
   - The leveraged loan and high yield debt markets tightened up in 2015. Single B high yield spreads have widened to ~800bps.
   - The U.S. median Debt/EBITDA ratio of 6.2x is up a bit from 5.8x in 2014.

3. Sentiment: **NEUTRAL**
   - Globally, $551B (1,062 funds) closed in 2015 compared to $589B (1,394 funds) in 2014.
   - Dry powder of nearly $1.3T globally has ticked up from $1.2T for 2014.
   - The global number of buyout deals was 3,556 in 2015 compared to 3,796 for all of 2014. The aggregate value of deals was $411B in 2015 compared to $348B for all of 2014.
   - There were 1,620 exits representing $405B in 2015. There were 1,734 exits representing $460B in 2014.
   - The IPO market in 2015 has softened to a level of $30B in 2015 versus $67B in 2014.

Commentary:

Areas of emphasis are U.S. middle market buyout with focus on managers with strong operational capability. Vertical strategies in healthcare and technology are under consideration. IMD will reduce emphasis on large buyout strategies though larger managers with specialized deal flow remain of interest and continue to monitor Europe for a favorable reentry point and look for opportunities to capitalize upon distress.

ASRS 2016 private equity pacing plan calls for $700 million in new commitments to achieve the 8% strategic allocation target.

CURRENT PORTFOLIO POSTURE: EQUAL WEIGHT vs. SAA target

COMMODITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **NEGATIVE**
   - The U.S. dollar has weakened year-to-date but remains strong on a relative basis. Questions remain about China's economy while Europe continues to struggle.
   - Most commodity sectors appear well supplied, particularly for the current global growth environment.
   - The decision by Saudi Arabia to freeze its production level has given the market some optimism but rig lay downs in the U.S. have yet to bring the market into balance.
   - Corn and wheat stockpiles have recently hit multi-year highs while world food prices continue to slide. Energy markets reflect the continued growth in global production as WTI

and Brent prices are both near $40. Metals are mixed as precious metals have strengthened while industrial metals still exhibit weak demand.

2. Valuations: **NEGATIVE**
   - The Bloomberg Commodities Index is flat year-to-date and has rebounded moderately from its 15-year low as the U.S. dollar has weakened although global supplies outpace demand.
   - On a trailing twelve-month and year-to-date basis, precious metals commodities are the only sub-index in positive territory at 3% and 18% respectively.

3. Sentiment: **NEGATIVE**
   - Moderate growth, weak inflation, and a strong supply environment have kept investor enthusiasm for commodities muted.
   - The slowdown in the Chinese economy and its equity market has hampered interest in commodities.
   - Geopolitical news has not been constructive for energy prices. Looking across the individual commodities, most remain well supplied, which is reflected in prices as inflationary fears are muted.

Commentary:

IMD has maintained a tactical underweight relative to the SAA approved in 2015 which reduced the commodities target from 4% to 2%. The confluence of the Chinese slowdown, weakness in Europe, and sufficient broad-based global supplies have kept inflationary pressures soft. North American shale has idled rigs in a material way but supplies have not fully equilibrated yet.

IMD will maintain a tactical underweight relative to the SAAP and monitor global supply and demand swings for inflationary pressures. Improving economic conditions and inflationary pressures would serve as a catalyst to initiate a neutral position should the conditions arise.

CURRENT PORTFOLIO POSTURE: UNDERWEIGHT vs. SAA target

OPPORTUNISTIC INVESTMENTS

IMD continues to monitor and assess co-investment flow from real estate, private equity and debt managers for select opportunistic investments with favorable capital market dynamics. Opportunistic investments are tactical in nature AND are outside ASRS SAAP benchmarks or absolute return oriented.

CURRENT PORTFOLIO POSTURE: Approx. 4.8% of ASRS TOTAL MARKET VALUE

GLOSSARY

Commentary: Provides verbiage on 1) the current asset class market environment and possible changes to this environment and 2) ASRS asset class portfolio positioning relative to ASRS SAA policy, its rationale for positioning and anticipated changes which may occur in such positioning.

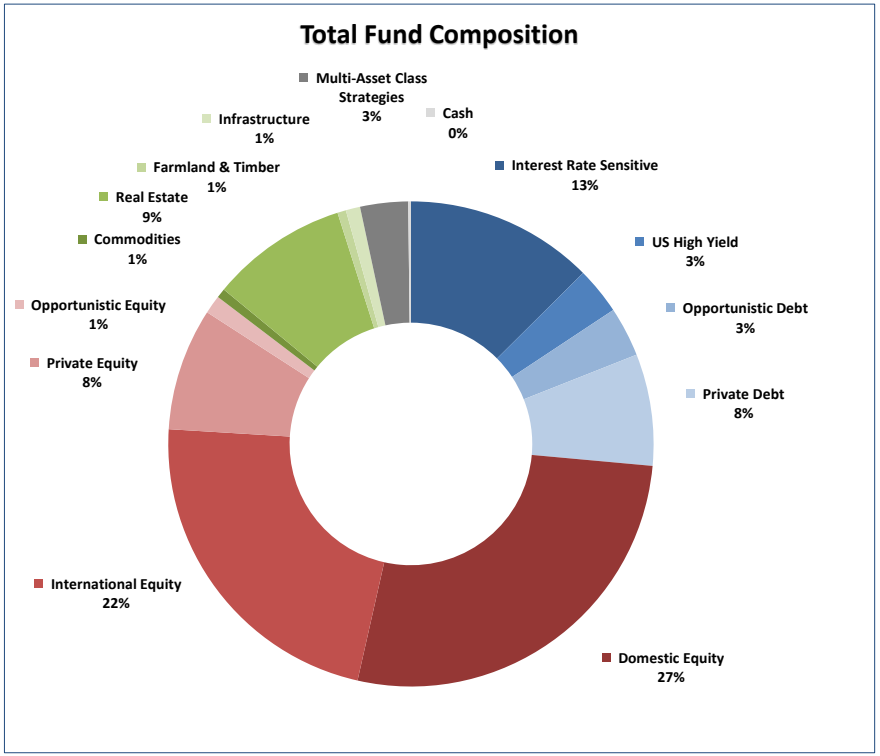
Current Portfolio Posture: Indicates ASRS asset class position relative to its asset allocation policy weight. "Overweight" indicates an asset class weight is greater than its policy target, "Neutral" indicates an equal weight and "Underweight" indicates a lesser weight than its policy target.

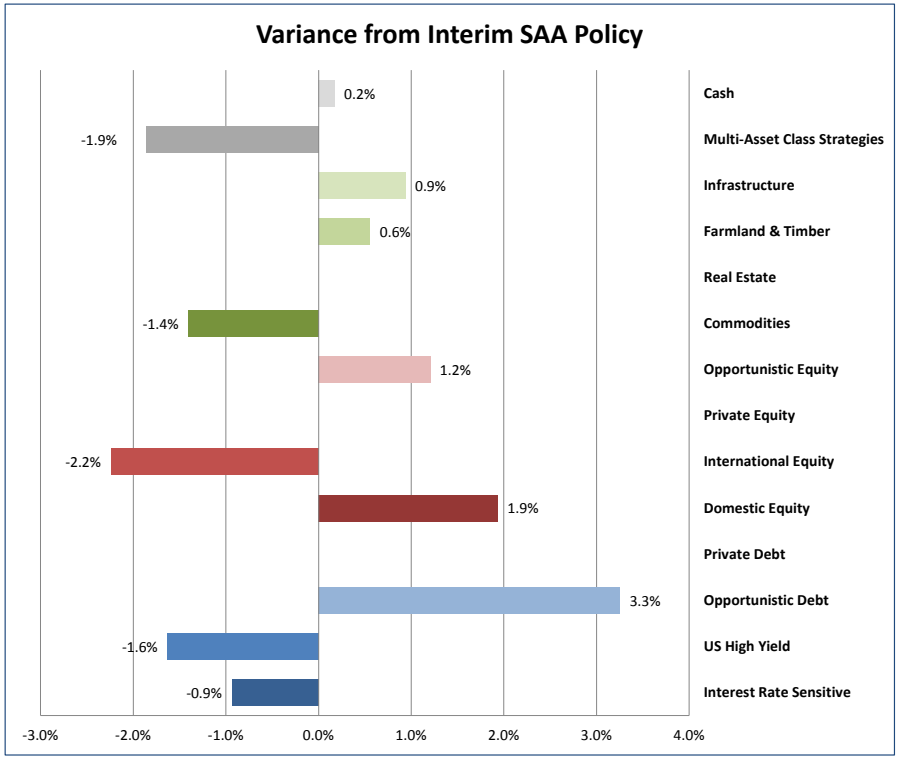
Investment House Views: Synthesizes IMD's current and forward-looking investment perspectives and tactical positioning in asset classes and investment strategies in which the ASRS invests.

Primary Market Metrics and Indicators: Broadly-defined metrics (Fundamentals, Valuations, and Sentiments) applied universally to ASRS asset classes and used collectively to evaluate existing market conditions. Indicators ("Positive," "Neutral" and "Negative") reflect IMD's existing views of these metrics and, in addition to other factors, generally determine the basis for the existing (and possible future changes) to ASRS aggregate portfolio position relative to or within ASRS SAA policy targets.

Agenda Item #5

Total Fund Positioning March 31, 2016





All Private Markets asset classes' market values are reported on a quarter-lag basis and adjusted to include the current quarter's cash flow.

Pension (Plan, System, HBS Assets) — ASRS Market Value Report — Thursday, March 31, 2016

Account Manager	Account Manager Style	Fixed Income Active	Fixed Income Enh/Passive	Equity Active	Equity Enh/Passive	Inflation Linked Active	Multi-Asset Active	Total	Pct of Fund
State Street B&T: Boston	Tactical Cash (non-assetized)							0	0.00%
								Tactical Cash Policy Range: 0% - 3%	**0.00%**
	Operating Cash (non-assetized)		58,929,081					58,929,081	0.18%
	Cash Total							**$59,047,994**	0.18%
								Cash Policy: 0%	**0.00%**
Blackrock: San Francisco	Treasuries (Long Duration)		382,034,763					382,034,763	1.14%
	Treasuries (Long Duration) Total							**$382,034,763**	1.14%
								Treasuries (Long Duration) Policy Range: 0% - 10%	**0.00%**
Blackrock: San Francisco	Passive (Intermediate Gov Credit)		24,956,362					24,956,362	0.07%
Operating Cash (assetized)	US Treasuries		229,161,280					229,161,280	0.68%
ASRS: Phoenix	Enhanced Passive F2		1,927,204,588					1,927,204,588	5.73%
Blackrock: San Francisco	Passive (US Debt Index)		1,589,042,507					1,589,042,507	4.72%
	Core Fixed Income Total							**$3,770,364,736.78**	11.20%
	Interest Rate Sensitive							**$4,152,399,499.87**	12.34%
								Interest Rate Sensitive: 11%	**11.00%**
Columbia: Minneapolis	Active	691,144,083						691,144,083	2.05%
JP Morgan: Indianapolis	Active	346,999,234						346,999,234	1.03%
	High Yield Fixed Income Total							**$1,038,157,079**	3.08%
								High Yield Fixed Income Policy	**4.00%**
	Opportunistic Debt	1,095,898,845						**$1,095,898,845**	3.26%
								Opportunistic Debt Policy:	**0.00%**
	Private Debt Total	2,462,640,526						**$2,462,640,526**	7.32%
								Private Debt Policy Range: 8% - 12%	**10.00%**
	Fixed Income Total							**$8,749,095,950**	26.00%
								Total Fixed Income Policy Range: 18% - 35%	**25.00%**
LSV: Chicago	Active (Value)			703,098,834				703,098,834	2.09%
ASRS: Phoenix	Passive E2				4,937,410,704			4,937,410,704	14.67%
ASRS: Phoenix	Enhanced Passive E7				612,976,420			612,976,420	1.82%
Operating Cash (assetized)	S&P 500				68,748,384			68,748,384	0.20%
ASRS: Phoenix	Enhanced Passive E8				592,446,220			592,446,220	1.76%
	Large Cap Equity Total							**$6,914,680,994**	20.55%
								Large Cap Policy	**20.00%**
Wellington: Boston	Active (Core)			272,494,634				272,494,634	0.81%
ASRS: Phoenix	Passive E3 (Growth)				397,190,708			397,190,708	1.18%
Operating Cash (assetized)	Russell 2000				34,374,192			34,374,192	0.10%
ASRS: Phoenix	Passive E4 (Value)				369,621,398			369,621,398	1.10%
	Mid Cap Equity Total							**$1,073,680,932**	3.19%
								Mid Cap Policy	**3.00%**
TimesSquare: New York	Active (Growth)			341,798,017				341,798,017	1.02%
Operating Cash (assetized)	Russell 2000				34,374,192			34,374,192	0.10%
DFA: Santa Monica	Active (Value)			271,769,619				271,769,619	0.81%
ASRS: Phoenix	Passive E6				325,351,751			325,351,751	0.97%
	Small Cap Equity Total							**$973,293,579**	2.89%
								Small Cap Policy	**3.00%**
	U.S. Equity Total							**$8,961,655,505**	26.63%
								US Equity Policy Range: 16% - 36%	**26.00%**
Brandes: San Diego	Active (Value)			554,121,516				554,121,516	1.65%
American Century	Active (EAFE)			539,288,265				539,288,265	1.60%
Trinity Street	Active (EAFE)			317,036,008				317,036,008	0.94%
Operating Cash (assetized)	MSCI EAFE				73,331,609			73,331,609	0.22%
Thompson Siegel Walmsley	Active (EAFE)			291,178,289				291,178,289	0.87%
Blackrock: San Francisco	Passive (EAFE)				3,906,854,026			3,906,854,026	11.61%
	Large Cap Developed Non-US Equity Total							**$5,682,448,824**	16.89%
								Large Cap Developed Policy	**17.00%**
AQR: Greenwich	Active (EAFE SC)			97,608,300				97,608,300	0.29%
DFA: Santa Monica	Active (EAFE SC)			101,559,564				101,559,564	0.30%
Franklin Templeton: San Mateo	Active (EAFE SC)			217,088,480				217,088,480	0.65%
Blackrock: San Francisco	Passive (EAFE SC)				253,717,148			253,717,148	0.75%
	Small Cap Developed Non-US Equity Total							**$669,976,005**	1.99%
								Small Cap Developed Policy	**2.00%**
William Blair: Chicago	Active (EM)			350,769,585				350,769,585	1.04%
Eaton Vance: Boston	Active (EM)			272,184,753				272,184,753	0.81%
LSV: Chicago	Active (EM)			113,662,968				113,662,968	0.34%
Operating Cash (assetized)	MSCI EM				18,332,902			18,332,902	0.05%
Blackrock: San Francisco	Passive (EM)				315,044,507			315,044,507	0.94%
	Emerging Markets Equity Total							**$1,069,994,715**	3.18%
								Emerging Markets Policy	**5.00%**
	Non-US Equity Total							**$7,422,419,544**	22.06%
								Non-US Equity Policy Range: 14% - 34%	**24.00%**
ASRS: Phoenix	Risk Factor Portfolio				567,997,797			567,997,797	1.69%
	Public Equity Total							**$16,952,072,846**	50.37%
	Private Equity Total			2,699,883,713				**$2,699,883,713**	8.02%
								Private Equity Policy Range: 6% - 10%	**8.00%**
	Opportunistic Equity			406,658,984				**$406,658,984**	1.21%
								Opportunistic Equity Policy:	**0.00%**
	Equity Total							**$20,058,615,543**	59.61%
								Total Equity Policy Range: 48% - 65%	**58.00%**
Gresham: New York						207,016,006		207,016,006	0.62%
	Commodities Total							**$207,016,006**	0.62%
								Commodities Policy Range: 0% - 4%	**2.00%**
	Real Estate Total					3,018,112,990		**$3,018,112,990**	8.97%
								Real Estate Policy Range: 8% - 12%	**10.00%**
	Infrastructure Total					316,552,365		**$316,552,365**	0.94%
								Infrastructure Policy Range: 0% - 3%	**0.00%**
	Farmland & Timber Total					188,451,382		**$188,451,382**	0.56%
								Farmland & Timber Policy Range: 0% - 3%	**0.00%**
	Inflation Linked Total							**$3,730,132,744**	11.08%
								Inflation Linked Policy Range: 10% - 16%	**12.00%**
Bridgewater							1,054,884,309	1,054,884,309	3.13%
	Multi-Asset Class Strategies							**$1,054,884,309**	3.13%
								Multi-Asset Class Policy Range: 0% - 12%	**5.00%**
	TOTAL Amounts	$4,596,696,450	$4,211,447,494	$7,550,712,376	$12,507,903,167	$3,730,132,744	$1,054,884,309	**$33,651,776,540**	**Total Fund**
	TOTAL Percent	13.66%	12.51%	22.44%	37.17%	11.08%	3.13%		

Asset Class	Actual Portfolio	SAAP Target (Range)	Interim SAA* Adj Policy	Actual - Interim SAA** % diff	$ diff	Policy Band check Actual - Adj Policy
Tactical Cash	0.00%	0% (0-3%)	0.00%	0.00%		
Cash	0.18%	0.00%	0.00%	0.18%	59,047,994	
Interest Rate Sensitive	12.34%	11%	13.28%	-0.94%		
High Yield	3.08%	4%	4.72%	-1.63%		
Opportunistic Debt	3.26%	0%	0.00%	3.26%	$1,095,898,845	
Private Debt	7.32%	10% (8-12%)	7.32% (5-9%)	0.00%		
Total Fixed Income	**26.00%**	**25% (18-35%)**	**25.31% (18-35%)**	**0.69%**	**$232,032,416**	**OK**
Large Cap	20.55%	20%	18.91%	1.64%	$550,623,185	
Mid Cap	3.19%	3%	2.78%	0.41%	$138,214,305	
Small Cap	2.89%	3%	3.00%	-0.11%	-$36,259,717	
US Equity	**26.63%**	**26% (16-36%)**	**24.69% (15-35%)**	**1.94%**	**$652,577,773**	**OK**
Developed Large Cap	16.89%	17%	17.30%	-0.41%	-$139,001,940	
Developed Small Cap	1.99%	2%	2.00%	-0.01%	-$3,059,526	
Emerging Markets	3.18%	5%	5.00%	-1.82%	-$612,594,112	
Non-US Equity	**22.06%**	**24% (14-34%)**	**24.3% (14-34%)**	**-2.24%**	**-$754,655,578**	**OK**
Risk Factors	1.69%	0%	1.69%	0.00%		
Private Equity	8.02%	8% (6-10%)	8.02%	0.00%	$0	**OK**
Opportunistic Equity	1.21%	0%	0.00%	1.21%	$406,658,984	
Total Equity	**59.61%**	**58% (48-65%)**	**58.7% (49-66%)**	**0.91%**	**$304,581,179**	**OK**
Commodities	0.62%	2% (0-4%)	2.02%	-1.41%	-$472,960,818	**OK**
Real Estate	8.97%	10% (8-12%)	8.97%	0.00%	$0	**OK**
Infrastructure	0.94%	0% (0-3%)	0.00%	0.94%	$316,552,365	**OK**
Farmland & Timber	0.56%	0% (0-3%)	0.00%	0.56%	$188,451,382	**OK**
Opportunistic I/L	0.00%	0%	0.00%	0.00%	$0	
Total Inflation Linked	**11.08%**	**12% (10-16%)**	**10.99% (9-13%)**	**0.10%**	**$32,042,929**	**OK**
Multi-Asset Strategies* **	**3.13%**	**5% (0-12%)**	**5% (0-12%)**	**-1.87%**	**-$627,704,518**	**OK**
Total	**100.00%**	**100%**	**100.00%**	**0.00%**	**$0**	

Internally Managed Portfolios:	
$9,162,201,790	**27%**

***Interim SAA includes a proration of unfunded Private Equity, Private Debt, and Real Estate**
****Private Equity is prorated to domestic equity; Real Estate is prorated to equity, commodities, and fixed income; Private Debt is prorated to Interest Rate Sensitive and High Yield**

Opportunistic definitions:
An investment in a category that is not included in the ASRS Asset Allocation policy and represents an investment opportunity that is tactical in nature.
Opportunistic investments have a 0% target (0%-10% range), regardless of asset class.

Total Opportunistic		
Opportunistic Debt	**$1,095,898,845**	**3.3%**
Opportunistic Equity	**$406,658,984**	**1.2%**
Opoprtunistic IL	**$0**	**0.0%**
	$1,502,557,828	**4.5%**

STATE STREET GLOBAL SERVICES®

STATE STREET INVESTMENT ANALYTICS

Executive Presentation

To: Arizona State Retirement System

truView Risk Report February 29, 2016

Produced by State Street Global Exchange, Risk Services

Monthly Reallocation Summary*

Month Ending January 31, 2016

Portfolio Reductions

- TOTAL CASH
  - $127.5M – CASH–ASSETIZED

- **TOTAL REDUCTIONS****
  - **$127.5M**

Portfolio Additions

- TOTAL CASH
  - $127.5M – CASH–UNASSETIZED

- **TOTAL ADDITIONS****
  - **$127.5M**

***Based on State Street accounting records for public markets and therefore exclude private market drawdowns.**
****Reductions and additions do not include plan distributions.**

Monthly Reallocation Summary*

Month Ending February 29, 2016

Portfolio Reductions

- TOTAL CASH
  - $240M – CASH–ASSETIZED

- **TOTAL REDUCTIONS****
  - **$240M**

Portfolio Additions

- TOTAL CASH
  - $240M – CASH–UNASSETIZED

- **TOTAL ADDITIONS****
  - **$240M**

***Based on State Street accounting records for public markets and therefore exclude private market drawdowns.**
****Reductions and additions do not include plan distributions.**

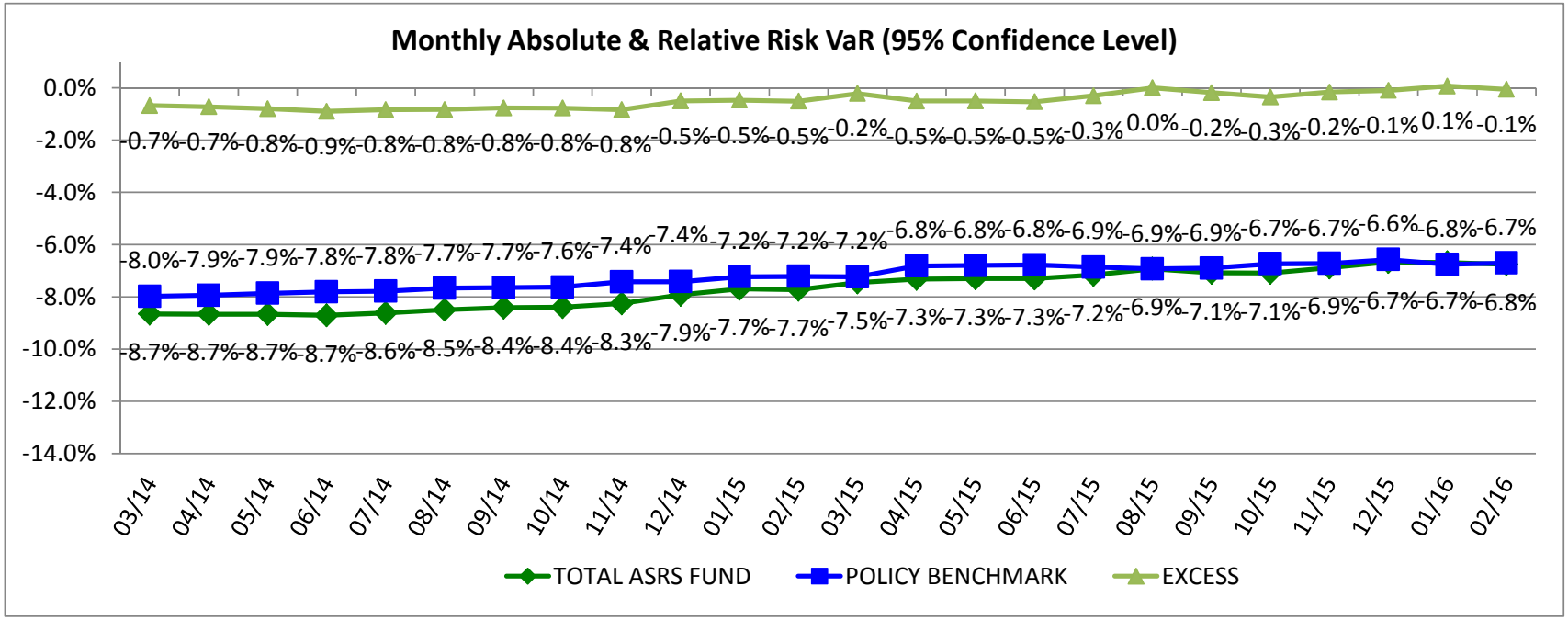
Monthly Risk Summary

Month Ending February 29, 2016

Month-end Risk Profile

- Historical Risk (95% VaR) for all asset classes reported a slight up-tick in risk from prior months. In aggregate, Total Plan risk increased 7bps which was primarily driven by market fluctuations and underlying active manager positioning. The Policy Benchmark decreased a marginal 5bps.

- Excess risk over the Policy Benchmark increased to settle at 13bps.



ARIZONA STATE RETIREMENT SYSTEM

As of February 29, 2016

TOTAL PLAN EXPOSURE OVERVIEW

Sector (Public US Equity Only)		$ Value	% Value	**Blended US BM	Difference
CONSUMER NON-CYCLICAL	$	2,055,309,787	23.4%	24.7%	(1.3%)
FINANCIAL	$	1,429,611,280	16.3%	16.7%	(0.5%)
TECHNOLOGY	$	970,689,285	11.0%	12.8%	(1.7%)
CONSUMER CYCLICAL	$	899,992,992	10.2%	10.7%	(0.5%)
INDUSTRIAL	$	870,357,141	9.9%	9.4%	0.5%
COMMUNICATIONS	$	826,985,555	9.4%	13.2%	(3.8%)
FUNDS	$	533,496,923	6.1%	0.0%	6.1%
ENERGY	$	500,698,169	5.7%	6.6%	(0.9%)
UTILITIES	$	348,479,026	4.0%	3.4%	0.6%
BASIC MATERIALS	$	223,631,000	2.5%	2.5%	0.1%
CASH	$	98,932,786	1.1%	0.0%	1.1%
GOVERNMENT	$	28,012,065	0.3%	0.0%	0.3%
DIVERSIFIED	$	1,299,171	0.0%	0.0%	(0.0%)
INDEX	$	71,274	0.0%	0.0%	0.0%
GRAND TOTAL	**$**	**8,787,566,454**	**100.0%**	**100.0%**	**0.0%**

Country Category (Total Plan)		$ Value	% Value	*Blended TOTAL BM	Difference
NORTH AMERICA	$	25,460,306,067	78.6%	67.0%	11.6%
EUROPE DEVELOPED	$	4,069,150,127	12.6%	17.3%	(4.7%)
ASIA DEVELOPED	$	1,998,740,753	6.2%	10.4%	(4.3%)
ASIA EM	$	511,768,080	1.6%	3.4%	(1.8%)
LATIN AMERICA	$	175,963,732	0.5%	1.0%	(0.5%)
AFRICA	$	83,708,828	0.3%	0.4%	(0.2%)
MIDDLE EAST	$	81,582,288	0.3%	0.3%	(0.1%)
EUROPE EM	$	31,396,413	0.1%	0.1%	(0.0%)
GRAND TOTAL	**$**	**32,412,616,289**	**100.0%**	**100.0%**	**0.0%**

Market Cap^ (Public Equities Only)		$ Value	% Value	*Blended TOTAL BM	Difference
1) 0 - 100M	$	2,991,412	0.0%	0.0%	(0.0%)
2) 100M - 500M	$	249,862,849	1.6%	1.7%	(0.1%)
3) 500M - 1B	$	407,974,503	2.7%	3.6%	(1.0%)
4) 1B - 5B	$	2,482,070,073	16.1%	21.5%	(5.4%)
5) 5B - 10B	$	1,779,995,258	11.6%	10.4%	1.2%
6) 10B - 50B	$	5,169,791,312	33.6%	30.5%	3.0%
7) >50B	$	5,297,794,507	34.4%	32.3%	2.2%
GRAND TOTAL	**$**	**15,390,479,915**	**100.0%**	**100.0%**	**0.0%**

^Excludes cash and non-traded securities

	Top 20 Issuer (Total Plan)		$ Value	% Value	Market Cap	Sector	Industry Group
1	CASH***	$	2,046,820,373	6.3%		CASH	Cash
2	US TREASURY N/B	$	1,177,432,703	3.6%		GOVERNMENT	SOVEREIGN
3	FANNIE MAE	$	677,473,829	2.1%		MORTGAGE SECURITIES	FNMA COLLATERAL
4	FREDDIE MAC	$	244,990,098	0.8%		MORTGAGE SECURITIES	FGLMC COLLATERAL
5	TREASURY BILL	$	213,552,818	0.7%		GOVERNMENT	SOVEREIGN
6	APPLE INC	$	152,210,741	0.5%	7) 50B+	TECHNOLOGY	COMPUTERS
7	ISHARES MSCI USA QUALITY FACTOR I	$	151,572,810	0.5%	4) 1B - 5B	FUNDS	EQUITY FUND
8	MICROSOFT CORP	$	146,766,268	0.5%	7) 50B+	TECHNOLOGY	SOFTWARE
9	JOHNSON & JOHNSON	$	140,972,398	0.4%	7) 50B+	CONSUMER NON-CYCLICAL	PHARMACEUTICALS
10	ISHARES MSCI USA SIZE FACTOR ETF	$	140,858,943	0.4%	2) 100M - 500M	FUNDS	EQUITY FUND
11	EXXON MOBIL CORP	$	139,552,531	0.4%	7) 50B+	ENERGY	OIL&GAS
12	GOVERNMENT NATIONAL MORTGAGE A	$	131,920,594	0.4%		MORTGAGE SECURITIES	GNMA2 COLLATERAL
13	ISHARES MSCI USA VALUE FACTOR ET	$	127,657,399	0.4%	3) 500M - 1B	FUNDS	EQUITY FUND
14	AT&T INC	$	121,342,448	0.4%	7) 50B+	COMMUNICATIONS	TELECOMMUNICATIONS
15	ALPHABET INC	$	114,721,946	0.4%	7) 50B+	COMMUNICATIONS	INTERNET
16	ISHARES MSCI USA MOMENTUM FACTO	$	113,407,771	0.3%	4) 1B - 5B	FUNDS	EQUITY FUND
17	JPMORGAN CHASE & CO	$	97,442,846	0.3%	7) 50B+	FINANCIAL	BANKS
18	PFIZER INC	$	92,400,038	0.3%	7) 50B+	CONSUMER NON-CYCLICAL	PHARMACEUTICALS
19	PROCTER & GAMBLE CO/THE	$	92,022,426	0.3%	7) 50B+	CONSUMER NON-CYCLICAL	COSMETICS/PERSONAL CARE
20	GENERAL ELECTRIC CO	$	89,095,487	0.3%	7) 50B+	INDUSTRIAL	MISCELLANEOUS MANUFACTUR

***Blended TOTAL BM**: 23% SP500, 3% SP400, 3% SP600, 7% R2000, 18% MSCI EAFE, 5% MSCI EM, 2% MSCI Sml Cap, 16% BC US AGG, 6% BC US HY, 6% FTSE NAREIT GLOBAL, 2% DJ-UBS COMMODITY, 5% CUSTOM MULTI-ASSET CLASS, 4% S&P/LSTA LEVERED LOAN.

****Blended US BM**: 80% SP500, 10% SP400, 10% SP600.

*****Cash** does not represent an IMD tactical view; **Cash** includes the ASRS Cash balance, manager- level portfolio cash & equivalents and cash collateralizing sundry portfolio-level futures contracts.

ARIZONA STATE RETIREMENT SYSTEM

As of February 29, 2016

INTERNATIONAL EQUITY EXPOSURE OVERVIEW

Sector (Public Intl Equity Only)		$ Value	% Value	*Blended NON-US BM	Difference
CONSUMER NON-CYCLICAL	$	1,566,046,739	23.1%	22.6%	0.5%
FINANCIAL	$	1,549,818,124	22.8%	23.7%	(0.9%)
CONSUMER CYCLICAL	$	994,308,075	14.7%	12.6%	2.1%
INDUSTRIAL	$	795,918,630	11.7%	11.5%	0.2%
COMMUNICATIONS	$	591,659,677	8.7%	9.7%	(1.0%)
BASIC MATERIALS	$	317,049,223	4.7%	5.7%	(1.0%)
ENERGY	$	313,718,616	4.6%	5.1%	(0.5%)
TECHNOLOGY	$	296,091,379	4.4%	5.1%	(0.7%)
UTILITIES	$	225,884,668	3.3%	3.5%	(0.1%)
CASH	$	85,913,693	1.3%	0.0%	1.3%
DIVERSIFIED	$	33,325,799	0.5%	0.6%	(0.1%)
INDEX	$	17,066,651	0.3%	0.0%	0.3%
FX	$	(15,493)	(0.0%)	0.0%	(0.0%)
GRAND TOTAL	**$**	**6,786,785,783**	**100.0%**	**100.0%**	**0.0%**

Country Category (Public Intl Equity Only)		$ Value	% Value	*Blended NON-US BM	Difference
EUROPE DEVELOPED	$	3,773,027,941	55.6%	51.1%	4.5%
ASIA DEVELOPED	$	1,984,051,120	29.2%	32.0%	(2.8%)
ASIA EM	$	524,214,043	7.7%	11.5%	(3.8%)
LATIN AMERICA	$	169,026,242	2.5%	2.4%	0.0%
NORTH AMERICA	$	154,144,500	2.3%	0.1%	2.2%
MIDDLE EAST	$	80,203,207	1.2%	1.1%	0.1%
AFRICA	$	70,393,528	1.0%	1.3%	(0.3%)
EUROPE EM	$	31,725,202	0.5%	0.4%	0.1%
GRAND TOTAL	**$**	**6,786,785,783**	**100.0%**	**100.0%**	**0.0%**

	Top 20 Industry Groups (Public Intl Only		$ Value	% Value	*Blended NON-US BM	Difference
1	BANKS	$	765,051,807	11.3%	11.9%	(0.6%)
2	PHARMACEUTICALS	$	546,614,360	8.1%	7.7%	0.3%
3	TELECOMMUNICATIONS	$	383,073,701	5.6%	5.9%	(0.2%)
4	FOOD	$	348,619,577	5.1%	4.6%	0.5%
5	INSURANCE	$	342,869,764	5.1%	4.9%	0.2%
6	RETAIL	$	286,938,374	4.2%	3.1%	1.1%
7	OIL&GAS	$	283,155,003	4.2%	4.6%	(0.4%)
8	AUTO MANUFACTURERS	$	208,636,245	3.1%	3.3%	(0.2%)
9	CHEMICALS	$	176,231,551	2.6%	3.2%	(0.6%)
10	DIVERSIFIED FINAN SERV	$	166,117,692	2.4%	2.5%	(0.0%)
11	BEVERAGES	$	158,037,053	2.3%	2.4%	(0.1%)
12	COMMERCIAL SERVICES	$	153,933,815	2.3%	2.0%	0.3%
13	ELECTRIC	$	150,914,716	2.2%	2.3%	(0.1%)
14	REAL ESTATE	$	145,384,753	2.1%	2.1%	(0.0%)
15	SEMICONDUCTORS	$	143,686,794	2.1%	2.5%	(0.4%)
16	TRANSPORTATION	$	121,440,360	1.8%	1.8%	(0.0%)
17	COSMETICS/PERSONAL CARE	$	110,518,609	1.6%	1.7%	(0.1%)
18	AUTO PARTS&EQUIPMENT	$	109,997,361	1.6%	1.3%	0.3%
19	BUILDING MATERIALS	$	106,823,890	1.6%	1.2%	0.3%
20	ENGINEERING&CONSTRUCTIC	$	98,162,916	1.4%	1.5%	(0.0%)

Market Cap** (Public Intl Equities Only)		$ Value	% Value	*Blended NON-US BM	Difference
1) 0 - 100M	$	1,826,366	0.0%	0.0%	0.0%
2) 100M - 500M	$	74,642,657	1.1%	0.6%	0.6%
3) 500M - 1B	$	144,595,368	2.2%	1.4%	0.8%
4) 1B - 5B	$	947,931,540	14.2%	13.7%	0.5%
5) 5B - 10B	$	958,666,350	14.3%	13.9%	0.5%
6) 10B - 50B	$	2,853,162,422	42.7%	41.1%	1.6%
7) >50B	$	1,700,845,927	25.5%	29.3%	(3.9%)
GRAND TOTAL	**$**	**6,681,670,630**	**100.0%**	**100.0%**	**0.0%**

**Excludes cash and non-traded securities

***Blended NON-US BM**: 72% MSCI EAFE, 20% MSCI EM, 8% MSCI Sml Cap.

ARIZONA STATE RETIREMENT SYSTEM
As of February 29, 2016

TOTAL FIXED INCOME EXPOSURE OVERVIEW

Sector (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
GOVERNMENT	$ 1,479,417,710	30.1%	32.0%	(1.9%)
MORTGAGE SECURITIES	$ 1,060,155,111	21.6%	22.0%	(0.4%)
INDEX	$ 412,619,667	8.4%	0.0%	8.4%
FINANCIAL	$ 379,697,493	7.7%	9.1%	(1.4%)
COMMUNICATIONS	$ 327,076,586	6.7%	7.5%	(0.9%)
CONSUMER NON-CYCLICAL	$ 326,620,803	6.7%	7.7%	(1.0%)
CONSUMER CYCLICAL	$ 217,980,491	4.4%	5.2%	(0.7%)
ENERGY	$ 175,124,813	3.6%	5.1%	(1.6%)
INDUSTRIAL	$ 154,573,206	3.1%	4.0%	(0.8%)
TECHNOLOGY	$ 104,375,339	2.1%	2.1%	0.1%
UTILITIES	$ 86,454,302	1.8%	2.2%	(0.4%)
BASIC MATERIALS	$ 73,936,661	1.5%	2.7%	(1.1%)
CASH	$ 64,245,102	1.3%	0.0%	1.3%
BANK LOANS	$ 26,764,767	0.5%	0.0%	0.5%
ASSET BACKED SECURITIES	$ 18,402,816	0.4%	0.4%	(0.0%)
DIVERSIFIED	$ 2,549,311	0.1%	0.2%	(0.1%)
GRAND TOTAL	**$ 4,909,994,177**	**100.0%**	**100.0%**	**0.0%**

	Top 20 Industry Groups (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
1	SOVEREIGN	$ 1,385,251,443	28.2%	30.0%	(1.8%)
2	FNMA COLLATERAL	$ 618,248,325	12.6%	9.2%	3.3%
3	BLANK	$ 406,718,267	8.3%	0.0%	8.3%
4	FGLMC COLLATERAL	$ 214,131,470	4.4%	5.7%	(1.3%)
5	BANKS	$ 202,267,829	4.1%	5.1%	(1.0%)
6	TELECOMMUNICATIONS	$ 151,575,963	3.1%	3.7%	(0.6%)
7	MEDIA	$ 145,036,660	3.0%	3.3%	(0.4%)
8	GNMA2 COLLATERAL	$ 104,258,409	2.1%	4.8%	(2.7%)
9	OIL&GAS	$ 100,787,141	2.1%	3.1%	(1.1%)
10	HEALTHCARE-SERVICES	$ 94,024,296	1.9%	1.9%	(0.0%)
11	COMMERCIAL MBS	$ 92,824,511	1.9%	1.3%	0.6%
12	DIVERSIFIED FINAN SERV	$ 90,240,088	1.8%	2.0%	(0.1%)
13	ELECTRIC	$ 83,972,352	1.7%	2.0%	(0.3%)
14	PHARMACEUTICALS	$ 78,634,744	1.6%	1.5%	0.1%
15	RETAIL	$ 74,145,048	1.5%	1.7%	(0.2%)
16	PIPELINES	$ 71,227,722	1.5%	1.4%	0.0%
17	CASH	$ 64,245,102	1.3%	0.0%	1.3%
18	SOFTWARE	$ 58,305,970	1.2%	1.0%	0.2%
19	CHEMICALS	$ 53,656,226	1.1%	0.9%	0.2%
20	MUNICIPAL	$ 49,723,155	1.0%	0.6%	0.4%

Credit Rating Group** (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
01) AAA	$ 2,956,601,452	60.2%	52.9%	7.3%
02) AA	$ 162,762,811	3.3%	2.9%	0.4%
03) A	$ 362,159,118	7.4%	7.6%	(0.2%)
04) BBB	$ 500,569,309	10.2%	10.6%	(0.4%)
05) BB	$ 434,268,181	8.8%	13.7%	(4.9%)
06) B	$ 391,458,266	8.0%	9.0%	(1.1%)
07) CCC	$ 89,347,382	1.8%	2.9%	(1.1%)
08) CC	$ 1,691,605	0.0%	0.2%	(0.2%)
09) C	$ 46,612	0.0%	0.0%	(0.0%)
10) D	$ 5,901,400	0.1%	0.0%	0.1%
11) Not Rated	$ 5,188,042	0.1%	0.0%	0.1%
GRAND TOTAL	**$ 4,909,994,178**	**100.0%**	**100.0%**	**0.0%**

Maturity Bucket (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
0-1Y	$ 179,017,207	4.0%	0.7%	3.3%
1Y-3Y	$ 644,539,241	14.3%	18.7%	(4.4%)
3Y-5Y	$ 727,114,034	16.1%	17.9%	(1.7%)
5Y-10Y	$ 1,436,490,583	31.9%	29.5%	2.4%
10Y-15Y	$ 165,833,856	3.7%	4.5%	(0.8%)
15Y+	$ 1,350,280,988	30.0%	28.7%	1.3%
GRAND TOTAL	**$ 4,503,275,909**	**100.0%**	**100.0%**	**0.0%**

***Blended TOTAL BM**: 73% BC US AGG, 27% BC US HY.

ARIZONA STATE RETIREMENT SYSTEM
As of February 29, 2016

TOTAL PLAN RISK OVERVIEW

Strategy	$ Value	% Value	Historical VaR 95%	HVaR Contri 95%	HVaR Contri % to Total	Parametric VaR 95%	PVaR Contri 95%	PVaR Contri % to Total	Exp Tail Loss 95%	Exp Tail Loss Contri 95%	Exp Tail Loss Contri % to Total	Max Loss	Std Dev	Downside Risk (8%)	Downside Risk Contri (8%)	Downside Risk Contri (8%) to Total
MONTHLY RISK																
CASH - UNASSETIZED	$ 24,231,674	0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	(0.6%)	(0.0%)	0.0%
CASH - ASSETIZED	$ 542,393,552	2%	(4.5%)	(0.1%)	1.1%	(4.4%)	(0.1%)	1.1%	(7.3%)	(0.1%)	1.0%	(16.9%)	2.8%	(2.3%)	(0.0%)	1.1%
INTEREST RATE SENSITIVI	$ 4,909,994,177	15%	(2.4%)	0.0%	(0.5%)	(2.2%)	(0.1%)	0.8%	(3.3%)	(0.0%)	0.4%	(5.7%)	1.4%	(1.3%)	(0.0%)	1.2%
US EQUITY	$ 8,787,566,454	27%	(8.3%)	(2.4%)	35.3%	(8.1%)	(2.1%)	31.7%	(14.1%)	(3.8%)	33.1%	(29.3%)	5.6%	(4.1%)	(1.1%)	31.7%
INTERNATIONAL EQUITY	$ 6,786,785,783	21%	(9.9%)	(1.8%)	26.4%	(9.4%)	(1.9%)	28.1%	(14.9%)	(3.0%)	25.8%	(35.0%)	6.2%	(4.6%)	(0.9%)	27.4%
REAL ESTATE	$ 2,882,158,567	9%	(10.8%)	(0.9%)	13.6%	(11.0%)	(0.9%)	13.5%	(19.1%)	(1.6%)	13.9%	(39.1%)	7.1%	(5.4%)	(0.5%)	13.3%
FARMLAND & TIMBER	$ 182,760,279	1%	(11.3%)	(0.1%)	0.9%	(11.5%)	(0.1%)	0.9%	(19.9%)	(0.1%)	0.9%	(40.8%)	7.4%	(5.6%)	(0.0%)	0.9%
PRIVATE EQUITY	$ 2,656,408,051	8%	(11.9%)	(1.0%)	14.5%	(10.9%)	(0.8%)	12.4%	(18.4%)	(1.5%)	12.9%	(36.5%)	7.0%	(5.4%)	(0.4%)	12.5%
PRIVATE DEBT	$ 2,430,414,841	7%	(2.6%)	(0.0%)	0.5%	(4.1%)	(0.2%)	2.9%	(7.9%)	(0.4%)	3.4%	(17.3%)	2.7%	(2.3%)	(0.1%)	3.2%
OPPORTUNISTIC EQUITY	$ 514,890,388	2%	(11.9%)	(0.2%)	2.8%	(10.9%)	(0.2%)	2.4%	(18.4%)	(0.3%)	2.5%	(36.4%)	7.0%	(5.4%)	(0.1%)	2.4%
OPPORTUNISTIC DEBT	$ 1,120,287,388	3%	(7.4%)	(0.2%)	2.7%	(9.3%)	(0.2%)	3.7%	(14.6%)	(0.4%)	3.6%	(28.6%)	5.7%	(4.3%)	(0.1%)	3.6%
GLOBAL INFLATION LINKEI	$ 196,747,261	1%	(7.9%)	(0.0%)	0.5%	(7.8%)	(0.0%)	0.5%	(11.7%)	(0.1%)	0.5%	(25.4%)	4.6%	(4.0%)	(0.0%)	0.5%
INFRASTRUCTURE	$ 316,552,360	1%	(9.5%)	(0.1%)	1.3%	(9.2%)	(0.1%)	1.3%	(15.3%)	(0.1%)	1.3%	(35.1%)	5.8%	(4.7%)	(0.0%)	1.3%
MULTI-ASSET CLASS	$ 1,061,425,514	3%	(4.4%)	(0.0%)	0.7%	(4.1%)	(0.1%)	0.8%	(6.2%)	(0.1%)	0.7%	(11.0%)	2.7%	(2.2%)	(0.0%)	0.9%
GRAND TOTAL	**$ 32,412,616,289**	**100%**	**(6.8%)**	**(6.8%)**	**100.0%**	**(6.8%)**	**(6.8%)**	**100.0%**	**(11.5%)**	**(11.5%)**	**100.0%**	**(26.3%)**	**4.5%**	**(3.4%)**	**(3.4%)**	**100.0%**
INTERIM POLICY BENCHMARK			***(6.7%)***			***(6.6%)***			***(11.1%)***			***(25.8%)***	**4.5%**	***(3.4%)***		
ANNUALIZED RISK																
CASH - UNASSETIZED	$ 24,231,674	0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.0%	(2.2%)	(0.0%)	0.0%
CASH - ASSETIZED	$ 542,393,552	2%	(15.5%)	(0.3%)	1.1%	(15.1%)	(0.2%)	1.1%	(25.4%)	(0.4%)	1.0%	N/A	9.7%	(8.1%)	(0.1%)	1.1%
INTEREST RATE SENSITIVI	$ 4,909,994,177	15%	(8.2%)	0.1%	(0.5%)	(7.7%)	(0.2%)	0.8%	(11.5%)	(0.1%)	0.4%	N/A	4.9%	(4.6%)	(0.1%)	1.2%
US EQUITY	$ 8,787,566,454	27%	(28.8%)	(8.3%)	35.3%	(28.1%)	(7.4%)	31.7%	(48.9%)	(13.2%)	33.1%	N/A	19.3%	(14.2%)	(3.8%)	31.7%
INTERNATIONAL EQUITY	$ 6,786,785,783	21%	(34.4%)	(6.2%)	26.4%	(32.7%)	(6.6%)	28.1%	(51.5%)	(10.3%)	25.8%	N/A	21.4%	(15.8%)	(3.3%)	27.4%
REAL ESTATE	$ 2,882,158,567	9%	(37.5%)	(3.2%)	13.6%	(38.1%)	(3.2%)	13.5%	(66.2%)	(5.5%)	13.9%	N/A	24.5%	(18.7%)	(1.6%)	13.3%
FARMLAND & TIMBER	$ 182,760,279	1%	(39.1%)	(0.2%)	0.9%	(39.7%)	(0.2%)	0.9%	(69.0%)	(0.4%)	0.9%	N/A	25.6%	(19.4%)	(0.1%)	0.9%
PRIVATE EQUITY	$ 2,656,408,051	8%	(41.2%)	(3.4%)	14.5%	(37.8%)	(2.9%)	12.4%	(63.7%)	(5.1%)	12.9%	N/A	24.2%	(18.7%)	(1.5%)	12.5%
PRIVATE DEBT	$ 2,430,414,841	7%	(8.8%)	(0.1%)	0.5%	(14.2%)	(0.7%)	2.9%	(27.2%)	(1.4%)	3.4%	N/A	9.5%	(7.8%)	(0.4%)	3.2%
OPPORTUNISTIC EQUITY	$ 514,890,388	2%	(41.1%)	(0.7%)	2.8%	(37.8%)	(0.6%)	2.4%	(63.6%)	(1.0%)	2.5%	N/A	24.2%	(18.7%)	(0.3%)	2.4%
OPPORTUNISTIC DEBT	$ 1,120,287,388	3%	(25.7%)	(0.6%)	2.7%	(32.3%)	(0.9%)	3.7%	(50.7%)	(1.4%)	3.6%	N/A	19.8%	(14.9%)	(0.4%)	3.6%
GLOBAL INFLATION LINKEI	$ 196,747,261	1%	(27.5%)	(0.1%)	0.5%	(27.2%)	(0.1%)	0.5%	(40.5%)	(0.2%)	0.5%	N/A	16.0%	(13.7%)	(0.1%)	0.5%
INFRASTRUCTURE	$ 316,552,360	1%	(33.0%)	(0.3%)	1.3%	(31.9%)	(0.3%)	1.3%	(52.9%)	(0.5%)	1.3%	N/A	20.0%	(16.1%)	(0.2%)	1.3%
MULTI-ASSET CLASS	$ 1,061,425,514	3%	(15.3%)	(0.2%)	0.7%	(14.3%)	(0.2%)	0.8%	(21.3%)	(0.3%)	0.7%	N/A	9.4%	(7.5%)	(0.1%)	0.9%
GRAND TOTAL	**$ 32,412,616,289**	**100%**	**(23.4%)**	**(23.4%)**	**100.0%**	**(23.4%)**	**(23.4%)**	**100.0%**	**(39.7%)**	**(39.7%)**	**100.0%**	**N/A**	**15.5%**	**(12.0%)**	**(12.0%)**	**100.0%**
INTERIM POLICY BENCHMARK			***(23.2%)***			***(23.0%)***			***(38.3%)***			**N/A**	***15.5%***	***(11.6%)***		

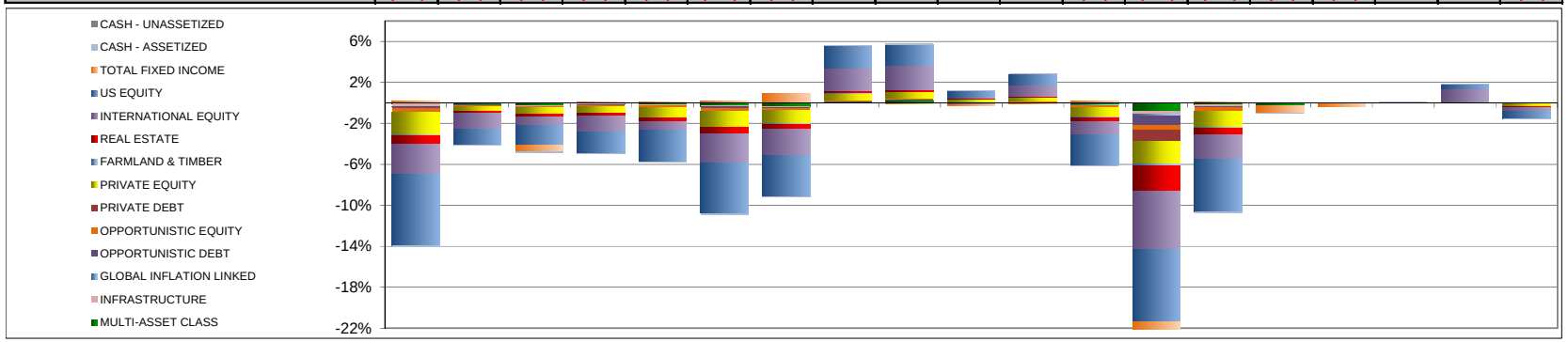
Strategy	$ Value	% Value	Beta SP500	Corr SP500	Beta MSCI EAFE	Corr MSCI EAFE	Duration	Convexity	Notional Exposure	Gross Exposure	Gross Leverage
CASH - UNASSETIZED	$ 24,231,674	0%	0.00		0.00				$ 24,231,674	$ 24,231,674	100.0%
CASH - ASSETIZED	$ 542,393,552	2%	0.25	0.94	0.21	0.94			$ 1,071,560,399	$ 542,393,552	100.0%
INTEREST RATE SENSITIVI	$ 4,909,994,177	15%	0.02	0.08	0.04	0.17	5.14	0.116	$ 4,712,103,208	$ 4,909,994,847	100.0%
US EQUITY	$ 8,787,566,454	27%	1.02	0.99	0.79	0.90	0.78	0.006	$ 8,906,986,368	$ 8,787,653,584	100.0%
INTERNATIONAL EQUITY	$ 6,786,785,783	21%	1.05	0.90	0.98	0.99			$ 6,786,808,946	$ 6,798,160,233	100.2%
REAL ESTATE	$ 2,882,158,567	9%	1.15	0.87	0.99	0.88			$ 2,882,158,567	$ 2,882,158,567	100.0%
FARMLAND & TIMBER	$ 182,760,279	1%	1.20	0.87	1.03	0.88			$ 182,760,279	$ 182,760,279	100.0%
PRIVATE EQUITY	$ 2,656,408,051	8%	1.24	0.95	0.95	0.85			$ 2,656,408,051	$ 2,656,410,589	100.0%
PRIVATE DEBT	$ 2,430,414,841	7%	0.31	0.60	0.26	0.59	0.74	0.010	$ 2,424,386,103	$ 2,430,414,841	100.0%
OPPORTUNISTIC EQUITY	$ 514,890,388	2%	1.24	0.95	0.95	0.85			$ 514,890,388	$ 514,890,388	100.0%
OPPORTUNISTIC DEBT	$ 1,120,287,388	3%	0.73	0.68	0.64	0.70			$ 1,120,287,388	$ 1,120,287,388	100.0%
GLOBAL INFLATION LINKEI	$ 196,747,261	1%	0.27	0.63	0.25	0.67	0.28	0.001	$ 396,131,293	$ 196,747,261	100.0%
INFRASTRUCTURE	$ 316,552,360	1%	1.05	0.97	0.90	0.98			$ 316,552,360	$ 316,552,360	100.0%
MULTI-ASSET CLASS	$ 1,061,425,514	3%	0.01	0.43	0.01	0.41	(7.91)	(0.836)	$ 18,757,933,561	$ 1,061,425,514	100.0%
GRAND TOTAL	**$ 32,412,616,289**	**100%**	**0.52**	**0.96**	**0.43**	**0.95**	**4.69**	**0.088**	**$ 50,753,198,585**	**$ 32,424,081,077**	**100.0%**

ARIZONA STATE RETIREMENT SYSTEM

As of February 29, 2016

TOTAL PLAN STRESS TESTS

Strategy	$ Value	% Value	Black Monday - 5 Day	Gulf War - 5 Day	Bond Crash: Feb 94 - May 94	Asian Crisis 97-98 - 5 day	Russian Crisis - 5 Day	Nasdaq Correction: July 98 - Aug 98	Russian Debt Crisis Aug-Oct	IR Steepening: Sept 98 - Nov 98	Emerging Markets Rally: Jan 99 - May 99	Fed Tightening: April - June 99	Nasdaq Rally: Nov 99 - Jan 00	9/11 Attack - 5 Day	09-10-2008	S&P 500 -20%	IR Parallel Shift +100bps	Spread Up 100bps	Inflation +1%	Gold Shock -20%	Oil Shock -20%
			Historical Scenarios													Predictive Scenarios					
Stress Test Stand Alone																					
CASH - UNASSETIZED	$ 24,231,674	0.1%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CASH - ASSETIZED	$ 542,393,552	1.7%	(10.2)	(2.6)	(6.1)	(2.9)	(4.5)	(9.5)	(2.2)	3.4	7.6	2.0	3.2	(4.0)	(13.7)	(7.9)	(2.6)	0.0	0.3	0.7	(1.0)
TOTAL FIXED INCOME	$ 4,909,994,177	15.1%	1.3	(0.2)	(4.1)	0.7	0.6	1.1	6.3	(0.2)	(0.7)	(0.6)	(0.9)	1.2	(13.4)	0.4	(5.0)	(2.1)	0.5	0.0	0.3
US EQUITY	$ 8,787,566,454	27.1%	(25.8)	(5.7)	(7.3)	(7.8)	(11.4)	(18.0)	(14.7)	8.1	7.4	2.6	3.9	(11.0)	(25.9)	(19.0)	(0.0)	0.0	0.0	1.7	(2.6)
INTERNATIONAL EQUITY	$ 6,786,785,783	20.9%	(13.9)	(7.4)	(3.7)	(7.5)	(3.9)	(13.7)	(12.6)	10.1	11.1	(0.7)	5.1	(6.1)	(27.2)	(11.4)	0.0	0.0	0.0	6.0	(2.0)
REAL ESTATE	$ 2,882,158,567	8.9%	(9.6)	(2.1)	(2.7)	(2.9)	(4.2)	(6.7)	(5.4)	3.0	2.8	1.0	1.5	(4.1)	(27.8)	(7.0)	0.0	0.0	0.0	0.0	(1.0)
FARMLAND & TIMBER	$ 182,760,279	0.6%	(10.0)	(2.2)	(2.9)	(3.0)	(4.4)	(7.0)	(5.7)	3.2	2.9	1.0	1.5	(4.3)	(29.0)	(7.4)	0.0	0.0	0.0	0.0	(1.0)
PRIVATE EQUITY	$ 2,656,408,051	8.2%	(26.8)	(5.9)	(7.7)	(8.1)	(11.9)	(18.9)	(15.2)	8.5	7.7	2.8	4.1	(11.4)	(27.1)	(19.7)	0.0	0.0	0.0	0.0	(2.7)
PRIVATE DEBT	$ 2,430,414,841	7.5%	(0.3)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.1)	0.1	0.1	0.0	0.0	(0.1)	(15.7)	(0.2)	(0.1)	(0.2)	0.0	0.0	(0.1)
OPPORTUNISTIC EQUITY	$ 514,890,388	1.6%	(26.7)	(5.9)	(7.7)	(8.1)	(11.8)	(18.8)	(15.2)	8.5	7.7	2.8	4.1	(11.4)	(27.1)	(19.7)	0.0	0.0	0.0	0.0	(2.7)
OPPORTUNISTIC DEBT	$ 1,120,287,388	3.5%	(4.6)	(1.0)	(1.3)	(1.4)	(2.0)	(3.3)	(2.6)	1.5	1.3	0.5	0.7	(2.0)	(27.3)	(3.4)	0.0	0.0	0.0	0.0	(1.0)
GLOBAL INFLATION LINKEI	$ 196,747,261	0.6%	(0.0)	0.0	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	(0.0)	(16.6)	0.0	0.0	0.0	0.0	(3.3)	(5.7)
INFRASTRUCTURE	$ 316,552,360	1.0%	(20.9)	(4.6)	(6.0)	(6.3)	(9.3)	(14.8)	(11.9)	6.6	6.0	2.2	3.2	(8.9)	(28.3)	(15.4)	0.0	0.0	0.0	0.0	(2.5)
MULTI-ASSET CLASS	$ 1,061,425,514	3.3%	(3.9)	(4.6)	(8.1)	(3.1)	(4.5)	(7.3)	(10.1)	(0.1)	6.0	1.2	1.4	(4.2)	(26.0)	(6.4)	(7.3)	0.3	0.7	4.0	0.3
GRAND TOTAL	**$ 32,412,616,289**	**100.0%**	**(13.9)**	**(4.2)**	**(4.9)**	**(4.9)**	**(5.8)**	**(10.8)**	**(8.2)**	**5.6**	**5.7**	**1.0**	**2.7**	**(6.0)**	**(23.6)**	**(10.7)**	**(1.0)**	**(0.3)**	**0.1**	**1.8**	**(1.5)**
INTERIM POLICY BENCHMARK			**(14.3)**	**(4.6)**	**(5.2)**	**(5.5)**	**(5.5)**	**(11.3)**	**(7.9)**	**6.7**	**6.7**	**0.8**	**3.1**	**(6.0)**	**(21.3)**	**(11.0)**	**(1.2)**	**(0.6)**	**0.1**	**2.1**	**(1.7)**
Stress Test Contribution																					
CASH - UNASSETIZED	$ 24,231,674	0.1%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CASH - ASSETIZED	$ 542,393,552	1.7%	(0.2)	(0.0)	(0.1)	(0.0)	(0.1)	(0.2)	(0.0)	0.1	0.1	0.0	0.1	(0.1)	(0.2)	(0.1)	(0.0)	0.0	0.0	0.0	(0.0)
TOTAL FIXED INCOME	$ 4,909,994,177	15.1%	0.2	(0.0)	(0.6)	0.1	0.1	0.2	1.0	(0.0)	(0.1)	(0.1)	(0.1)	0.2	(2.0)	0.1	(0.8)	(0.3)	0.1	0.0	0.0
US EQUITY	$ 8,787,566,454	27.1%	(7.0)	(1.5)	(2.0)	(2.1)	(3.1)	(4.9)	(4.0)	2.2	2.0	0.7	1.1	(3.0)	(7.0)	(5.1)	(0.0)	0.0	0.0	0.4	(0.7)
INTERNATIONAL EQUITY	$ 6,786,785,783	20.9%	(2.9)	(1.6)	(0.8)	(1.6)	(0.8)	(2.9)	(2.6)	2.1	2.3	(0.2)	1.1	(1.3)	(5.7)	(2.4)	0.0	0.0	0.0	1.3	(0.4)
REAL ESTATE	$ 2,882,158,567	8.9%	(0.9)	(0.2)	(0.2)	(0.3)	(0.4)	(0.6)	(0.5)	0.3	0.2	0.1	0.1	(0.4)	(2.5)	(0.6)	0.0	0.0	0.0	0.0	(0.1)
FARMLAND & TIMBER	$ 182,760,279	0.6%	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	(0.0)	(0.2)	(0.0)	0.0	0.0	0.0	0.0	(0.0)
PRIVATE EQUITY	$ 2,656,408,051	8.2%	(2.2)	(0.5)	(0.6)	(0.7)	(1.0)	(1.5)	(1.2)	0.7	0.6	0.2	0.3	(0.9)	(2.2)	(1.6)	0.0	0.0	0.0	0.0	(0.2)
PRIVATE DEBT	$ 2,430,414,841	7.5%	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	(0.0)	(1.2)	(0.0)	(0.0)	(0.0)	0.0	0.0	(0.0)
OPPORTUNISTIC EQUITY	$ 514,890,388	1.6%	(0.4)	(0.1)	(0.1)	(0.1)	(0.2)	(0.3)	(0.2)	0.1	0.1	0.0	0.1	(0.2)	(0.4)	(0.3)	0.0	0.0	0.0	0.0	(0.0)
OPPORTUNISTIC DEBT	$ 1,120,287,388	3.5%	(0.2)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	0.1	0.0	0.0	0.0	(0.1)	(0.9)	(0.1)	0.0	0.0	0.0	0.0	(0.0)
GLOBAL INFLATION LINKEI	$ 196,747,261	0.6%	(0.0)	0.0	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	(0.0)	(0.1)	0.0	0.0	0.0	0.0	(0.0)	(0.0)
INFRASTRUCTURE	$ 316,552,360	1.0%	(0.2)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	0.1	0.1	0.0	0.0	(0.1)	(0.3)	(0.2)	0.0	0.0	0.0	0.0	(0.0)
MULTI-ASSET CLASS	$ 1,061,425,514	3.3%	(0.1)	(0.1)	(0.3)	(0.1)	(0.1)	(0.2)	(0.3)	(0.0)	0.2	0.0	0.0	(0.1)	(0.9)	(0.2)	(0.2)	0.0	0.0	0.1	0.0
GRAND TOTAL	**$ 32,412,616,289**	**100.0%**	**(13.9)**	**(4.2)**	**(4.9)**	**(4.9)**	**(5.8)**	**(10.8)**	**(8.2)**	**5.6**	**5.7**	**1.0**	**2.7**	**(6.0)**	**(23.6)**	**(10.7)**	**(1.0)**	**(0.3)**	**0.1**	**1.8**	**(1.5)**
INTERIM POLICY BENCHMARK			**(14.3)**	**(4.6)**	**(5.2)**	**(5.5)**	**(5.5)**	**(11.3)**	**(7.9)**	**6.7**	**6.7**	**0.8**	**3.1**	**(6.0)**	**(21.3)**	**(11.0)**	**(1.2)**	**(0.6)**	**0.1**	**2.1**	**(1.7)**



GLOSSARY	DEFINITION	INTERPRETATION
Historical VaR 95%	A risk metric that is derived from a full revaluation historical simulation of the risk factors impacting a portfolio, making no assumption of the tail distribution, and reporting the largest loss likely to be suffered over a holding period (1Month for ASRS) 5 times out of 100, or 1 month out of 20	Value at Risk is a number, measured in price units or as percentage of portfolio value, which tells you that in a defined large percentage of cases (usually 95% or 99%) your portfolio is likely to not lose more than that amount of money. Or said the other way around, in a defined small percentage of cases (5% or 1%) your loss is expected to be greater than that number.
HVaR Contri 95%	This is the decomposition of the VaR, making it an additive measure, showing positive values where risk is decreased and correlations are negative.	
HVaR Contri % to Total	This is the VaR contribution displayed in percent.	
Parametric VaR 95%	A risk metric that is derived from a full revaluation historical simulation of the risk factors impacting a portfolio, making a Normal distribution assumption of the tail distribution, and reporting the largest loss likely to be suffered over a holding period (1Month for ASRS) 5 times out of 100, or 1 month out of 20.	Value at Risk is a number, measured in price units or as percentage of portfolio value, which tells you that in a defined large percentage of cases (usually 95% or 99%) your portfolio is likely to not lose more than that amount of money. Or said the other way around, in a defined small percentage of cases (5% or 1%) your loss is expected to be greater than that number.
PVaR Contri 95%	This is the decomposition of the VaR, making it an additive measure, showing positive values where risk is decreased and correlations are negative.	
PVaR Contri % to Total	This is the VaR contribution displayed in percent.	
Exp Tail Loss 95%	Also known as Conditional VaR or ETL, it is derived by taking a weighted average between the VaR and losses exceeding the VaR. If VaR is reported at 95.0%, then ETL will average the losses between 95.1% to 99.9%. It is a risk measure that assesses the risk beyond VaR and into the tail end of the distribution of loss.	A measure that produces better incentives for traders than VaR is expected shortfall. This is also sometimes referred to as Conditional VaR, or tail loss. Where VaR asks the question 'how bad can things get?', expected shortfall asks 'if things do get bad, what is our expected loss?
Exp Tail Loss Contri 95%	This is the decomposition of the ETL making it an additive measure, showing positive values where risk is decreased and correlations are negative.	
Exp Tail Loss Contri % to Total	This is the ETL contribution displayed in percent.	
Max Loss	The maximum projected loss.	
Downside Risk (8.7%)	A risk metric that distinguishes between "good" and "bad" returns by assigning risk only to those returns below a return specified by an investor. Downside risk is considered a more effective risk measure than standard deviation (volatility) for two important reasons: 1) it is investor specific, and 2) it identifies return distributions that have higher probabilities for negative ("left tail") market events. Downside risk is also referred to as downside deviation or target semi-deviation.	A 5 % downside risk with an 8.7% MAR means that the conditional average underperformance (below 8.7% annual) is 5%, adjusted for a positive skew (greater than the MAR). Effectively, downside risk amplifies a big loss (by squaring the distance of that loss to the target) and smoothes out the risk measure by taking into account the gains setting them up to be equal to the target MAR.
Downside Risk Contri (8.7%)	This is the decomposition of the downside risk, making it an additive measure, showing positive values where risk is decreased and correlations are negative.	
Downside Risk Contri (8.7%) to Total	This is the downside risk contribution displayed in percent.	

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ARIZONA STATE RETIREMENT SYSTEM
Investment Management Division
Feb-29-2016
Net Returns
Final

ASRS Pension and HBS Assets

Public Securities Markets

Investment Managers Performance Summary

	Benchmark	Market Value ($mil.)	1 Mth	3 Mth	1 Year	3 Year	5 Year	10 Year	ITD	Inception Date
US EQUITY LARGE CAP										
E2 MODEL	S&P 500 INDEX (DAILY)	4,635	-0.13	-6.63	-6.24	10.69	10.11	6.48	7.12	04-01-1997
Excess			0.00	-0.04	-0.05	-0.06	-0.03	0.04	0.07	
LSV ASSET MANAGEMENT	LSV CUSTOM INDEX	656	0.43	-8.37	-11.52	9.74	9.51	6.16	9.74	01-01-2003
Excess			-0.13	-2.41	-3.42	1.37	1.01	1.25	1.86	
E7	MSCI USA High Dividend Yield Index	577	0.87	-1.64	-1.12	11.00			11.70	08-01-2012
Excess			-0.02	-0.16	-0.25	-0.05			-0.04	
E8	MSCI USA Minimum Volatility Index	560	1.05	0.02	1.90	12.67			13.05	08-01-2012
Excess			-0.04	-0.18	-0.18	0.14			0.31	
TOTAL US EQUITY LARGE CAP	**S&P 500 INDEX (DAILY)**	**6,429**	**0.11**	**-5.77**	**-5.62**	**10.78**	**10.04**	**6.47**	**7.23**	**06-01-2002**
Excess			0.25	0.81	0.57	0.03	-0.09	0.03	0.67	
US EQUITY MID CAP										
WELLINGTON MANAGEMENT COMPANY LLP	S&P 400 MIDCAP INDEX (DAILY)	253	1.42	-11.15	-10.54	10.57	8.64	7.84	10.15	07-01-2002
Excess			0.01	-2.81	-0.55	2.38	0.37	0.67	1.03	
E3 MODEL	S&P/CITIGROUP 400 GROWTH	375	0.60	-8.57	-8.14	8.71	8.66	8.35	7.81	12-01-2000
Excess			0.01	-0.11	-0.12	-0.02	0.15	0.49	0.50	
E4 MODEL	S&P/CITIGROUP 400 VALUE	336	2.23	-8.42	-12.29	7.42	7.88	6.64	9.03	07-01-2002
Excess			-0.02	-0.07	-0.08	-0.07	-0.09	0.24	0.17	
TOTAL US EQUITY MID CAP	**S&P 400 MIDCAP INDEX (DAILY)**	**964**	**1.38**	**-9.22**	**-10.30**	**8.62**	**8.20**	**7.18**	**9.08**	**06-01-2002**
Excess			-0.03	-0.87	-0.32	0.43	-0.07	0.01	0.62	
US EQUITY SMALL CAP										
DIMENSIONAL FUND ADVISORS EQFD	DFA BLENDED BENCHMARK	250	2.17	-9.88	-12.97	6.55	6.81	5.86	10.67	09-01-1998
Excess			0.03	-1.11	-2.38	-1.45	-1.81	-0.39	0.76	
E6	S&P 600 SMALL CAP (DAILY)	302	1.10	-9.69	-8.91	9.05	9.25		6.64	02-01-2007
Excess			-0.02	-0.03	0.19	0.03	-0.08		0.32	
TIMESSQUARE CAPITAL MANAGEMENT	TIMESSQUARE BLENDED BENCHMARK	320	-0.81	-13.40	-13.49	6.47	9.01	8.67	10.06	04-01-2005
Excess			-0.10	2.29	3.28	-0.73	1.75	2.29	2.35	
TOTAL US EQUITY SMALL CAP	**ASRS SMALL CAP CUSTOM INDEX**	**872**	**0.69**	**-11.14**	**-11.77**	**7.23**	**8.23**	**6.78**	**9.12**	**06-01-2002**
Excess			-0.43	-1.48	-2.66	-1.80	-1.10	-0.07	0.69	

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Investment Managers Performance Summary

	Benchmark	Market Value ($mil.)	1 Mth	3 Mth	1 Year	3 Year	5 Year	10 Year	ITD	Inception Date
TOTAL US EQUITY	**COMBINED DOMESTIC EQUITY INDEX**	**8,265**	**0.32**	**-6.73**	**-6.62**	**10.23**	**9.70**	**6.83**	**10.93**	**07-01-1975**
Excess			0.03	0.57	0.54	0.07	-0.08	0.07	-0.06	
INTERNATIONAL DEVELOPED LARGE CAP										
BRANDES INVESTMENT PARTNERS INT EQ	BRANDES CUSTOM INDEX	523	-1.39	-8.69	-12.52	4.51	1.58	2.17	7.96	10-01-1998
Excess			0.44	1.47	2.66	4.00	0.76	-0.57	2.91	
AMERICAN CENTURY	MSCI EAFE NET (BLENDED)	507	-2.81	-10.48	-12.72				-8.33	07-01-2014
Excess			-0.97	-0.32	2.46				2.92	
BGI EAFE INDEX	MSCI EAFE NET (BLENDED)	3,647	-1.79	-10.14	-14.93	0.62	0.83		5.80	07-01-2009
Excess			0.04	0.02	0.25	0.12	0.01		-0.01	
THOMSON, SIEGEL & WALMSLEY	MSCI EAFE NET (BLENDED)	269	-2.20	-10.26	-12.74				-9.65	07-01-2014
Excess			-0.37	-0.10	2.45				1.60	
TRINITY STREET	MSCI EAFE NET (BLENDED)	294	-1.58	-10.08	-11.46				-10.22	07-01-2014
Excess			0.25	0.08	3.72				1.03	
TOTAL INTERNATIONAL DEVELOPED LARGE CAP	**MSCI EAFE NET (BLENDED)**	**5,240**	**-1.86**	**-10.03**	**-14.30**	**0.63**	**0.75**			**09-01-2009**
Excess			-0.03	0.13	0.88	0.12	-0.07			
INTERNATIONAL DEVELOPED SMALL CAP										
AQR CAPITAL	MSCI EAFE SMALL CAP NET (BLENDED)	90	-0.97	-6.74	-2.31				6.33	06-01-2013
Excess			-0.85	0.56	3.14				1.74	
BLACKROCK EAFE SMALL CAP	MSCI EAFE SMALL CAP NET (BLENDED)	234	-0.13	-7.31	-5.40	5.34	3.99		9.03	06-01-2010
Excess			-0.01	-0.01	0.05	0.02	-0.15		-0.11	
DIMENSIONAL FUND ADVISORS INTL SC	MSCI EAFE SMALL CAP NET (BLENDED)	94	-0.07	-8.04	-11.74	2.25	1.09	2.50	3.90	09-01-2005
Excess			0.05	-0.74	-6.29	-3.07	-3.05	-0.91	-1.03	
FRANKLIN TEMPLETON INVESTMENTS	MSCI EAFE SMALL CAP NET (BLENDED)	195	-2.35	-10.26	-10.94	1.99			4.17	04-01-2011
Excess			-2.23	-2.96	-5.49	-3.33			-0.05	
TOTAL INTERNATIONAL DEVELOPED SMALL CAP	**MSCI EAFE SMALL CAP NET (BLENDED)**	**613**	**-0.96**	**-8.30**	**-8.04**	**3.96**	**4.13**		**6.18**	**10-01-2009**
Excess			-0.84	-1.00	-2.59	-1.36	-0.01		-0.67	
INTERNATIONAL EMERGING MARKETS										
BLACKROCK EMERGING MARKETS	MSCI EMF NET (BLENDED)	279	-0.19	-8.81	-23.57	-9.08	-5.62		-4.61	10-01-2010
Excess			-0.03	-0.09	-0.16	-0.27	-0.39		-0.37	
EATON VANCE EMERGING MARKET EQUITY	MSCI EMF NET (BLENDED)	244	0.94	-5.26	-21.41	-8.09	-4.66		-4.03	12-01-2010

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ASRS Pension and HBS Assets

Public Securities Markets

Investment Managers Performance Summary

	Benchmark	Market Value ($mil.)	1 Mth	3 Mth	1 Year	3 Year	5 Year	10 Year	ITD	Inception Date
Excess			1.10	3.46	2.00	0.72	0.57		0.37	
LSV EMERGING MARKET EQUITY	MSCI EMF NET (BLENDED)	100	-0.04	-9.59	-26.84	-10.37	-5.79		-4.70	12-01-2010
Excess			0.13	-0.87	-3.43	-1.56	-0.56		-0.30	
WILLIAM BLAIR & COMPANY	MSCI EMF NET (BLENDED)	316	-1.59	-11.01	-23.44	-6.30	-1.76		-2.58	11-01-2010
Excess			-1.43	-2.29	-0.03	2.51	3.46		2.23	
TOTAL INTERNATIONAL EMERGING MARKETS	**MSCI EMF NET (BLENDED)**	**939**	**-0.36**	**-8.77**	**-23.53**	**-8.38**	**-4.57**		**-4.08**	**10-01-2010**
Excess			-0.20	-0.04	-0.12	0.43	0.66		0.16	
TOTAL INTERNATIONAL EQUITY	**INTERNATIONAL EQUITY INDEX**	**6,793**	**-1.58**	**-9.70**	**-15.16**	**-1.28**	**-0.31**	**1.52**	**5.45**	**04-01-1987**
Excess			-0.40	-0.29	0.95	0.03	0.00	-0.65	0.32	
RISK FACTOR PORTFOLIO										
RISK FACTOR PORTFOLIO		534	0.40	-6.13	-5.20				9.29	06-01-2013
TOTAL EQUITY W/ RISK FACTOR OVERLAY	**MSCI WORLD NET (BLENDED)**	**15,592**	**-0.51**	**-8.03**	**-10.71**	**5.42**	**5.87**	**4.81**	**5.90**	**01-01-1998**
Excess			0.23	0.29	0.30	-0.06	0.61	0.54	0.82	
TOTAL EQUITY W/O RISK FACTOR	**MSCI WORLD NET (BLENDED)**	**15,058**	**-0.54**	**-8.10**	**-10.88**	**5.35**	**5.82**	**4.79**	**5.89**	**01-01-1998**
Excess			0.20	0.23	0.12	-0.13	0.56	0.51	0.81	
INTEREST RATE SENSITIVE										
BLACKROCK LONG GOVT BONDS	Barclays Treasury Long (Daily)	382	2.99	8.03					8.29	09-01-2015
Excess			0.01	-0.11					-0.02	
BGI US DEBT FD	Barclays Aggregate (Daily)	1,578	0.67	1.79	1.58				3.34	05-01-2014
Excess			-0.04	0.03	0.08				0.15	
F2 MODEL	Barclays Aggregate (Daily)	1,910	0.70	1.74	1.85	2.52	3.88	4.96	5.42	10-01-2000
Excess			-0.01	-0.02	0.34	0.31	0.28	0.26	0.17	
BGI GOVT/CRDTBD INDEX	Barclays Gov/Credit Int (Daily)	25	0.47	1.42	1.94	1.77	2.98		4.48	11-01-2008
Excess			-0.02	0.05	0.11	0.13	0.12		0.10	
INTEREST RATE SENSITIVE	**Barclays Aggregate (Daily)**	**3,895**	**0.91**	**2.35**	**2.29**	**2.56**			**2.41**	**01-01-2013**
Excess			0.20	0.59	0.79	0.34			0.37	
HIGH YIELD FIXED INCOME										
COLUMBIA MANAGEMENT INV. ADVISORS, LLC	Barclays Corp High Yield (Daily)	674	1.23	-0.90	-2.69	3.19	5.66		7.86	10-01-2009
Excess			0.66	2.64	5.60	2.48	1.57		0.82	
JP MORGAN HIGH YIELD	Barclays Corp High Yield (Daily)	334	0.37	-3.33	-7.26				1.34	07-01-2013

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ARIZONA STATE RETIREMENT SYSTEM
Investment Management Division
Feb-29-2016
Net Returns
Final

ASRS Pension and HBS Assets

Public Securities Markets

Investment Managers Performance Summary

	Benchmark	Market Value ($mil.)	1 Mth	3 Mth	1 Year	3 Year	5 Year	10 Year	ITD	Inception Date
Excess			-0.20	0.20	1.04				0.36	
TOTAL HIGH YIELD FIXED INCOME	**Barclays Corp High Yield (Daily)**	**1,009**	**0.95**	**-1.72**	**-4.26**	**2.41**	**4.96**		**7.22**	**10-01-2009**
Excess			0.37	1.82	4.04	1.69	0.87		0.18	
TOTAL PUBLIC FIXED INCOME	**ASRS CUSTOM FIXED INCOME BENCHMARK**	**4,904**	**0.91**	**1.50**	**0.67**	**1.19**	**3.39**	**4.84**	**8.23**	**07-01-1975**
Excess			0.10	1.37	4.03	1.45	1.11	0.79		
MULTI-ASSET CLASS STRATEGIES										
BRIDGEWATER ASSOCIATES GLBL TAA	BRIDGEWATER CUSTOM BENCHMARK	1,064	-4.11	-5.52	-8.64	6.11	7.39	7.41	7.80	01-01-2004
Excess			-4.12	-5.56	-7.56	-0.79	0.59	1.98	1.77	
TOTAL MULTI-ASSET CLASS STRATEGIES	**MULTI ASSET CUSTOM INDEX**	**1,064**	**-4.11**	**-5.52**	**-9.70**	**4.73**	**5.95**	**6.21**	**6.73**	**01-01-2004**
Excess			-4.12	-5.56	-7.45	-1.74	-0.60	0.90	0.80	
GLOBAL INFLATION LINKED										
GRESHAM	Bloomberg Commodity Index Total Return	199	-1.12	-7.25	-27.99	-17.83	-13.53		-7.98	09-01-2010
Excess			0.51	-0.99	-1.48	-0.12	0.91		1.37	
TOTAL GLOBAL INFLATION LINKED	**Bloomberg Commodity Index Total Return**	**199**	**-1.12**	**-7.25**	**-27.99**	**-17.82**	**-13.41**		**-7.92**	**02-01-2010**
Excess			0.51	-0.99	-1.48	-0.10	1.03		0.36	
CASH ASSETIZATION										
TOTAL CASH ASSETIZATION	**CASH ASSETIZATION CUSTOM INDEX**	**523**	**-0.18**	**-4.22**	**-8.88**				**-4.80**	**02-01-2015**
Excess			-0.30	-0.59	4.82				4.92	
TOTAL PUBLIC MARKET		**22,306**	**-0.37**	**-5.84**	**-8.66**	**4.01**	**4.92**		**7.48**	**10-01-2009**

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ARIZONA STATE RETIREMENT SYSTEM
Investment Management Division
Feb-29-2016
Net Returns
Final

ASRS Long Term Disability Assets

Investment Managers Performance Summary

	Benchmark	Market Value ($mil.)	1 Mth	3 Mth	YTD	1 Year	3 Year	5 Year	10 Year	ITD	Inception Date
LTD											
BLACKROCK - US DEBT FUND B	Barclays Aggregate (Daily)	36.8	0.66	1.78	2.13	1.50	2.21	3.63		3.59	01-01-2011
Excess			-0.05	0.01	0.03	0.00	-0.01	0.03		0.03	
BLACKROCK - US HIGH YIELD FUND B	Barclays Corp High Yield (Daily)	13.9	0.91	-2.95	-0.54	-8.34	0.68	3.93		4.54	01-01-2011
Excess			0.34	0.58	0.50	-0.05	-0.04	-0.16		-0.12	
BLACKROCK-LTD-EM BD INDX FD B	JPM GBI-EM Global Diversified Index	0.1	1.40	-0.76	1.74	-13.16	-10.29			-9.73	01-01-2013
Excess			-0.04	-0.29	-0.06	-0.65	-0.75			-0.77	
BLACKROCK - RUSSELL 1000 FUND B	RUSSELL 1000 (DAILY)	49.6	-0.02	-7.11	-5.40	-7.15	10.44	9.93		10.85	01-01-2011
Excess			0.01	0.01	0.02	0.06	0.01	0.02		0.02	
BLACKROCK - RUSSELL 2000 FUND B	RUSSELL 2000 (DAILY)	26.3	0.03	-13.32	-8.74	-14.75	5.92	6.29		7.15	01-01-2011
Excess			0.03	0.06	0.06	0.23	0.19	0.18		0.19	
BLACKROCK - EAFE INDEX FUND B	MSCI EAFE NET (BLENDED)	28.5	-1.83	-10.20	-8.94	-15.20	0.38	0.60		1.68	01-01-2011
Excess			-0.00	-0.04	-0.01	-0.02	-0.13	-0.22		-0.22	
BLACKROCK EAFE SMALL CAP FUND B	MSCI EAFE SMALL CAP NET (BLENDED)	3.7	-0.15	-7.34	-7.96	-5.45	5.34	4.00		4.49	01-01-2011
Excess			-0.03	-0.04	0.02	0.00	0.02	-0.14		-0.13	
BLACKROCK MSCI EMERGING MARKETS FUND B	MSCI EMF NET (BLENDED)	9.4	-0.15	-8.82	-6.66	-23.60	-9.14	-5.65		-6.14	01-01-2011
Excess			0.02	-0.10	-0.02	-0.19	-0.33	-0.42		-0.41	
BGI-LTD- R ESTATE FD	WILSHIRE RESI (DAILY)	21.2	-0.93	-2.86	-4.87	-3.62	8.19	9.19	5.47	6.96	01-01-2005
Excess			-0.10	-0.07	-0.22	-0.46	-0.43	-0.82	-0.49	-0.46	
BLACKROCK DJ UBS COMM FUND B	Bloomberg Commodity Index Total Return	2.8	-1.63	-6.40	-3.25	-26.65	-17.97	-14.73		-13.92	01-01-2011
Excess			0.00	-0.13	0.03	-0.14	-0.26	-0.30		-0.29	
LONG TERM DISABILITY - CASH	91 DAY TREASURY BILL (DAILY)	2.4	0.02	0.03	0.03	0.03	0.01	0.03	1.25	2.57	07-01-1995
Excess			-0.01	-0.03	0.00	-0.05	-0.05	-0.05	0.06	-0.05	
TOTAL LTD	**LTD POLICY INDEX**	**194.8**	**-0.18**	**-5.89**	**-4.53**	**-8.91**	**4.03**	**4.96**	**4.03**	**5.59**	**07-01-2002**

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Arizona State Retirement System

Private Markets Performance Summary - September 30, 2015

Asset Class	Net Asset Value	ITD IRR	ITD Benchmark	Out Performance
Private Equity	$ 2,612,677,353	11.40%	9.47% *Russell 2000*	1.93%
Real Estate	$ 2,706,475,429	7.49%	6.75% *ODCE - net*	0.74%
Private Opportunistic Equity	$ 482,107,520	23.90%	8.00% *Absolute 8*	15.90%
Private Debt	$ 1,994,407,118	11.38%	4.92% *Leveraged Loans + 250bps*	6.46%
Opportunistic Fixed Income	$ 1,117,410,462	10.31%	8.00% *Absolute 8*	2.31%

April 2016

Long Term Disability (LTD)

Thursday, March 31, 2016

Account Manager	Account Manager Style	Fixed Income	Equity	Inflation Linked	Total	Pct of Fund	Target (Range)
StateStreet B&T: Boston	Cash	$2,172,700			$2,172,700	1.09%	
BlackRock: San Francisco	Fixed Core (Passive)	$36,990,456			$36,990,456	18.49%	19%
BlackRock: San Francisco	Fixed High Yield (Passive)	$14,513,848			$14,513,848	7.25%	7%
BlackRock: San Francisco	Emerging Market Debt (Passive)	$123,947			$123,947	0.06%	0%
						25.80%	**26% (19-36%)**
BlackRock: San Francisco	Russell 1000 (Passive)		$48,856,387		$48,856,387	24.42%	24%
BlackRock: San Francisco	Russell 2000 (Passive)		$27,384,428		$27,384,428	13.69%	12%
						38.10%	**36% (26-46%)**
BlackRock: San Francisco	EAFE (Passive)		$30,140,145		$30,140,145	15.06%	18%
BlackRock: San Francisco	EAFE SC (Passive)		$3,943,774		$3,943,774	1.97%	2%
BlackRock: San Francisco	Emerging Markets (Passive)		$10,408,810		$10,408,810	5.20%	5%
						22.24%	**25% (15-35%)**
BlackRock: San Francisco	Dow Jones UBS Commodities (Passive)			$2,963,747	$2,963,747	1.48%	2% (0-4%)
BlackRock: San Francisco	US Real Estate (Passive)			$22,600,000	$22,600,000	11.29%	11% (9-13%)
						12.78%	**13% (10-16%)**
	TOTAL Amounts	$53,800,952	$120,733,543	$25,563,746	**$200,098,241**		
	TOTAL Percent	26.89%	60.34%	12.78%			

	Fixed Income	Equity	Inflation Linked
Actual Portfolio	**26.89%**	**60.34%**	**12.78%**
Policy	**26% (19-36%)**	**61% (51-68%)**	**13% (10-16%)**

Agenda Item #6

Asset Class Committee Report

Arizona State Retirement System

April 25, 2016

Private Markets Committee – February 25, 2016

- Approved a $50 million investment in a European focused mid-market buyout strategy
- Approved a $50 million investment in a lower to mid-market enterprise software strategy
- Approved a $100 million increase to a core-plus real estate open end fund
- Approved a $30 million co-invest with a private equity counter-party
- Approved a $15 million increase to a separate account partnership focused on industrial properties
- Approved the disposition of a warehouse building located in Florida

Private Markets Committee – March 22, 2016

- Approved a $50 million renewal investment with a consumer focused buyout firm
- Approved a $25 million investment in a mid-market enterprise software strategy

Future Meetings and Topics of Note

- Private Markets Committee is schedule to meet on April 22, 2016 ("future" as of the date of preparation of these materials)
  - Will consider one or more private equity investments
- Public Markets Committee is scheduled to meet on May 2, 2016
  - Will consider an investment in a public equities specialty category
- At the June meeting of the Private Markets Committee, the committee will review a mid-year update to the pacing plans for private equity and real estate

Agenda Item #7

Arizona State Retirement System

Independent ASRS Investment Program Oversight

April 25, 2016

Allan Martin, Partner, NEPC

NEPC, LLC

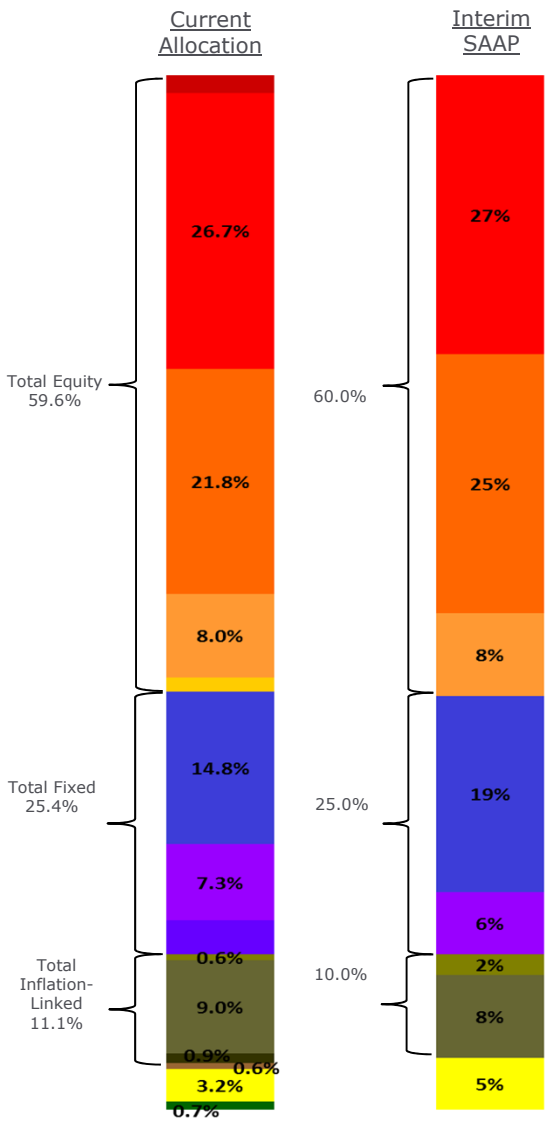
Contents

- Independent Oversight/Compliance
  - SAA Policy Compliance
  - Asset Class Committee Monitoring
- Market Environment Update
- Appendix: SAA Policy History

Independent Oversight/Compliance

Arizona State Retirement System

SAA Policy Compliance



	Current Mkt Value	Current Allocation	Interim SAAP	Interim SAAP Difference	Policy Range	Within Range	SAAP
Total Domestic and International Equity	**$16,792,182,954**	**50.2%**	**52%**	**-1.8%**			**50%**
Equity Risk Factor Portfolio	*$567,086,736*	*1.7%*	*0%*	*1.7%*			*0%*
Domestic Equity[1]	**$8,941,468,307**	**26.7%**	**27%**	**-0.3%**	**16% - 36%**	**Yes**	**26%**
U.S. Large Cap	*$6,900,677,667*	*20.6%*	*21%*	*-0.4%*			*20%*
U.S. Mid Cap	*$1,070,696,680*	*3.2%*	*3%*	*0.2%*			*3%*
U.S. Small Cap	*$970,093,960*	*2.9%*	*3%*	*-0.1%*			*3%*
International Equity[1]	**$7,283,627,911**	**21.8%**	**25%**	**-3.2%**	**14% - 34%**	**Yes**	**24%**
Developed Large Cap	*$5,579,669,414*	*16.7%*	*18%*	*-1.3%*			*17%*
Developed Small Cap	*$657,131,072*	*2.0%*	*2%*	*0.0%*			*2%*
Emerging Markets	*$1,046,827,425*	*3.1%*	*5%*	*-1.9%*			*5%*
Private Equity[2]	**$2,685,046,226**	**8.0%**	**8%**	**0.0%**	**6% - 10%**	**Yes**	**8%**
Opportunistic Equity[2,4]	**$463,500,790**	**1.4%**	**0%**	**1.4%**			**0%**
Total Equity	**$19,940,729,971**	**59.6%**	**60%**	**-0.4%**	**48% - 65%**	**Yes**	**58%**
Public Markets Fixed Income[1]	**$4,946,140,494**	**14.8%**	**19%**	**-4.2%**			**15%**
Treasuries Long Duration	*$382,469,754*	*1.1%*	*0%*	*1.1%*	*0% - 10%*	*Yes*	*0%*
Interest Rate Sensitive	*$3,533,402,616*	*10.6%*	*15%*	*-4.4%*			*11%*
High Yield	*$1,030,268,124*	*3.1%*	*4%*	*-0.9%*			*4%*
Private Debt[2]	**$2,452,320,683**	**7.3%**	**6%**	**1.3%**	**8% - 12%**	**No**	**10%**
Opportunistic Debt[2,4]	**$1,096,195,408**	**3.3%**	**0%**	**3.3%**			**0%**
Total Fixed Income	**$8,494,656,585**	**25.4%**	**25%**	**0.4%**	**18% - 35%**	**Yes**	**25%**
Commodities	**$209,108,933**	**0.6%**	**2%**	**-1.4%**	**0% - 4%**	**Yes**	**2%**
Real Estate[2]	**$3,005,864,214**	**9.0%**	**8%**	**1.0%**	**8% - 12%**	**Yes**	**10%**
Infrastructure[2]	**$316,552,365**	**0.9%**	**0%**	**0.9%**	**0% - 3%**	**Yes**	**0%**
Farmland and Timber[2]	**$188,451,382**	**0.6%**	**0%**	**0.6%**	**0% - 3%**	**Yes**	**0%**
Opportunistic Inflation-Linked[4]	**$0**	**0.0%**	**0%**	**0.0%**			**0%**
Total Inflation-Linked	**$3,719,976,894**	**11.1%**	**10%**	**1.1%**	**10% - 16%**	**Yes**	**12%**
Multi-Asset Class Strategies	**$1,054,878,819**	**3.2%**	**5%**	**-1.8%**	**0% - 12%**	**Yes**	**5%**
Cash[3]	**$250,318,614**	**0.7%**	**0%**	**0.7%**			**0%**
Operating Cash (Non-Assetized)	*$21,474,732*	*0.1%*	*0%*	*0.1%*			*0%*
Operating Cash (Assetized)	*$228,843,882*	*0.7%*	*0%*	*0.7%*			*0%*
Total	**$33,460,560,883**	**100%**	**100%**	**0%**			**100%**

[1]Domestic Equity, International Equity, and U.S. Fixed Income market values include residual values remaining in terminated manager accounts.

[2]Values shown for private markets portfolios include cash flows that occurred during 1Q 2016.

[3]Cash includes money for the upcoming monthly pension distribution.

[4]Aggregate Opportunistic asset classes not to exceed 10%.

Note: Interim SAA Policy includes proration of 4% Private Debt, and 2% Real Estate, which are unfunded.

Policy Ranges shown are relative to the long-term SAAP, which can cause some asset classes to be out of range while implementation of the long-term SAAP is in process.

Current Market Value and Current Allocation are based on unaudited values as of March 29, 2016. Data shown above will differ from what is presented in the 1Q 2016 Board Report.

Market values include manager held cash.

Asset Class Committee Monitoring

- **Two Asset Class Committee meetings have been held since the last time we provided an update on the ASRS Asset Class Committee Meetings.**

- **February 25, 2016 – Private Markets Committee**
  - Monthly Status Report, General Discussion and Deal Flow
  - Private Equity Manager Recommendation ($50 million commitment)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Private Equity Manager Recommendation ($30 million commitment; co-investment)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Private Equity Manager Recommendation ($50 million commitment)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - SMA Review
    - RCLCo and Staff presented the results of the separately managed accounts program
  - Real Estate Asset Redemption Recommendation ($275 million investment)
    - Committee approved the recommendation delegating strategy to staff
      - Investment is a core strategy that mimics the NCREIF ODCE benchmark and does not strategically alight with ASRS's strategic plan for the real estate asset class.

Asset Class Committee Monitoring

- **February 25, 2016 – Private Markets Committee**
  - Real Estate Manager Recommendation – Additional Commitment ($100 million; $200 million original commitment)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 10%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Real Estate Manager Recommendation – Additional Commitment ($15 million; $100 million original commitment)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 10%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Real Estate Asset Disposition Recommendation
    - Committee approved the recommendation delegating strategy to staff
      - Asset is currently under contract to be sold, which would result in a return of 23% since its initial investment in 2014.

Asset Class Committee Monitoring

- **March 22, 2016 – Private Markets Committee**
  - Monthly Status Report, General Discussion and Deal Flow
  - Private Equity Manager Recommendation ($50 million commitment)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
      - The ASRS has invested with this manager in a prior fund(s) within the private equity program
  - Private Equity Manager Recommendation ($25 million commitment)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
      - The ASRS has invested with this manager in a prior fund(s) within the private equity program

General Observations

- **The Fund continues to make significant progress moving the portfolio from the Interim SAAP toward the long-term SAAP. New long-term SAAP adopted as of April 1, 2015.**
  - Current Interim SAAP includes proration of 4% Private Debt and 2% Real Estate, which are unfunded.
  - Continued build out of private markets asset classes provides opportunity to take advantage of illiquidity premium to produce expected returns in excess of what we believe can be achieved in the public markets.

- **IMD has already taken significant steps to move the Fund toward implementation of the recently approved SAAP.**
  - The largest single underweight position in the Fund is Private Debt, which was increased from a 3% SAAP target to a 10% SAAP target with an 8% - 12% range (current actual is 7.3%).
    - $5.1 billion in commitments to private debt strategies equates to approximately 15.2% of Total Fund assets vs. the SAAP target of 10%.
      - $5.1 billion includes $500 million investment approved in December 2015 that is expected to close in 1Q 2016.
      - Estimate private debt asset class reaching 10% target by the end of 2016.
      - Estimate private debt asset class reaching 12% cap in 3Q 2017.
  - Multi-Asset Class Strategies (formerly GTAA) has been restructured and moved 'above the line', and now has an explicit 5% target within the SAAP.

- **Tactical positioning consistent with IMD House Views.**

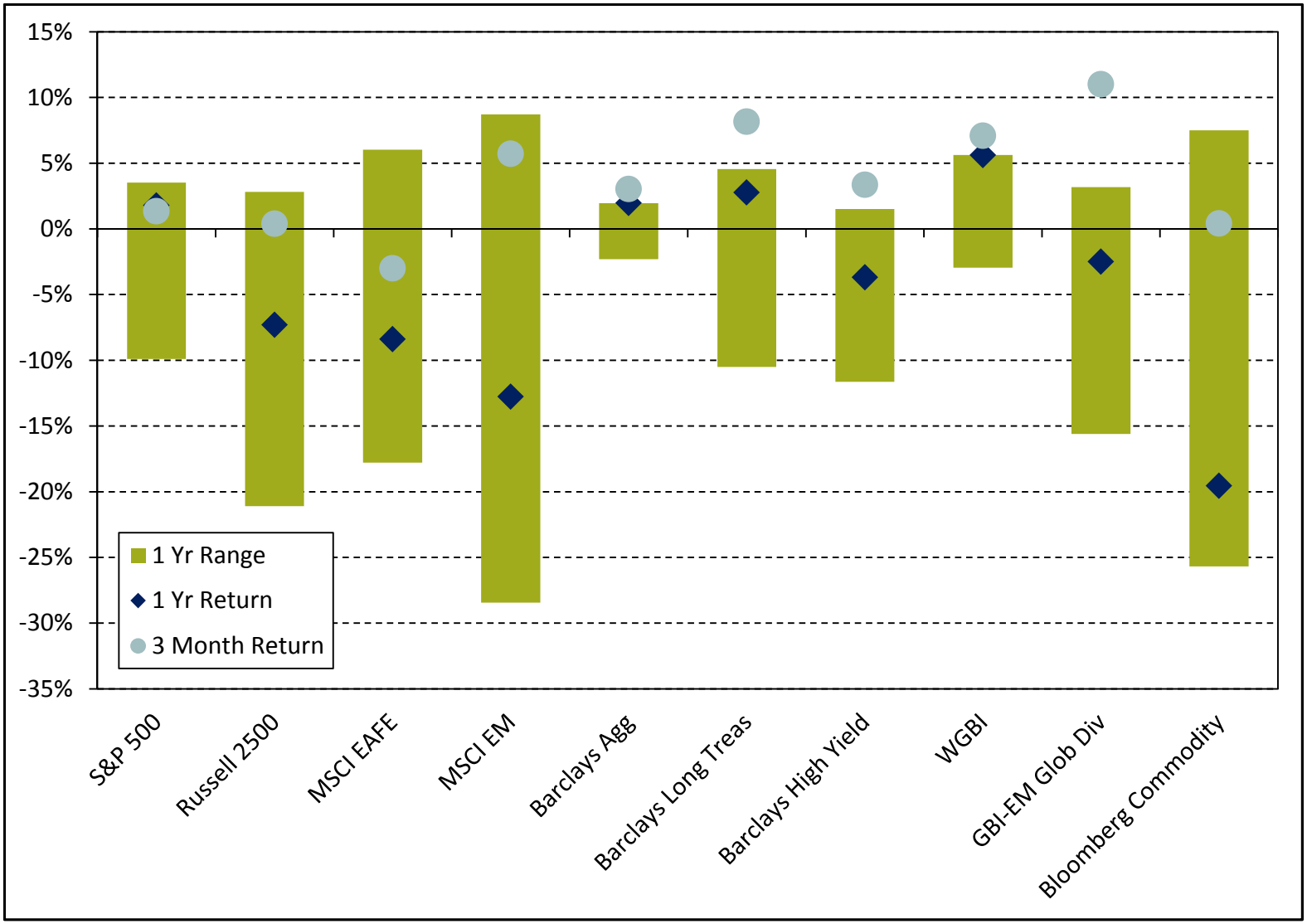
Market Environment Update

Index Performance Summary as of 3/31/2016

	2009	2010	2011	2012	2013	2014	2015	JAN	FEB	MAR	YTD
Barclays US Strips 20+ Yr	-36.0%	10.9%	58.5%	3.0%	-21.0%	46.4%	-3.7%	6.9%	4.6%	-0.3%	11.4%
JPM GBI-EM Global Diversified	22.0%	15.7%	-1.8%	16.8%	-9.0%	-5.7%	-14.9%	0.4%	1.4%	9.1%	11.0%
Barclays US Govt/Credit Long	1.9%	10.2%	22.5%	8.8%	-8.8%	19.3%	-3.3%	2.1%	2.2%	2.8%	7.3%
Citi WGBI	2.6%	5.2%	6.4%	1.7%	-4.0%	-0.5%	-3.6%	1.4%	2.9%	2.7%	7.1%
Barclays US Long Credit	16.8%	10.7%	17.1%	12.7%	-6.6%	16.4%	-4.6%	0.3%	1.7%	4.8%	6.8%
FTSE NAREIT Equity REITs	28.0%	28.0%	8.3%	18.1%	2.5%	30.1%	3.2%	-3.4%	-0.4%	10.1%	6.0%
MSCI EM	78.5%	18.9%	-18.4%	18.2%	-2.6%	-2.2%	-14.9%	-6.5%	-0.2%	13.2%	5.7%
JPM EMBI Global Diversified	29.8%	12.2%	7.4%	17.4%	-5.3%	7.4%	1.2%	-0.2%	1.9%	3.3%	5.0%
Barclays US Corporate HY	58.2%	15.1%	5.0%	15.8%	7.4%	2.5%	-4.5%	-1.6%	0.6%	4.4%	3.4%
Barclays US Agg Bond	5.9%	6.5%	7.8%	4.2%	-2.0%	6.0%	0.6%	1.4%	0.7%	0.9%	3.0%
Barclays US Agg Interm	6.5%	6.2%	6.0%	3.6%	-1.0%	4.1%	1.2%	1.3%	0.5%	0.6%	2.3%
Barclays Municipal	12.9%	2.4%	10.7%	6.8%	-2.6%	9.1%	3.3%	1.2%	0.2%	0.3%	1.7%
S&P 500	26.5%	15.1%	2.1%	16.0%	32.4%	13.7%	1.4%	-5.0%	-0.1%	6.8%	1.4%
Credit Suisse Leveraged Loan	44.9%	10.0%	1.8%	9.4%	6.2%	2.1%	-0.4%	-0.7%	-0.6%	2.6%	1.3%
Russell 1000	28.4%	16.1%	1.5%	16.4%	33.1%	13.2%	0.9%	-5.4%	0.0%	7.0%	1.2%
Barclays US Govt/Credit 1-3 Yr	3.8%	2.8%	1.6%	1.3%	0.6%	0.8%	0.7%	0.5%	0.1%	0.4%	1.0%
Bloomberg Commodity	18.9%	16.8%	-13.3%	-1.1%	-9.5%	-17.0%	-24.7%	-1.7%	-1.6%	3.8%	0.4%
Russell 2500	34.4%	26.7%	-2.5%	17.9%	36.8%	7.1%	-2.9%	-8.0%	0.7%	8.3%	0.4%
MSCI ACWI	34.6%	12.7%	-7.4%	16.1%	22.8%	4.2%	-2.4%	-6.0%	-0.7%	7.4%	0.2%
Russell 2000	27.2%	26.9%	-4.2%	16.4%	38.8%	4.9%	-4.4%	-8.8%	0.0%	8.0%	-1.5%
Credit Suisse Hedge Fund	18.6%	11.0%	-2.5%	7.7%	9.7%	4.1%	-0.7%	-1.4%	-1.1%	-1.1%	-2.5%
MSCI EAFE	31.8%	7.8%	-12.1%	17.3%	22.8%	-4.9%	-0.8%	-7.2%	-1.8%	6.5%	-3.0%
Alerian MLP	76.4%	35.9%	13.9%	4.8%	27.6%	4.8%	-32.6%	-11.1%	-0.5%	8.3%	-4.2%

Source: Morningstar Direct

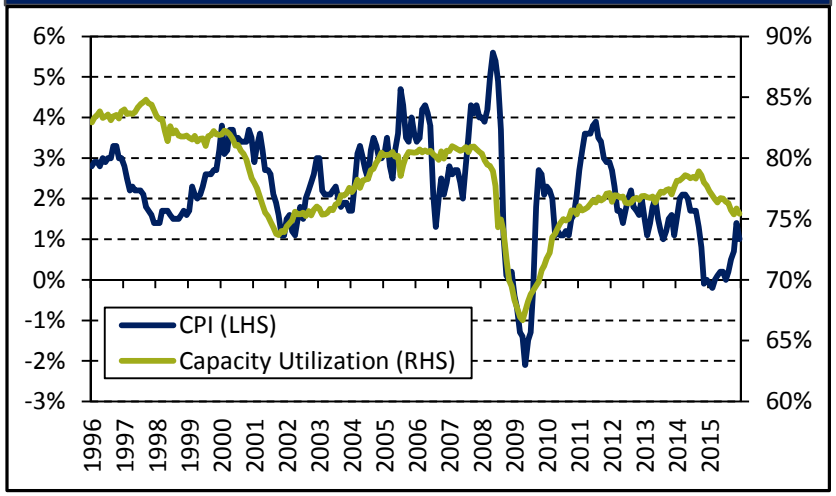
Broad Market Performance Summary as of 3/31/2016



Source: Bloomberg, Standard and Poors, Russell, MSCI, Barclays, Citigroup, JP Morgan
**1 Yr Range: Represents range of cumulative high/low daily index returns for an investment made one year ago*

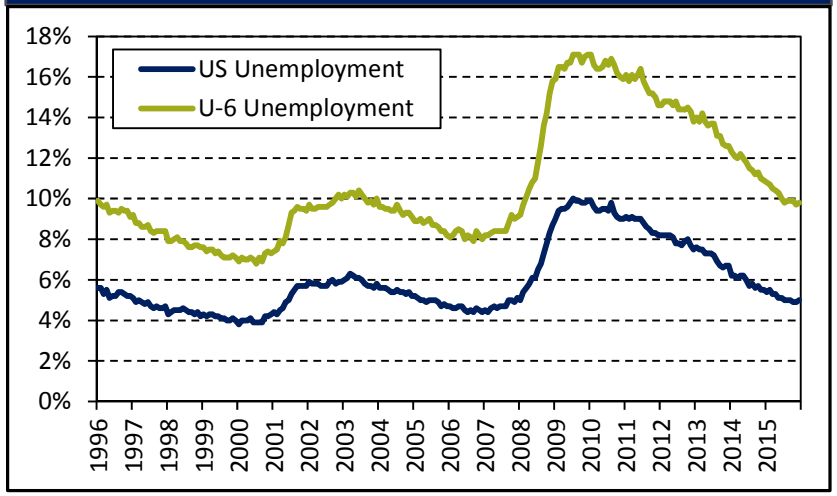
US Economic Indicators

Inflation has increased off lows



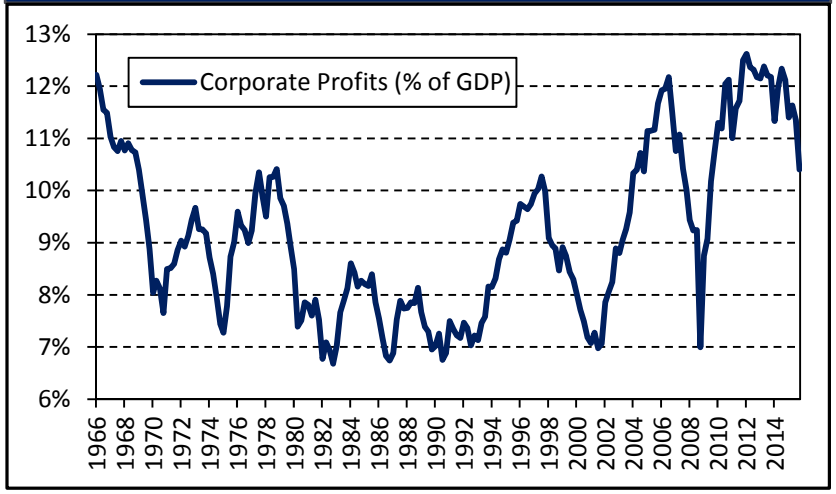
Source: Bloomberg, Federal Reserve, Bureau of Labor Statistics

Unemployment steadily improving



Source: Bloomberg, Bureau of Labor Statistics

Corporate profits lower off secular highs



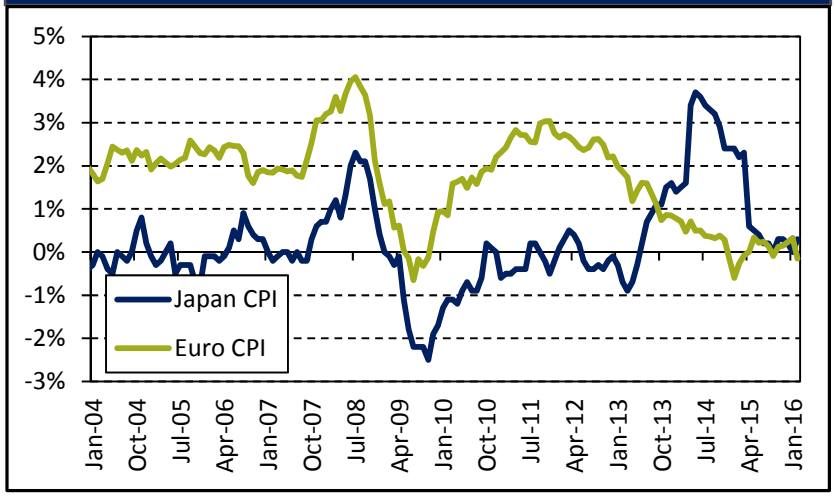
Source: Bloomberg, Bureau of Economic Analysis

Manufacturing trending higher after dip

Source: Bloomberg, Institute for Supply Management

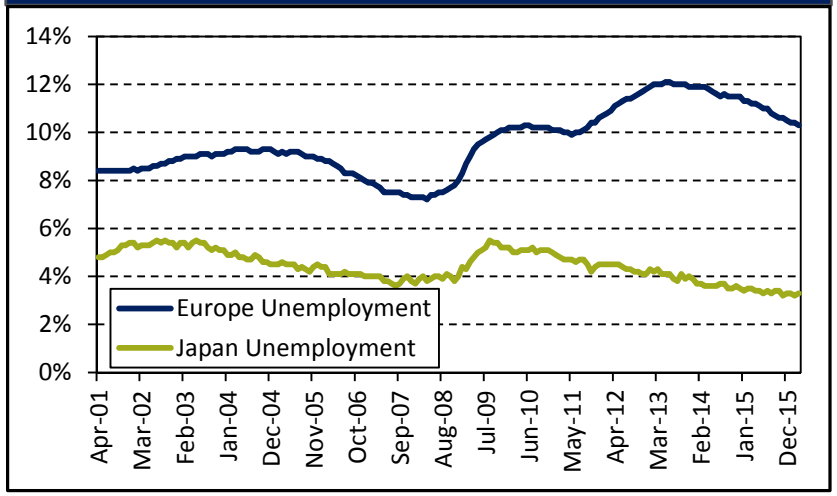
International Economic Indicators

Inflation remains muted



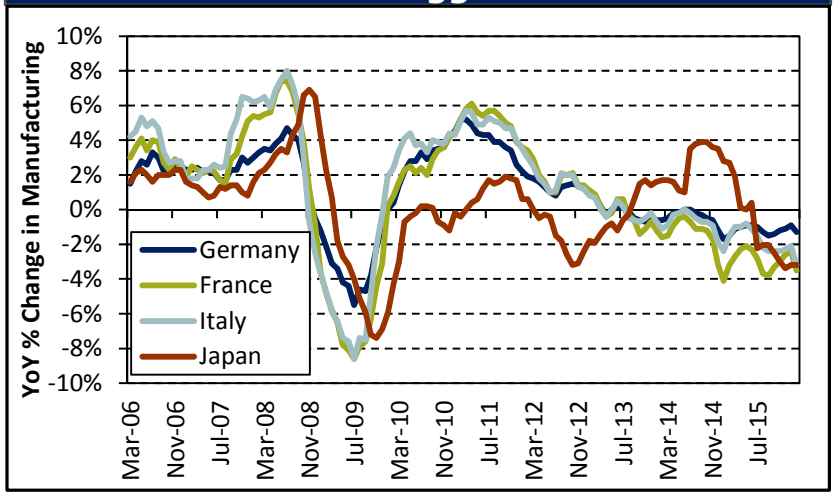
Source: Bloomberg, Japan Ministry of Internal Affairs and Communications, Eurostat

Europe employment recovery lagging



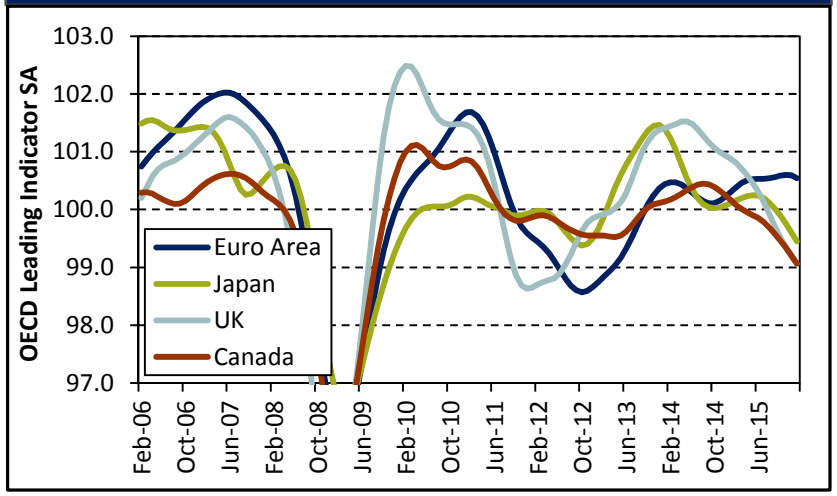
Source: Bloomberg, Japan Ministry of Internal Affairs and Communications, Eurostat

Manufacturing in developed economies has lagged



Source: Bloomberg, OECD, Eurostat

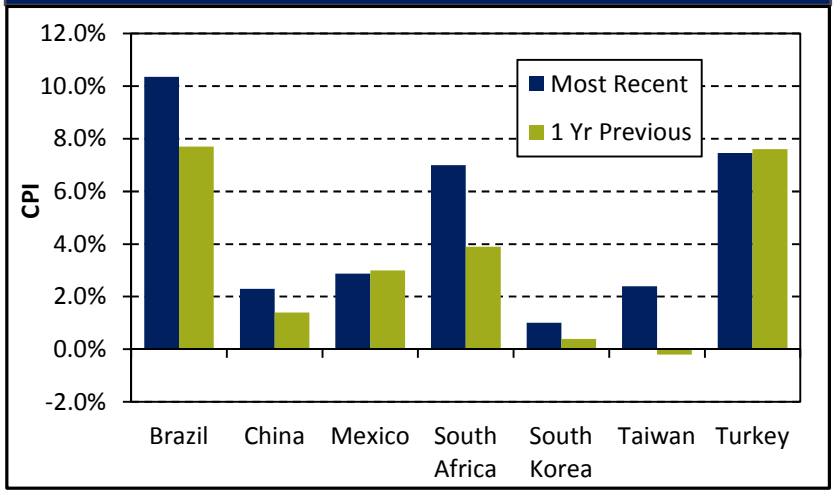
Leading indicators mostly neutral



Source: Bloomberg, OECD

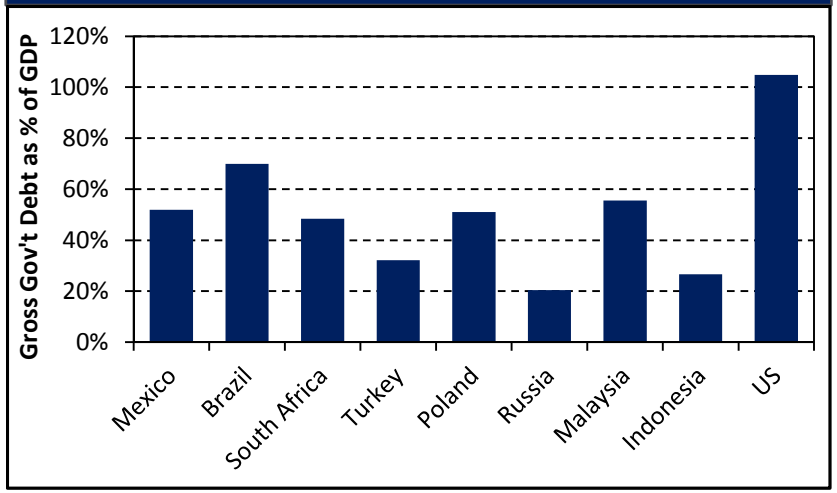
Emerging Market Economic Indicators

EM inflation is varied by country



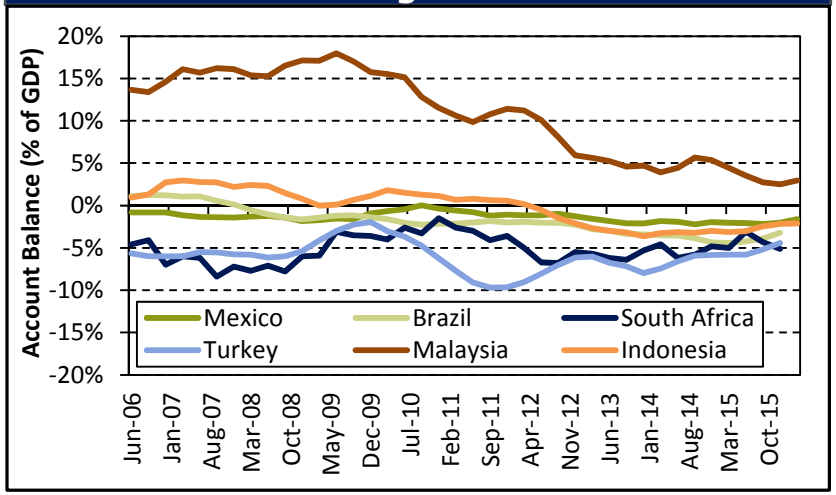
Source: Bloomberg

Relatively healthy Debt/GDP ratios



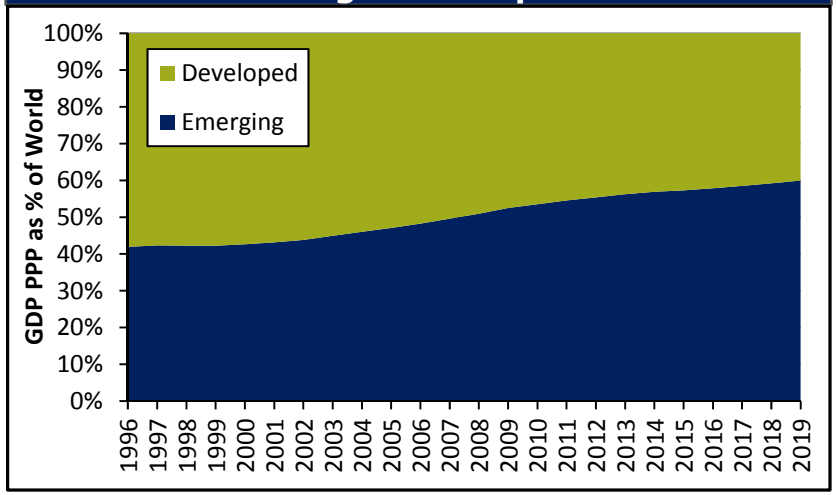
Source: Bloomberg, IMF

Marginal improvement in account balance challenged countries



Source: Bloomberg

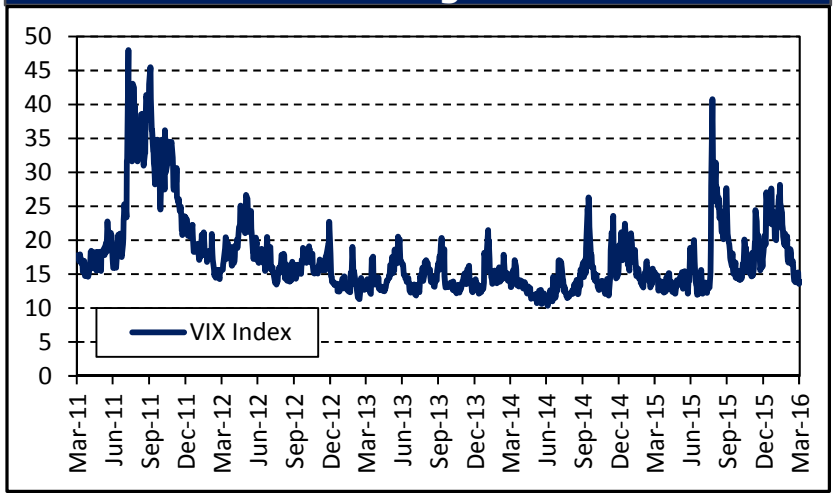
Emerging economies make up >50% of global output



Source: Bloomberg, IMF

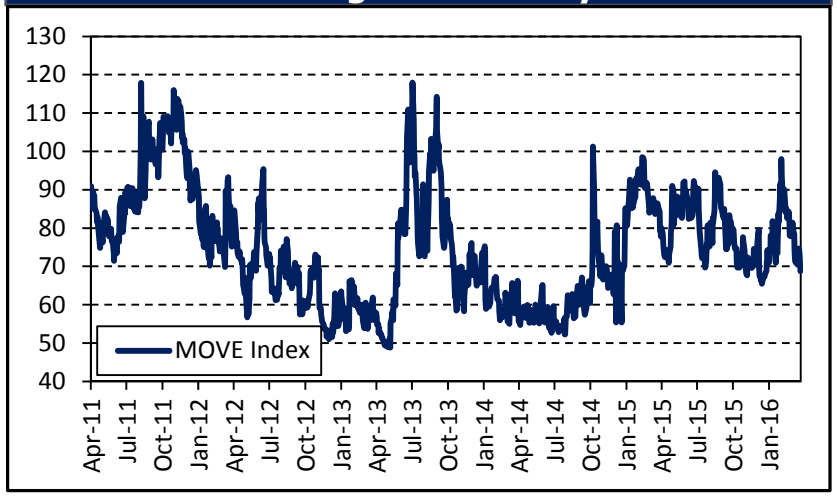
Volatility

Equity volatility decreasing off early year highs



Source: Bloomberg, CBOE

Treasury rates experiencing periods of higher volatility

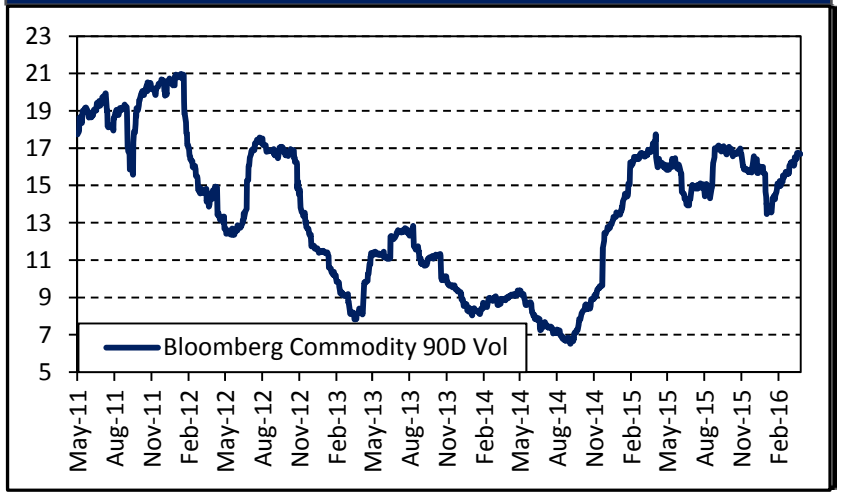


Source: Bloomberg, Merrill Lynch

Sustained uptick in currency volatilities

Source: Bloomberg, Deutsche Bank

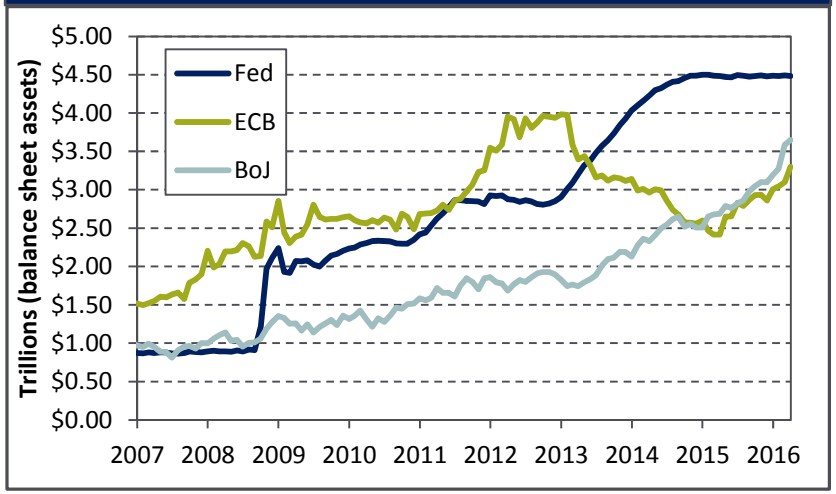
Commodity pricing volatility has increased



Source: Bloomberg, Merrill Lynch

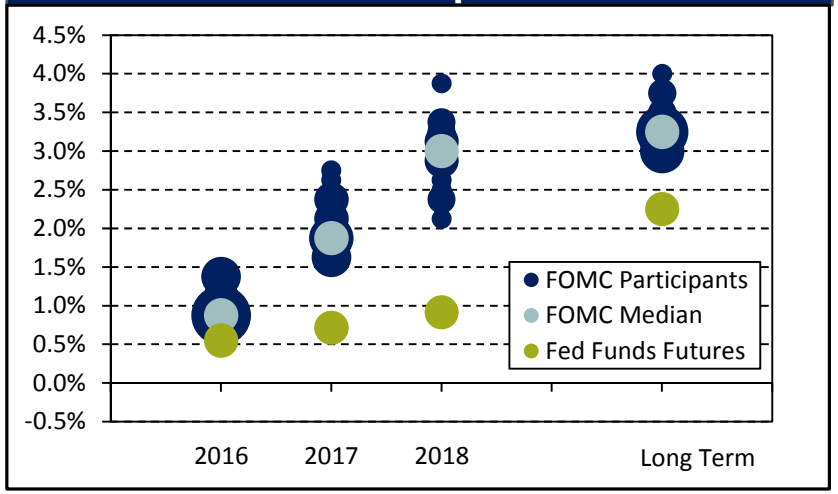
Central Banks

Major central bank policy divergence



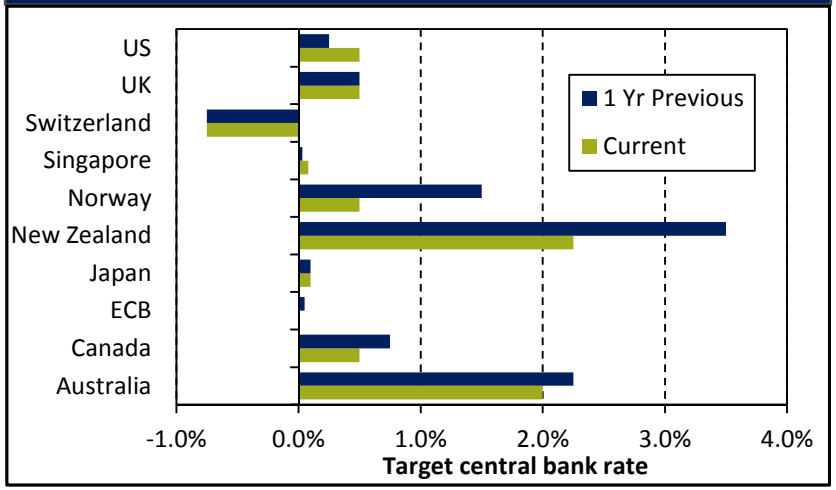
Source: Bloomberg, Federal Reserve, Bank of Japan, ECB, NEPC

Fed's ideal rate of policy firming above market expectations



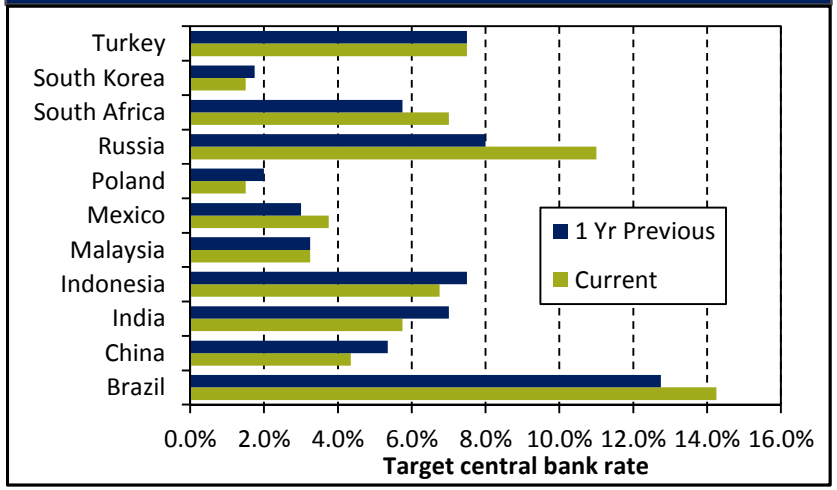
Source: Bloomberg, Federal Reserve, NEPC

Many developed central banks have maintained low interest rates



Source: Bloomberg

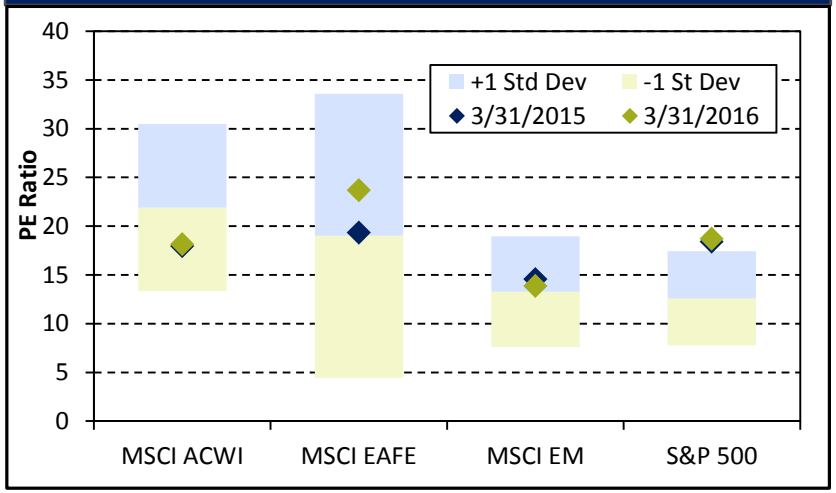
EM central bank policies have varied by circumstance



Source: Bloomberg

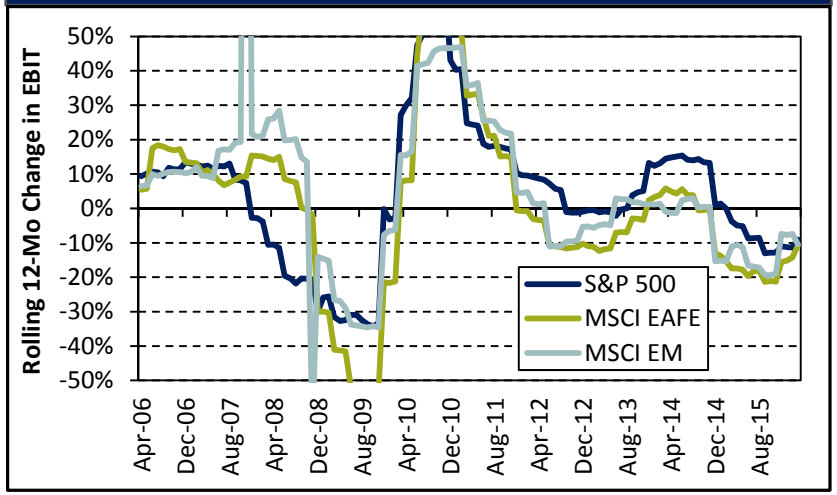
Global Equity

Global valuations are mixed



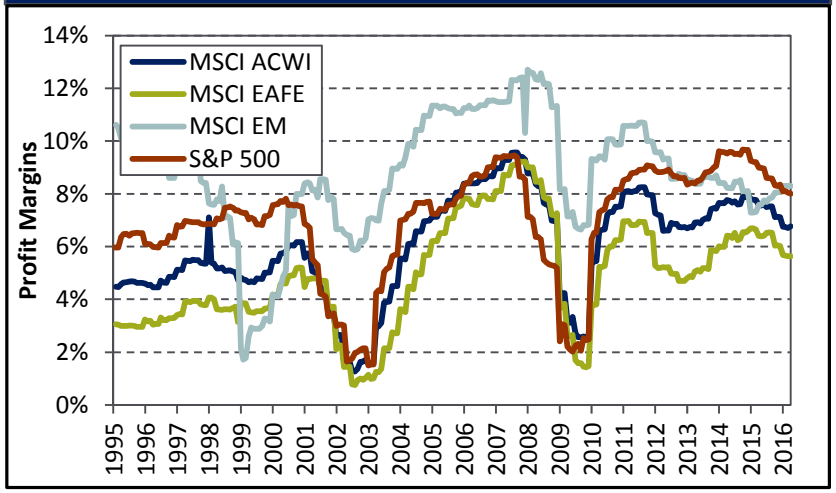
*Source: Bloomberg, Standard and Poors, MSCI *MSCI EAFE is ex UK Telecom*

Earnings growth trending lower



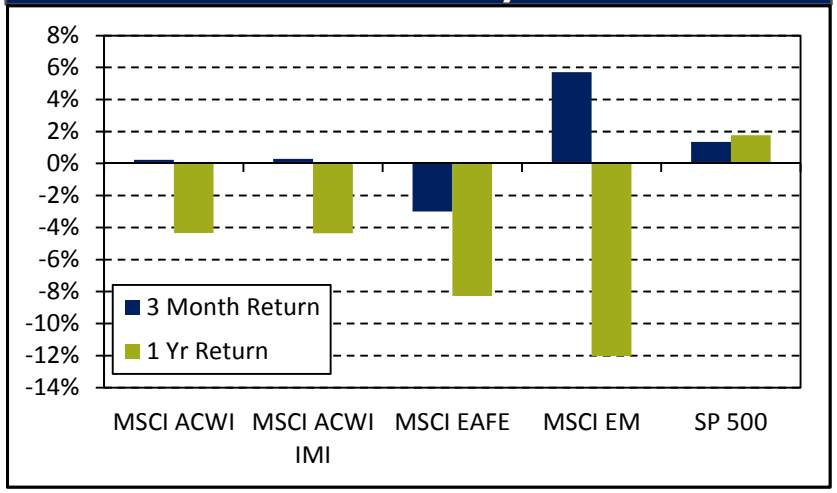
Source: Bloomberg, Standard and Poors, MSCI

Margins declining outside of EM



Source: Bloomberg, MSCI

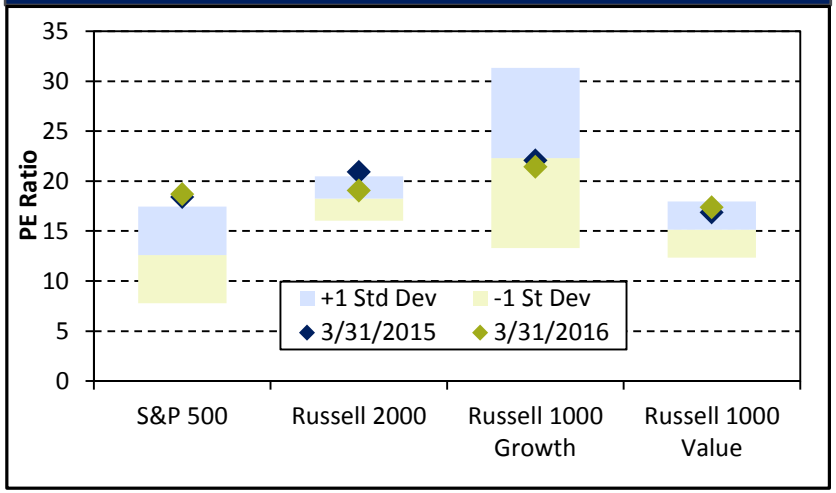
Global equity returns have been negative over one year



Source: Bloomberg, MSCI

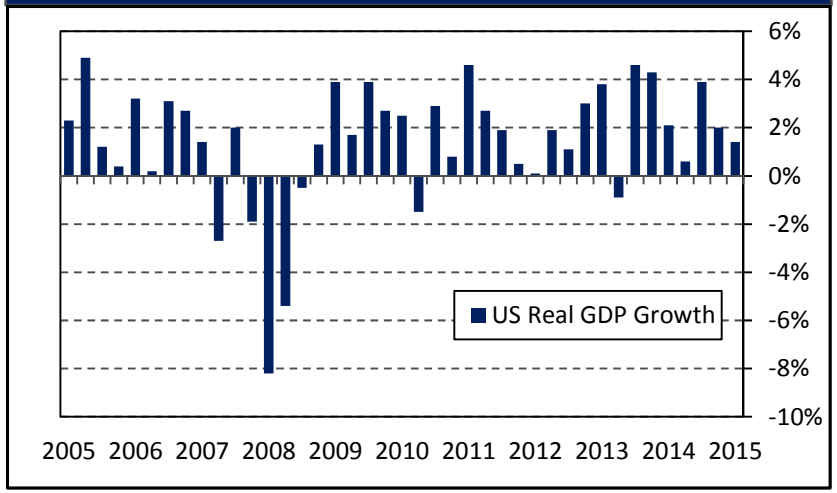
US Equity

Valuations near or above historical norms



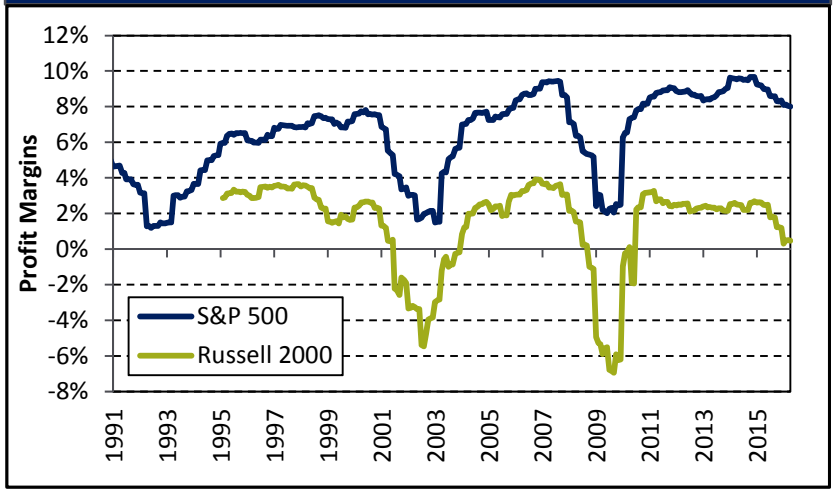
*Source: Bloomberg, Standard and Poors, Russell *Russell 2000 PE is index adjusted positive*

Growth recovery marked by inconsistency



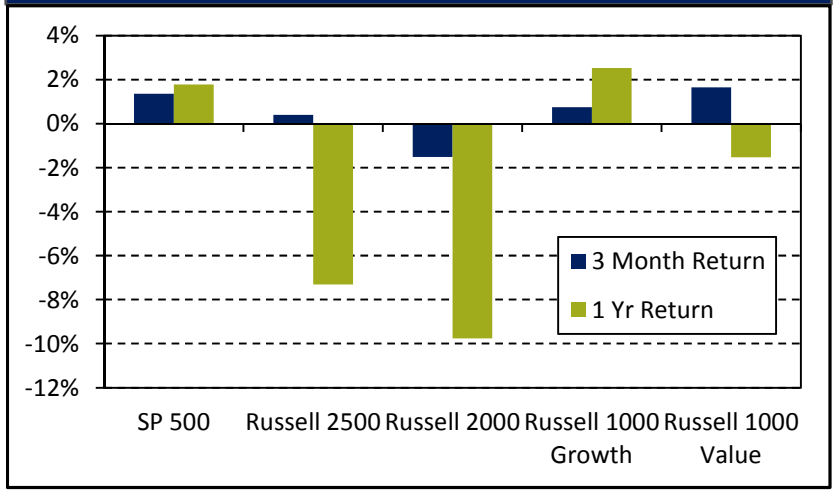
Source: Bloomberg, Bureau of Economic Analysis

Profit margins lower off highs



Source: Bloomberg, Standard and Poors, Russell

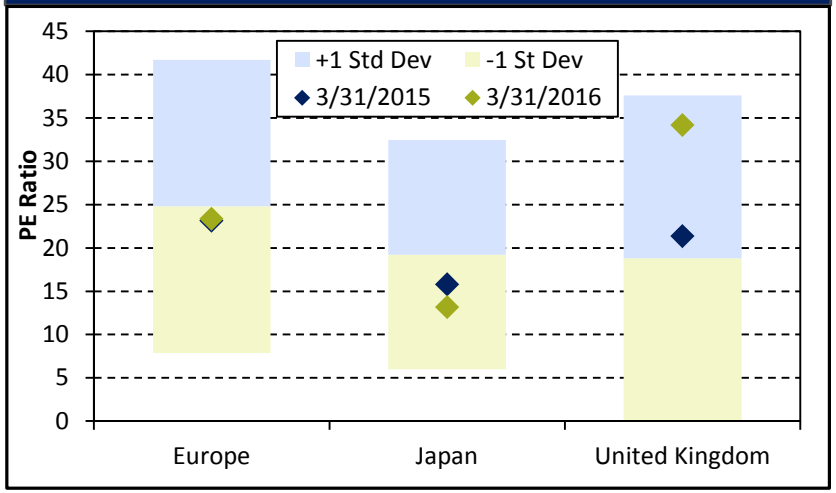
Trailing performance has been mixed



Source: Bloomberg, Standard and Poors, Russell

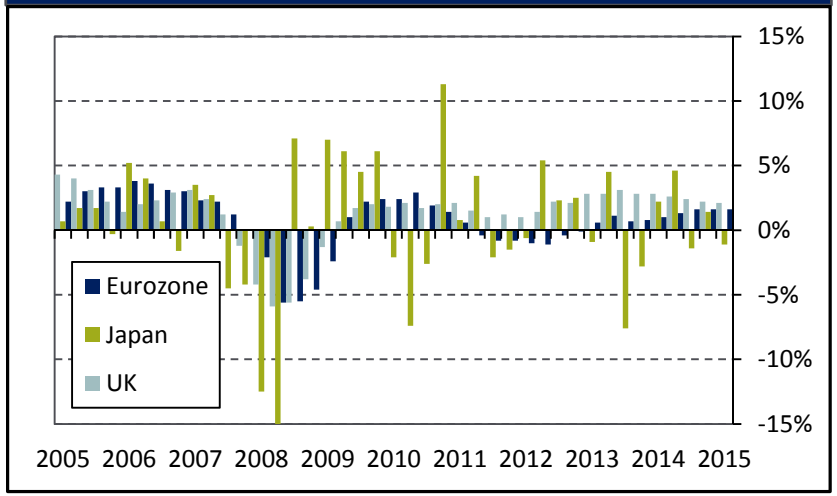
International Equity

PEs near varied by region/country



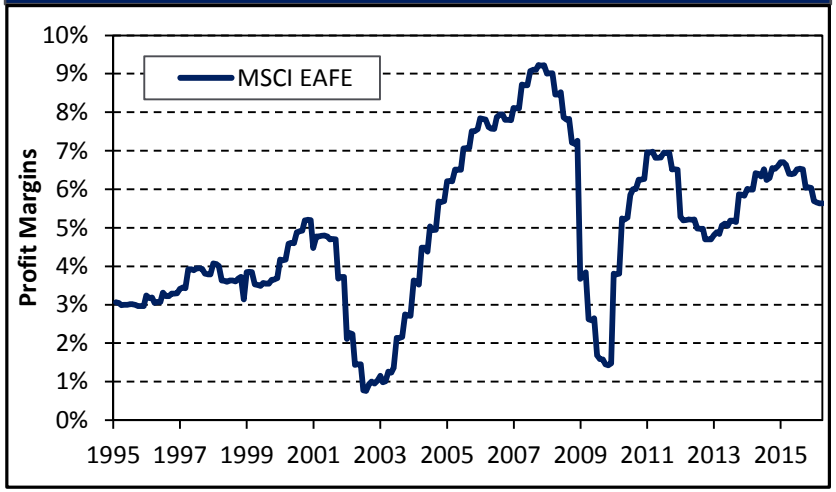
*Source: Bloomberg, MSCI, FTSE *UK represented by FTSE 100 Index*

Slow Global Growth



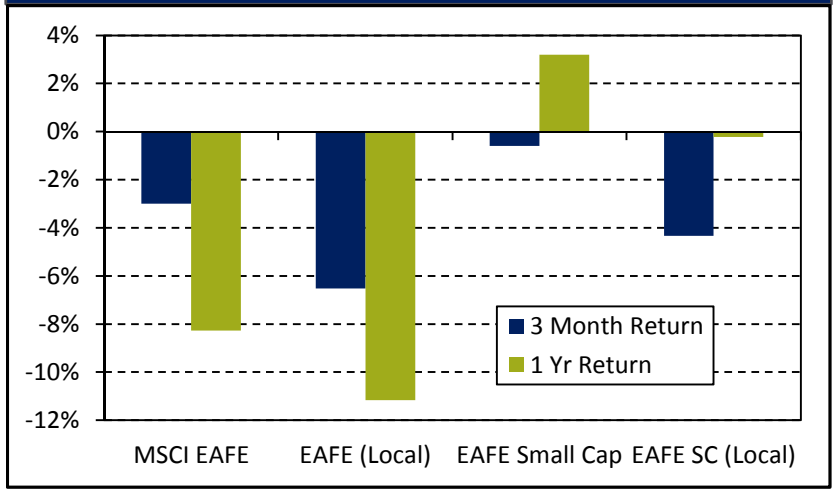
Source: Bloomberg

Margins elevated but not at extremes



Source: Bloomberg, MSCI

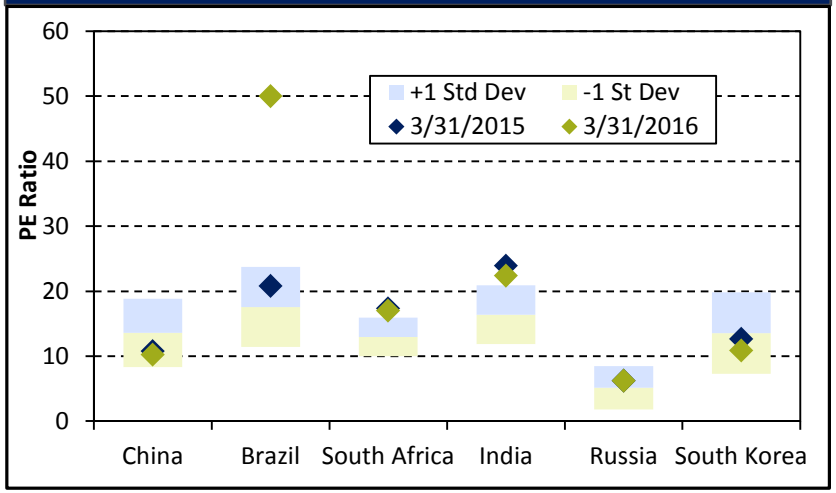
Returns near flat or negative



Source: Bloomberg, MSCI

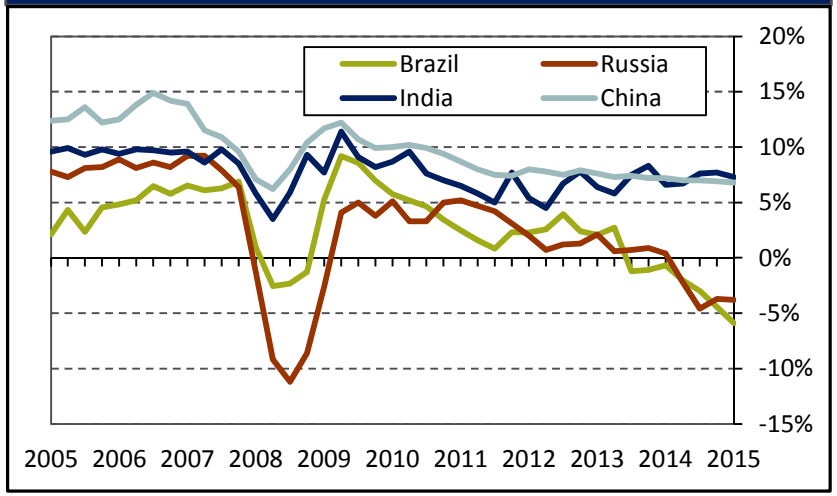
Emerging Markets Equity

Regional valuations show divergence



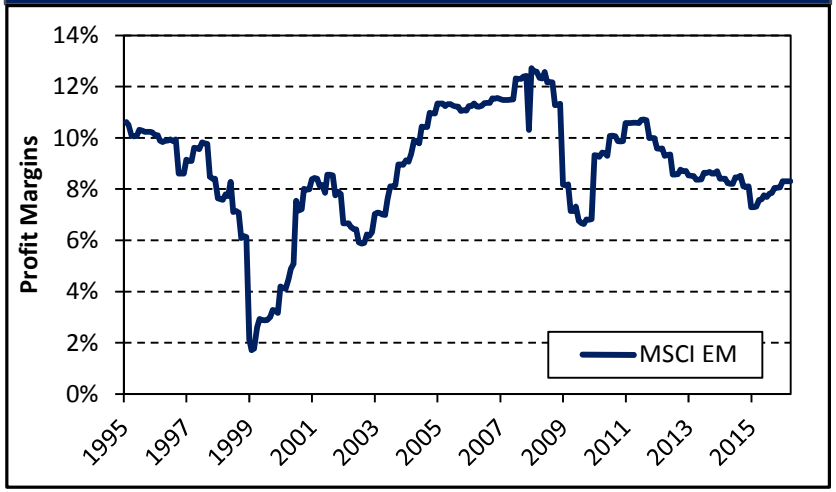
Source: Bloomberg, MSCI

Slowing growth in major economies



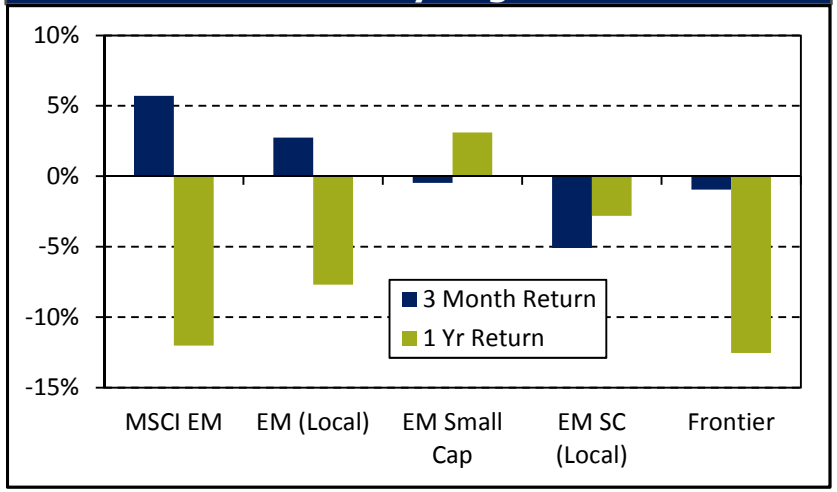
Source: Bloomberg

Profit margins in line with history



Source: Bloomberg, MSCI

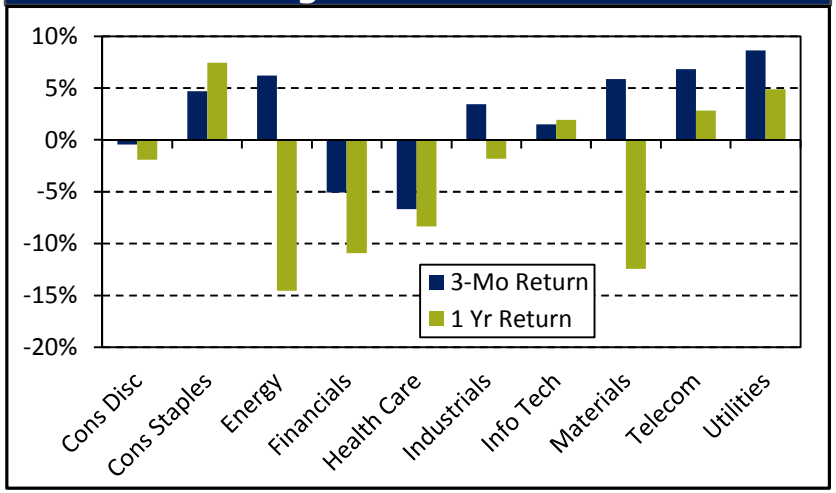
Recent rally in EM but one year returns mostly negative



Source: Bloomberg, MSCI

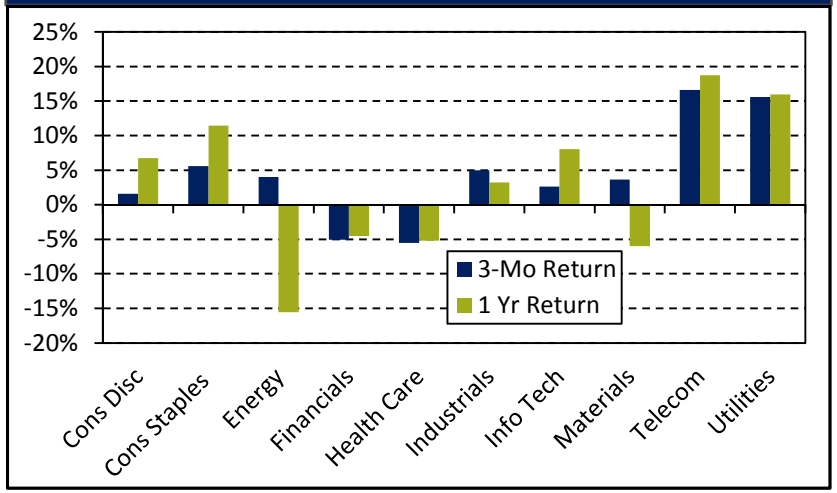
Global Equity by Sector

ACWI Financials and Health Care returns negative in short term



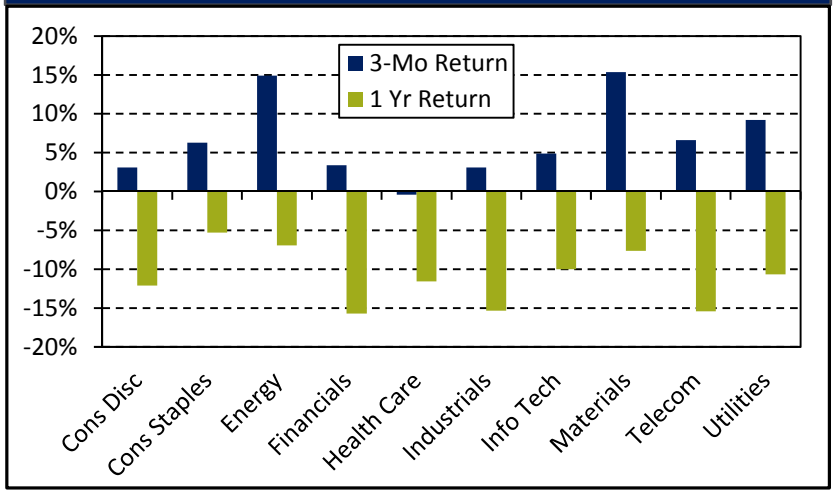
Source: Bloomberg, MSCI

S&P 500 sectors mostly positive in short term



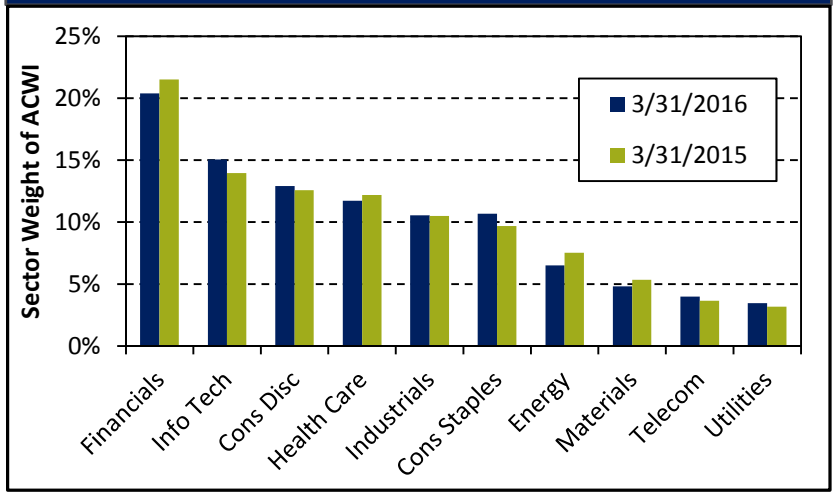
Source: Bloomberg, Standard and Poors

Returns mostly positive across EM sectors in short term



Source: Bloomberg, MSCI

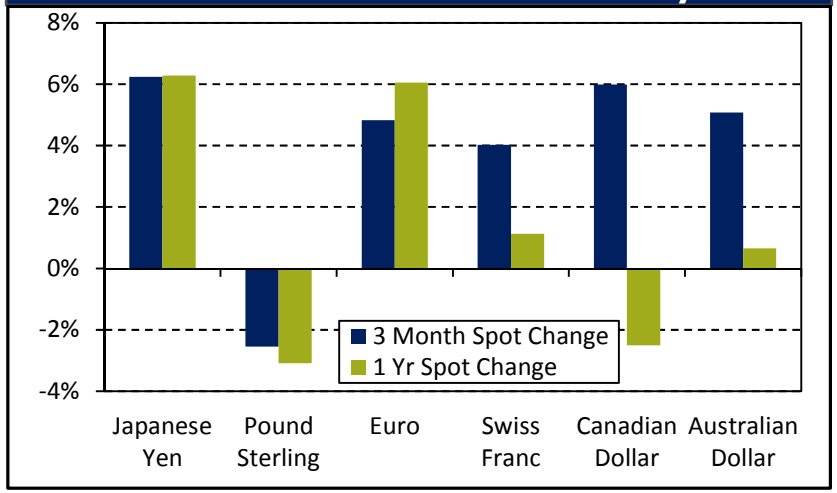
Global energy sector weight has fallen



Source: Bloomberg, MSCI

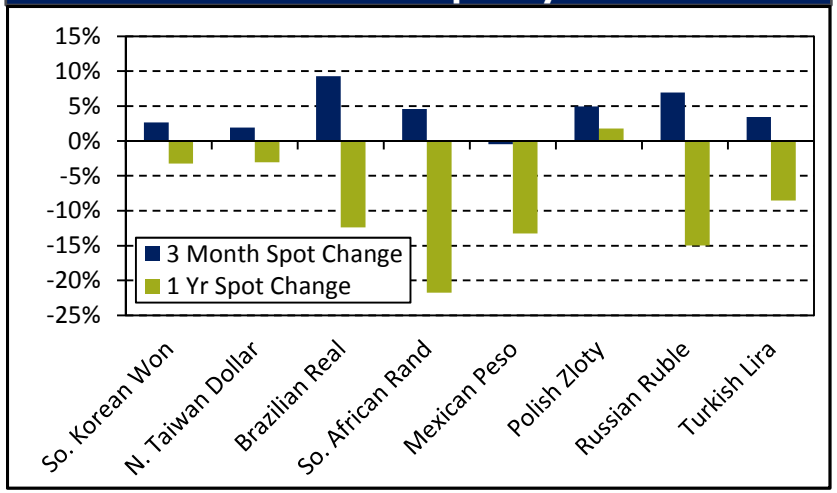
Currencies

Developed currencies mostly positive versus the dollar receently



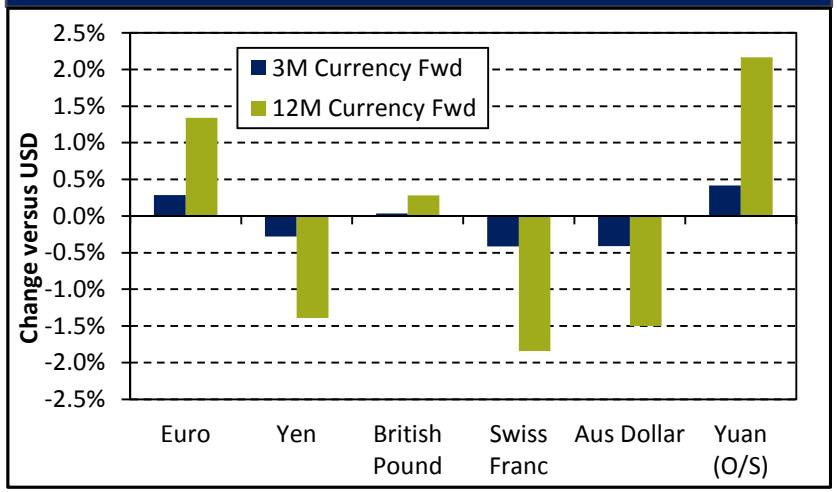
Source: Bloomberg

EM currencies suffered in unique fashions over the past year



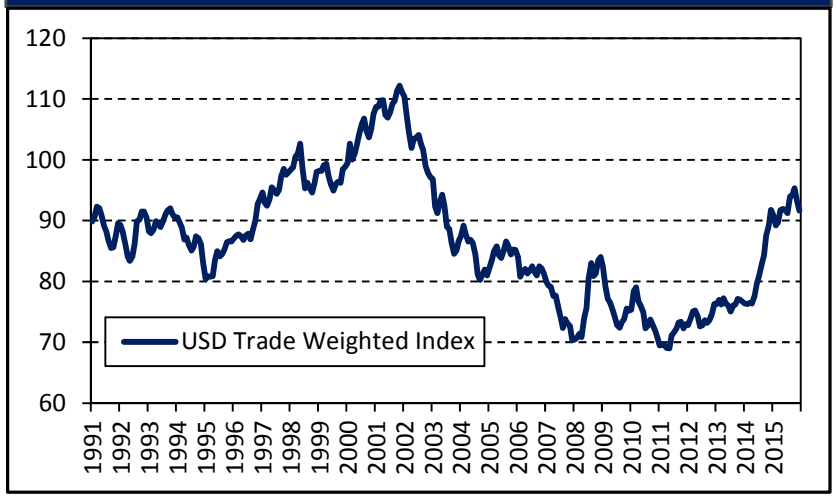
Source: Bloomberg

Yen expected to decline versus USD



Source: Bloomberg

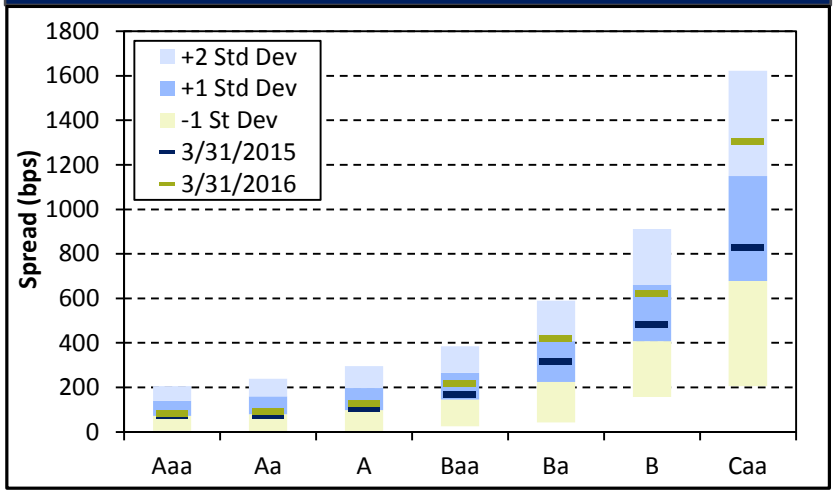
Recent dollar strength pronounced



Source: Bloomberg, Federal Reserve

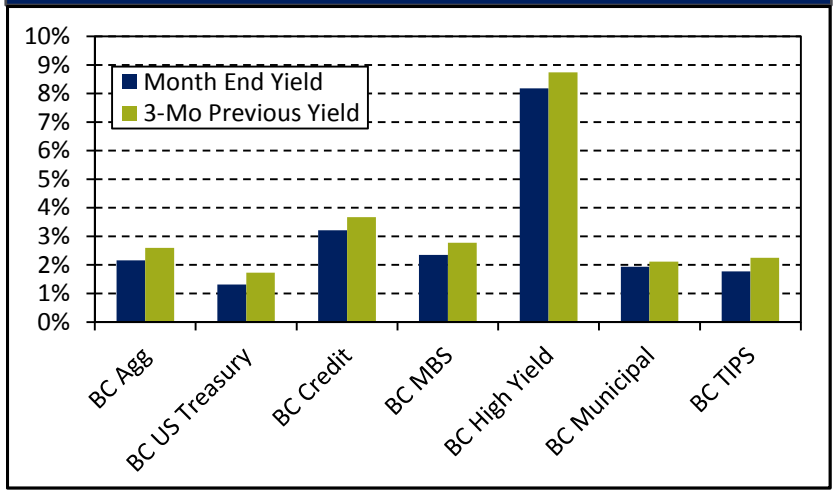
US Fixed Income

Spread levels above historical medians



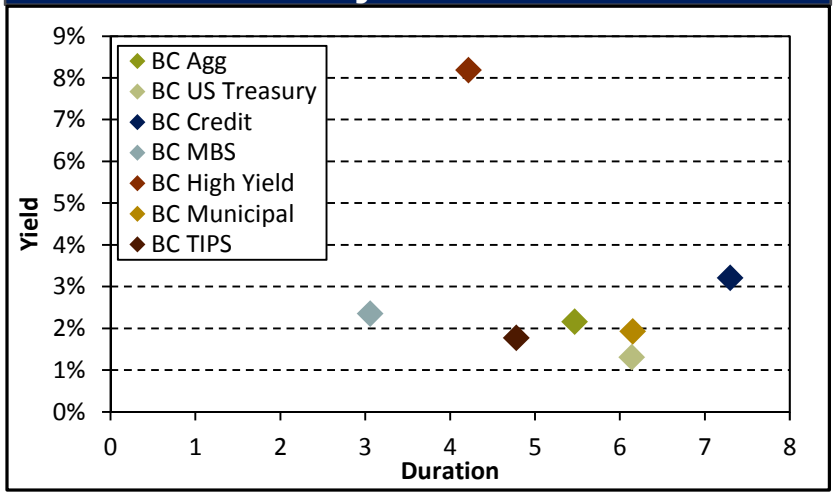
Source: Bloomberg, Barclays

Yields have mostly declined



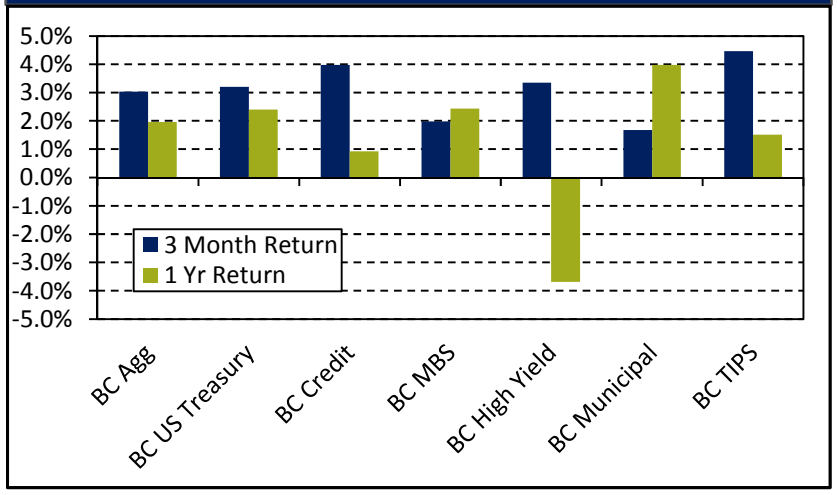
Source: Bloomberg, Barclays

Similar yield/duration tradeoff among major US indices



Source: Bloomberg, Barclays

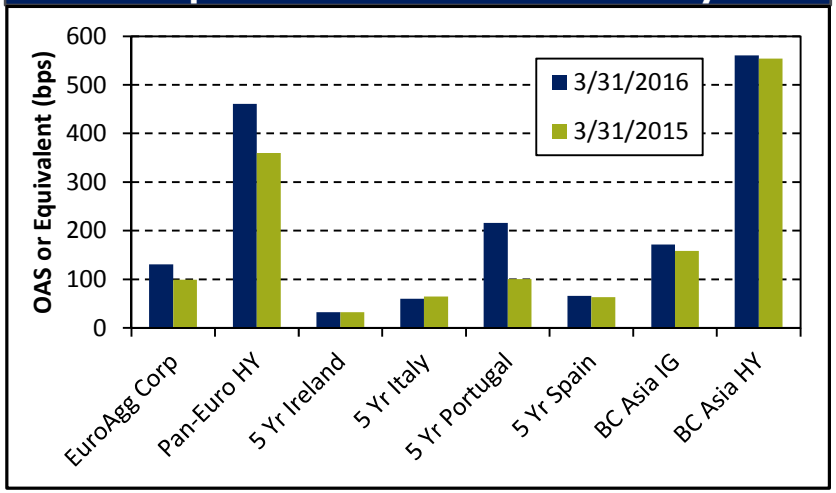
Returns marked by recent credit rally



Source: Bloomberg, Barclays

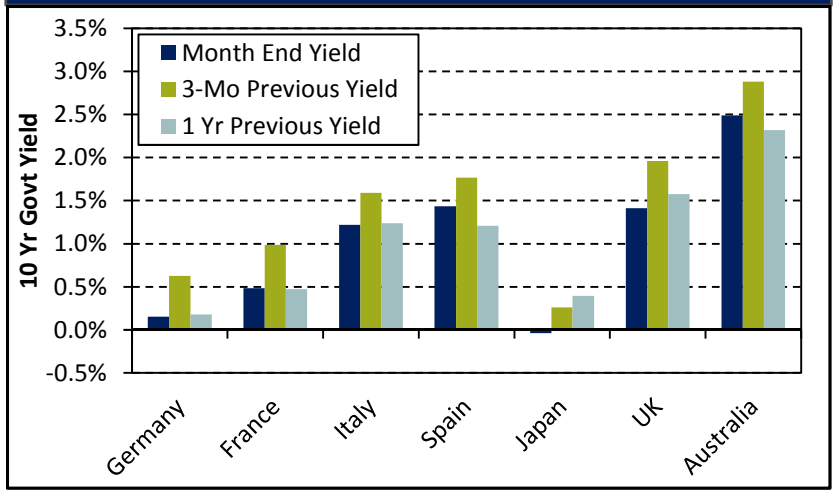
International Developed Fixed Income

European periphery yields at small premium relative to Germany



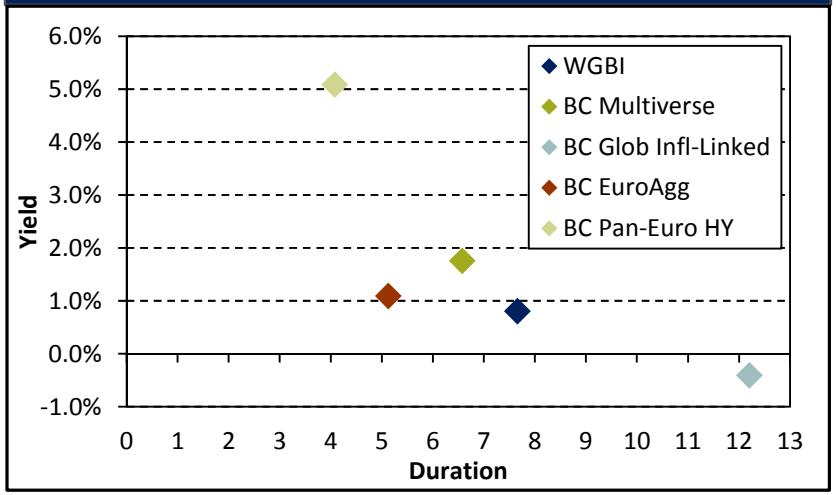
*Source: Barclays, Bloomberg, *European periphery spreads are over equivalent German Bund*

Global yields are at or near historic lows



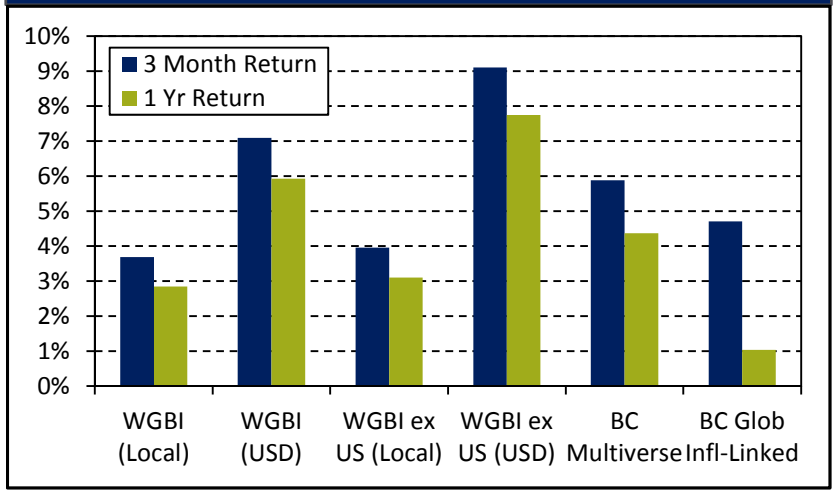
Source: Bloomberg

Low global yields relative to duration



Source: Bloomberg, Citigroup, Barclays

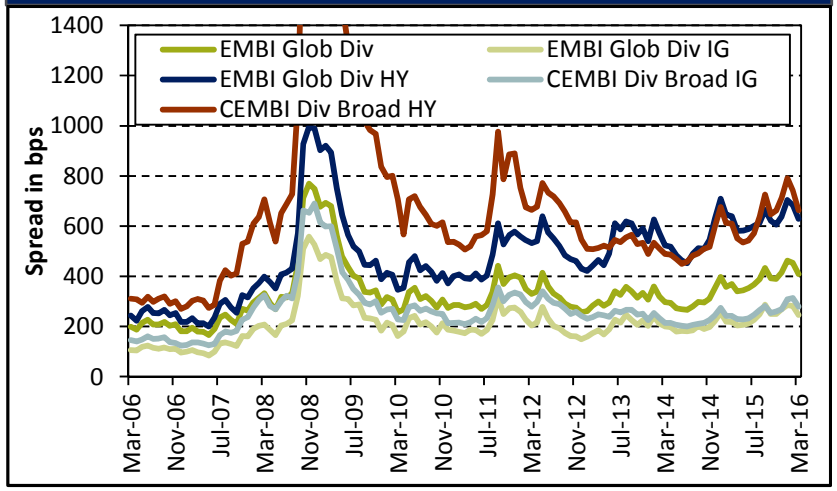
Global bonds positive in USD terms



Source: Bloomberg, Citigroup, Barclays

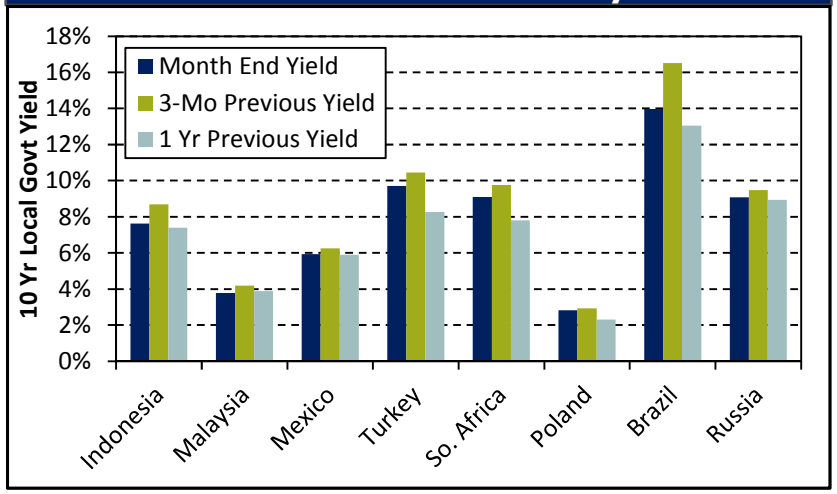
Emerging Markets Fixed Income

Spreads have widened recently



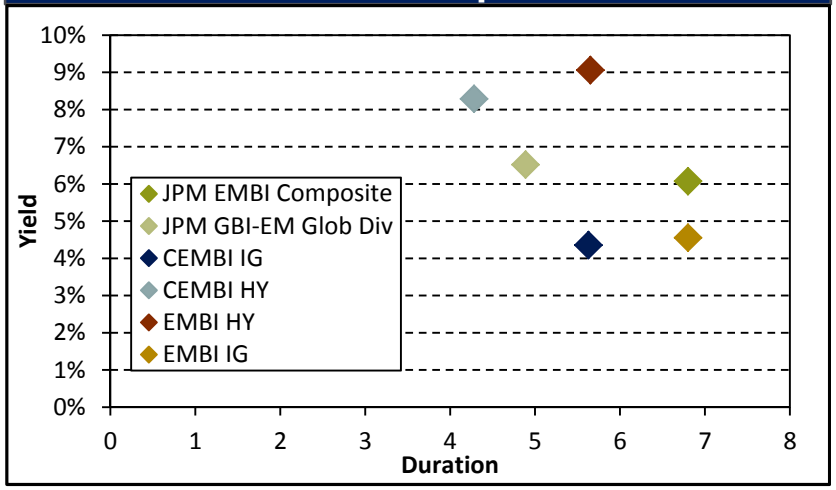
Source: Bloomberg, JP Morgan

Emerging market bond yield changes have varied directionally



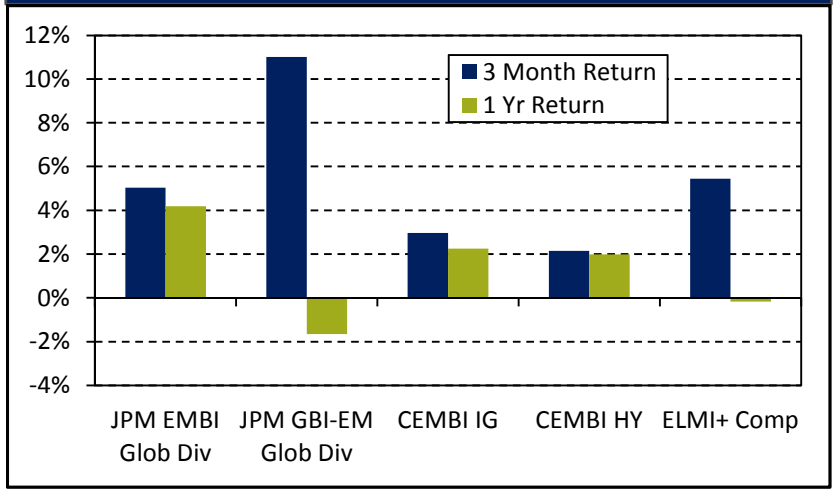
Source: Bloomberg

EM yields higher versus global counterparts



Source: Bloomberg, JP Morgan

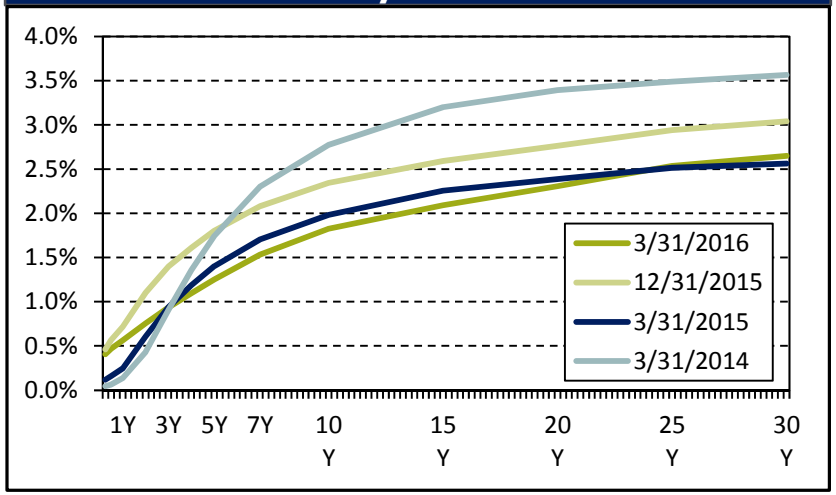
Currency effect pronounced in EMD returns



Source: Bloomberg, JP Morgan

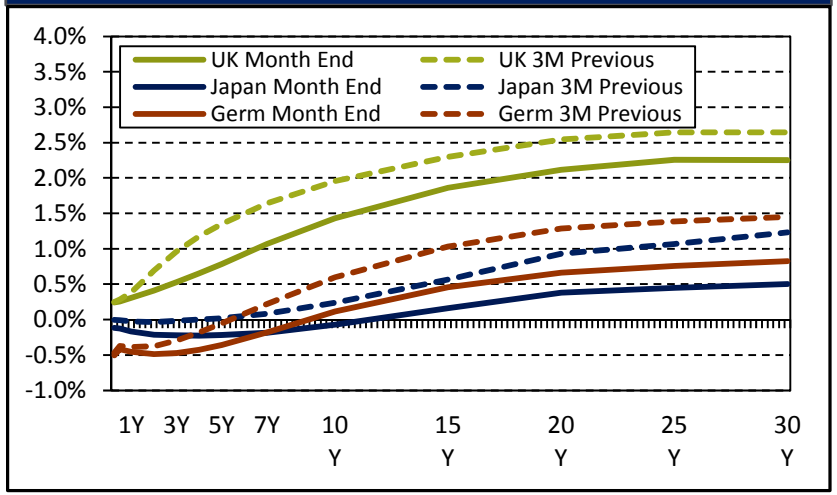
Rates

Treasury yield curve has declined since year end



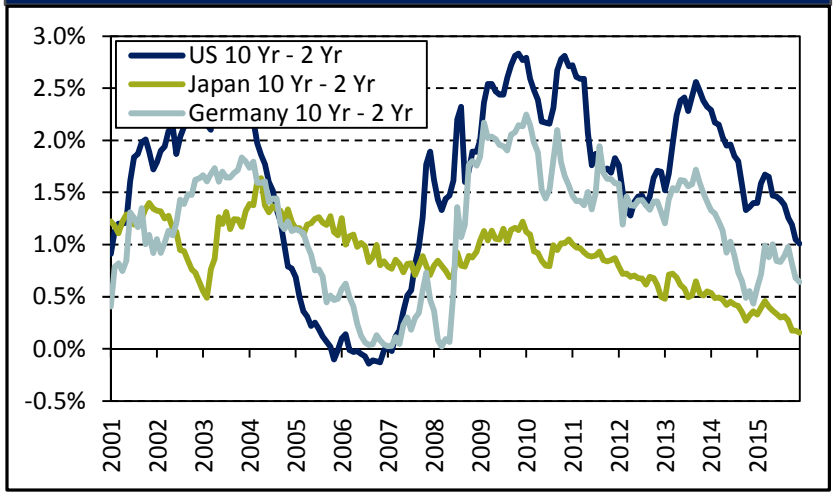
Source: Bloomberg

Global yield curves have shifted downwards



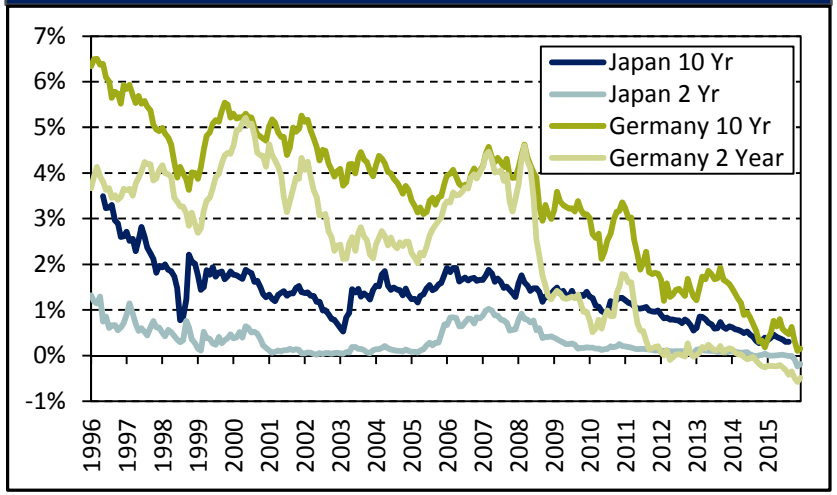
Source: Bloomberg

Global yield curves trending lower



Source: Bloomberg

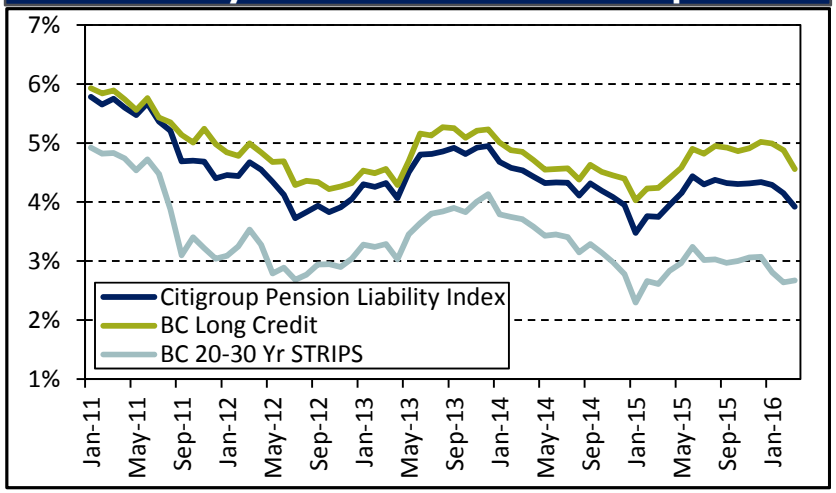
Global yields have trended lower over long term



Source: Bloomberg

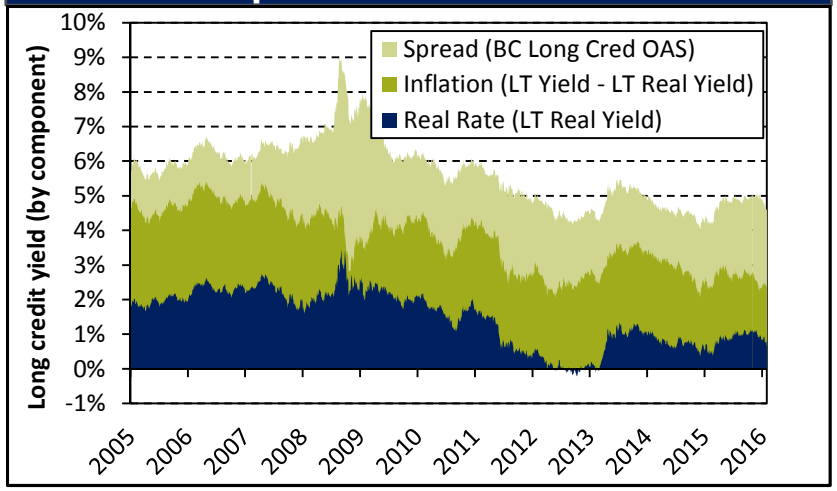
Long Rates and Liability

Long duration yields have fallen over last few years even with recent uptick



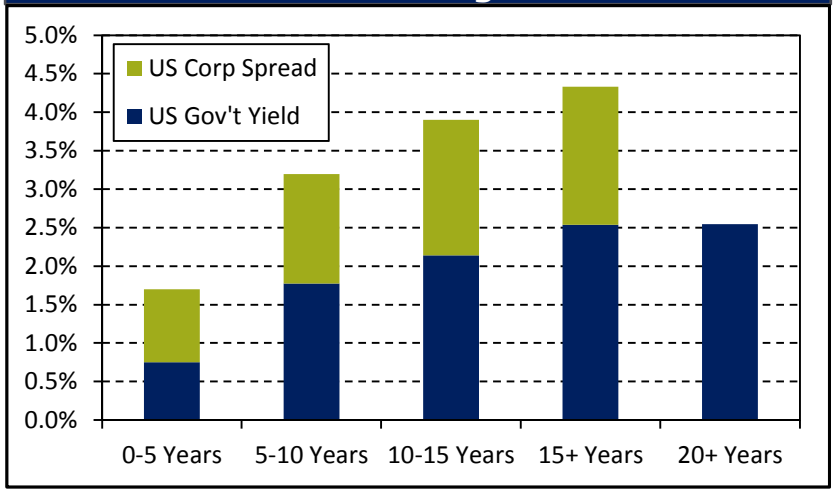
Source: Bloomberg, Citigroup, Barclays

Lower yields driven by low inflation expectations and real rates



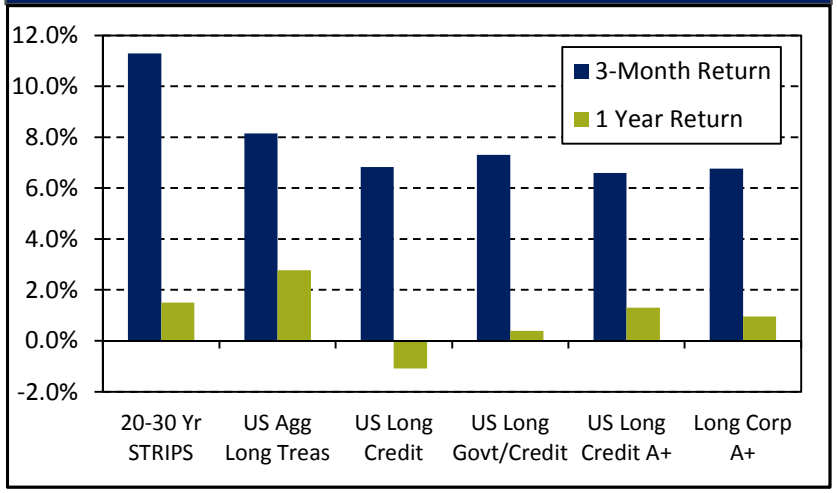
Source: Bloomberg, US Treasury, Barclays, NEPC

Yields are low but spreads above historic averages



*Source: Bloomberg, BofA Merrill Lynch, Barclays *No index for 20+ year corporate*

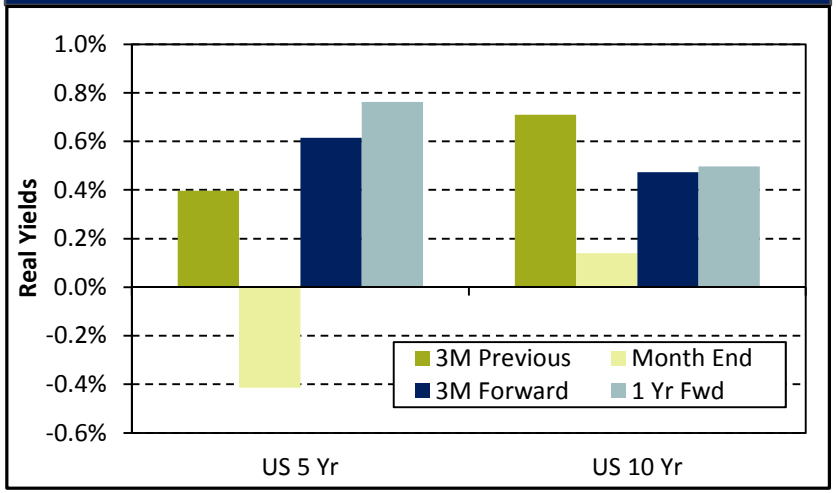
Returns recently positive



Source: Bloomberg, Barclays

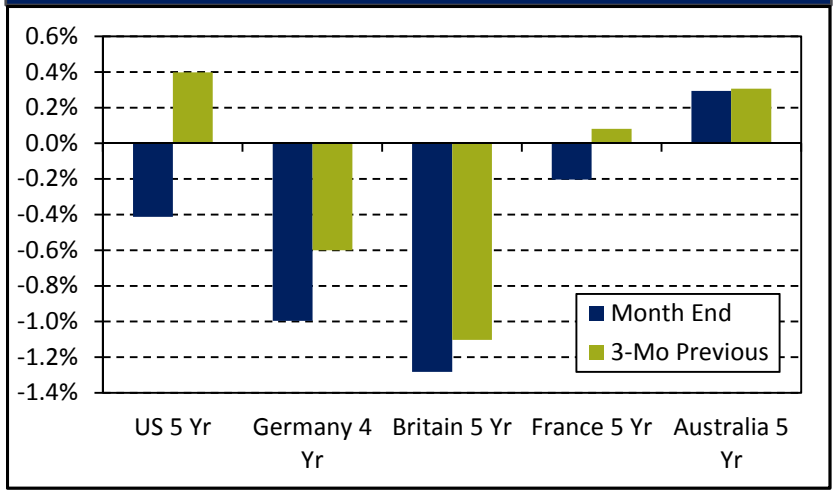
Inflation and Real Rates

US real yields have decreased slightly



Source: Bloomberg

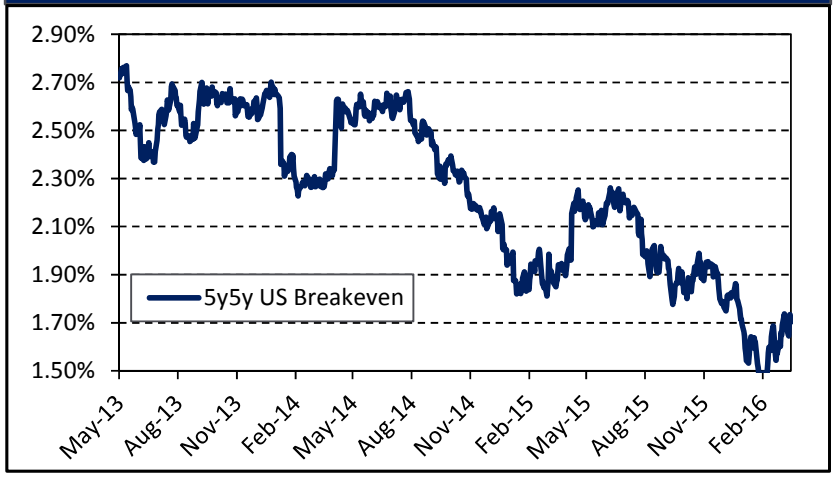
Global real yields mostly negative



**3-Mo data not available for Germany 4 year rate*

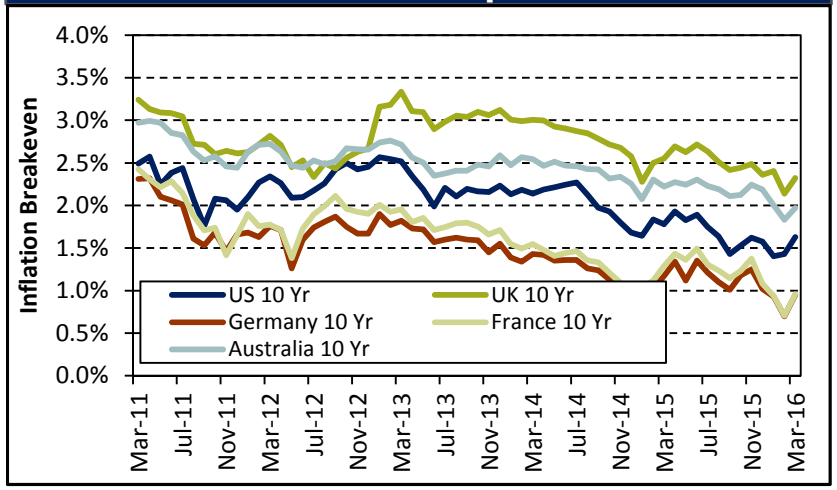
Source: Bloomberg

US inflation expectations very low



Source: Bloomberg

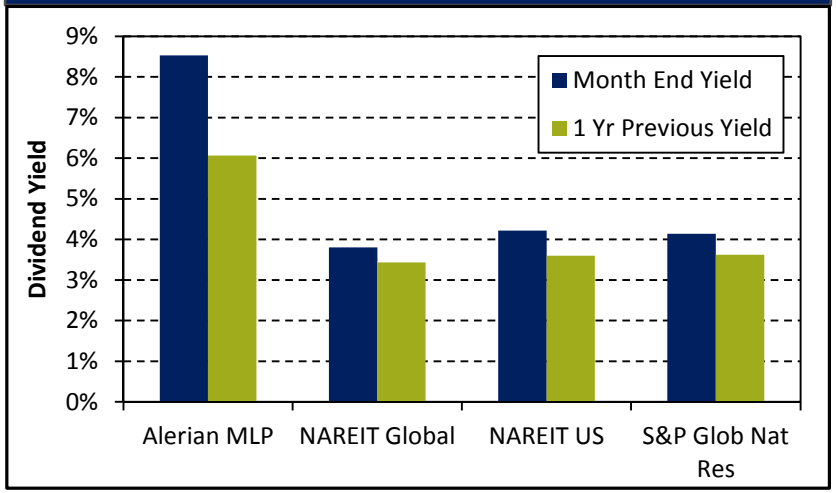
Global inflation expectations have seen recent uptick



Source: Bloomberg

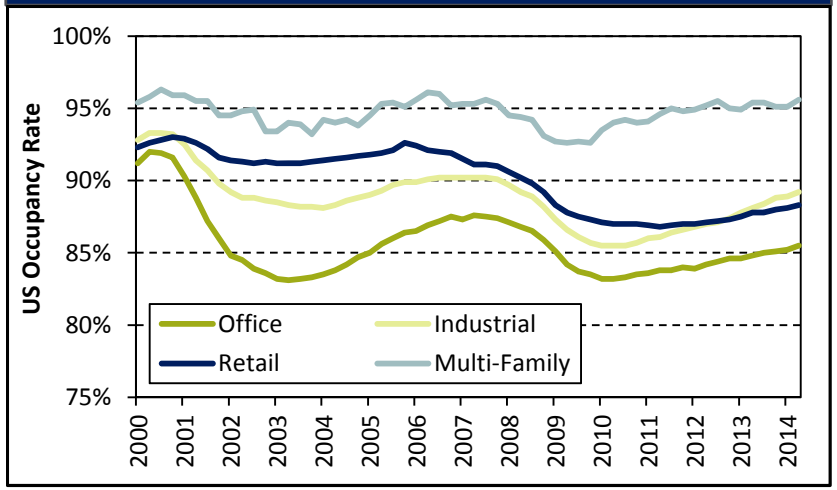
Inflation Sensitive Growth Assets

Yields higher relative to last year



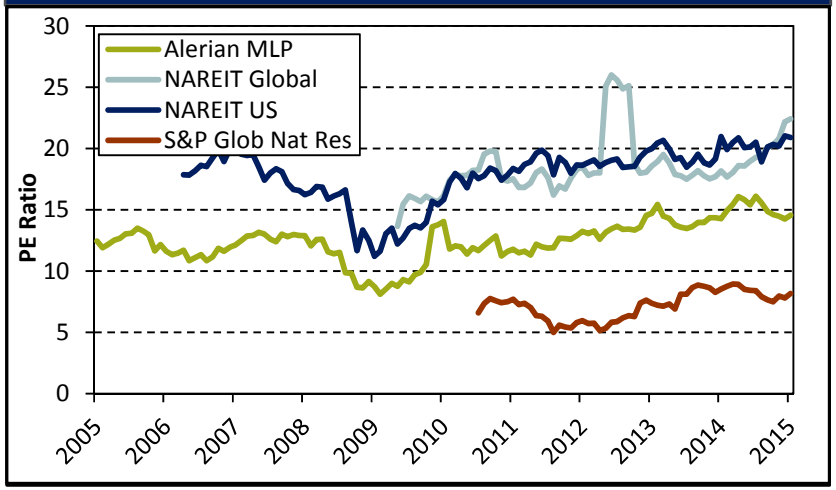
Source: Bloomberg, Alerian, Nareit, Standard and Poors

Gradual recovery in occupancy rates



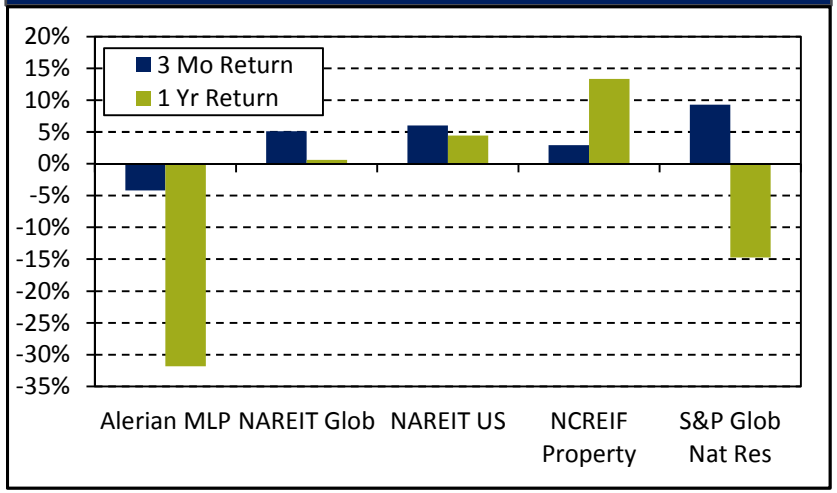
Source: Bloomberg, CB Richard Ellis

PE Ratios near or above averages



Source: Bloomberg, US Census Bureau

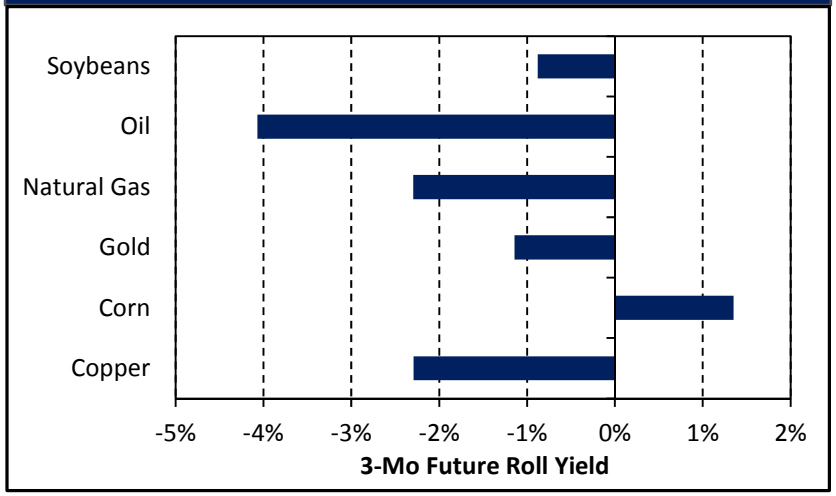
Recent MLP selloff and energy pressure



Source: Bloomberg, Alerian, Nareit, Standard and Poors

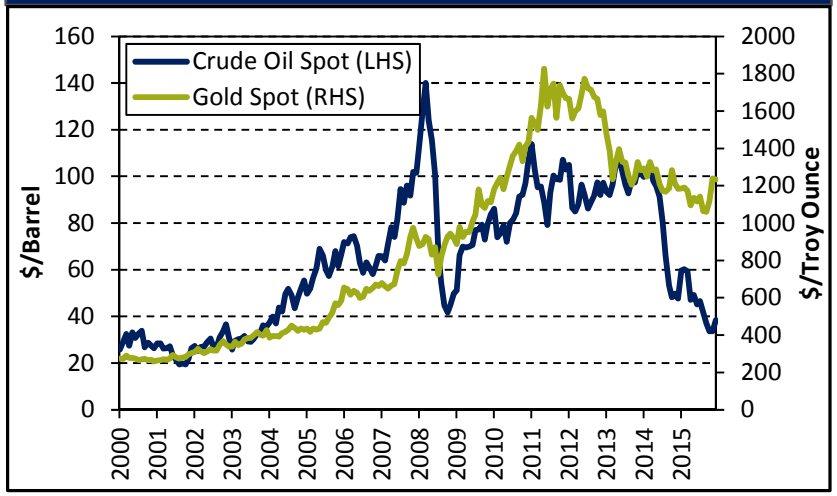
Commodities

Contango in major commodity futures



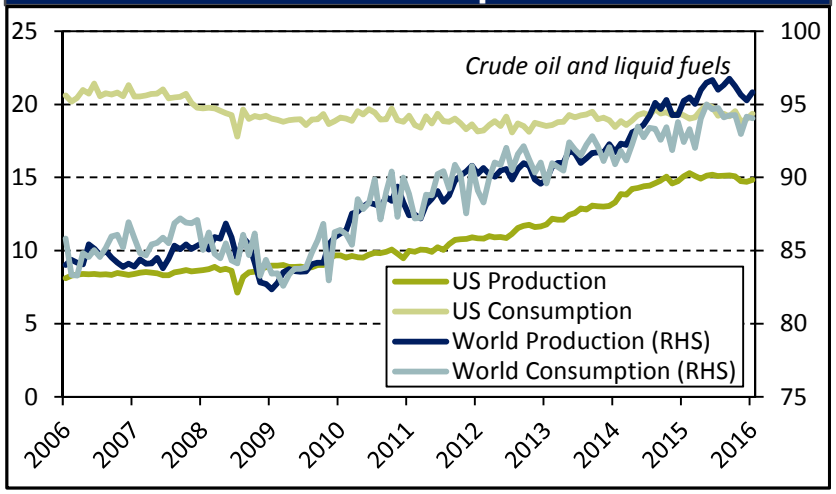
Source: Bloomberg

Precipitous fall in oil prices



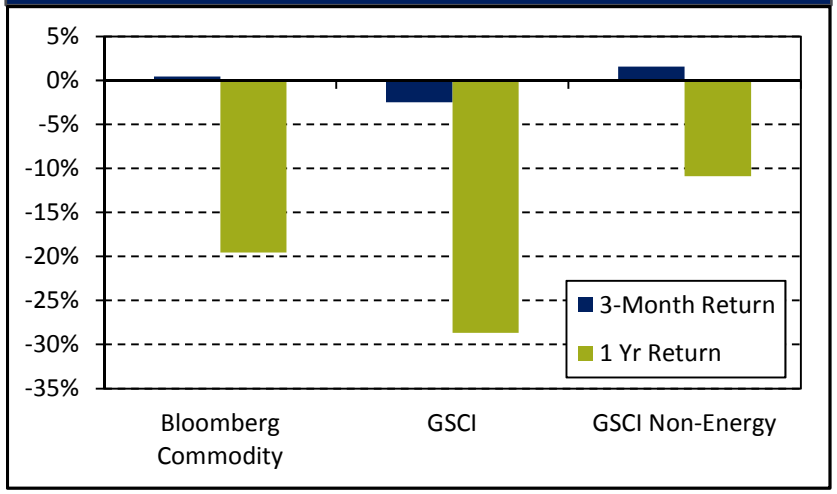
Source: Bloomberg

US fuel production closing gap with consumption



*Source: Bloomberg, US Department of Energy *Crude oil and liquid fuels*

Commodity indices negative over one year after oil-induced decline



Source: Bloomberg, Standard and Poors

Appendix: SAA Policy History

Strategic Asset Allocation Policy (SAAP) History

- 7/1/75 – 12/31/79 – 40% S&P 500/60% Barclays Capital Aggregate
- 1/1/80 – 12/31/83 – 50% S&P 500/50% Barclays Capital Aggregate
- 1/1/84 – 12/31/91 – 60% S&P 500/40% Barclays Capital Aggregate
- 1/1/92 – 12/31/94 – 50% S&P 500/10% MSCI EAFE/40% Barclays Capital Aggregate
- 1/1/95 – 6/30/97 – 45% S&P 500/15% MSCI EAFE/40% Barclays Capital Aggregate
- 7/1/97 – 12/31/99 – 50% S&P 500/15% MSCI EAFE/35% Barclays Capital Aggregate
- 1/1/00 – 9/30/03 – 53% S&P 500/17% MSCI EAFE/30% Barclays Capital Aggregate
- 10/1/03 – 12/31/06 – 53% S&P 500/15% MSCI EAFE/ACWI ex-U.S.[1]/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 1/1/07 – 10/31/2009 – 31% S&P 500/7% S&P 400/7% S&P 600/18% MSCI ACWI ex-U.S./5% Russell 2000 (lagged one quarter)/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 11/1/2009 – 6/30/2012 – 28% S&P 500/6% S&P 400/6% S&P 600/13% MSCI EAFE/2% MSCI EAFE Small Cap/3% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/24% Barclays Capital Aggregate/2% Barclays Capital High Yield/6% NCREIF ODCE (lagged one quarter)/3% Dow Jones/UBS Commodities Index
- 7/1/2012 – 3/31/2015 – 23% S&P 500/5% S&P 400/5% S&P 600/14% MSCI EAFE/3% MSCI EAFE Small Cap/6% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/13% Barclays Capital Aggregate/5% Barclays Capital High Yield/4% JP Morgan GBI-EM Global Diversified/3% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/8% NCREIF ODCE (lagged one quarter)/4% Dow Jones/UBS Commodities Index
- **4/1/2015 - present – 20% S&P 500/3% S&P 400/3% S&P 600/17% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/11% Barclays Capital Aggregate/4% Barclays Capital High Yield/10% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/10% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodities Index TR/5% Multi-Asset Class Custom Index**

- ***Interim SAA Policy:** 21% S&P 500/3% S&P 400/3% S&P 600/18% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/15% Barclays Capital Aggregate/4% Barclays Capital High Yield/6% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/8% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodity Index/5% Multi-Asset Class Custom Index

Note: Interim SAA Policy includes proration of 2% Real Estate and 4% Private Debt which are unfunded. Real Estate was prorated to equity and fixed income; Private Debt was prorated to fixed income. Recently approved Strategic Asset Allocation Policy effective April 1, 2015.

[1]MSCI EAFE/ACWI ex-U.S. Benchmark is the MSCI EAFE Index prior to 10/1/2005 and the MSCI ACWI ex-U.S. thereafter.

Note: All MSCI indices changed from Gross to Net dividend withholding taxes effective 1/1/2014.

Information Disclosure

- **NEPC uses, as its data source, the plan's custodian bank or fund service company, and NEPC relies on those sources for security pricing, calculation of accruals, and all transactions, including income payments, splits, and distributions. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.**

- **Information in this report on market indices and security characteristics is received from sources external to NEPC. While efforts are made to ensure that this external data is accurate, NEPC cannot accept responsibility for errors that may occur.**

Agenda Item #8

Cash Management Workgroup

April 25, 2016

Investment Committee Presentation

Outline

1. Goals & Initiatives
2. Internal Portfolio Cash Flows
3. Cash Assetization Program
4. Short Term Investment Fund
5. Supporting Material

Goals & Initiatives

- The members of the cash management working group are Lupita Breland, John Doran, John Kwon and Cole Smith
- Cash Management Working Group goals:
  - Provide sufficient cash liquidity
  - Mitigate cash drag
  - Minimize transaction costs
  - Optimize ASRS Manager portfolios
- Current Initiatives:
  - Reallocate Internal Portfolio cash flows
  - Modify Cash Assetization Program
  - Transition Current STIF Vehicle
- Longer Term Initiatives:
  - Modelling/Stress testing Total Fund flows
  - Incorporating External Manager cash flows

Internal Portfolio Cash Flows

Cash flows from dividends and coupon payments from the internally managed equity and fixed income portfolios provide the IMD with a 'frictionless' source of funds that can be readily transferred to the cash assetization program without incurring transaction costs.

- F2 receives an average of $180mm per year from coupon and interest payments.
  - On or around the 20th of the month, when Principal & Interest payments from MBS holdings are posted, the cash team in agreement with the Fixed Income Portfolio Manager will determine the amount of cash available to be moved into the assetization account.
- The internal equity portfolios generate excess dividends of $120mm per year.
  - Because the internal equity portfolios dividend stream varies, cash balances will be moved on an ad hoc basis. However, cash balances will be equitized in each portfolio until proceeds are moved to the assetization account.
- Utilizing internal portfolio cash flows will save transaction costs of approximately $150,000 per year.

Cash Assetization Program

- The current assetization program exposes cash balances in account A1S1 to a target futures basket; necessitating regular transfers of idle balances from master cash.
- As a result of maintaining a cash buffer to ensure sufficient balances and late distributions from private fund sources, master cash averages approximately $27 million (~8bps).
- The IMD is modifying the assetization program by allowing the investment manager (SSGM) to add master cash balances to the calculation for target notional exposure.
- The estimated incremental income from reduced cash drag on master cash balances is approximately $1.5 million ($27mm per year @ 5.5% expected return).

Short Term Investment Fund

- Currently the ASRS's cash balances are invested in the State Street's Government Short Term Investment Fund (GSTIF). The Cash Management Workgroup is exploring other available options offered by State Street, which may provide the ASRS more attractive yield returns.
- Across the total fund portfolio, STIF balances average approximately $750mm per day. This balance includes idle balances in manager portfolios and cash that is equitized in the internal equity portfolios.
- The current yield differential between the GSTIF and the alternative that is under consideration averages 25bps per annum, amounting to $1.875mm per year.

Estimated Internal Cash Flows

Estimated Internal Cash Flows

Fixed Income		
Coupon Payments	$	40,000,000
MBS P&I	$	140,000,000
Total	$	180,000,000

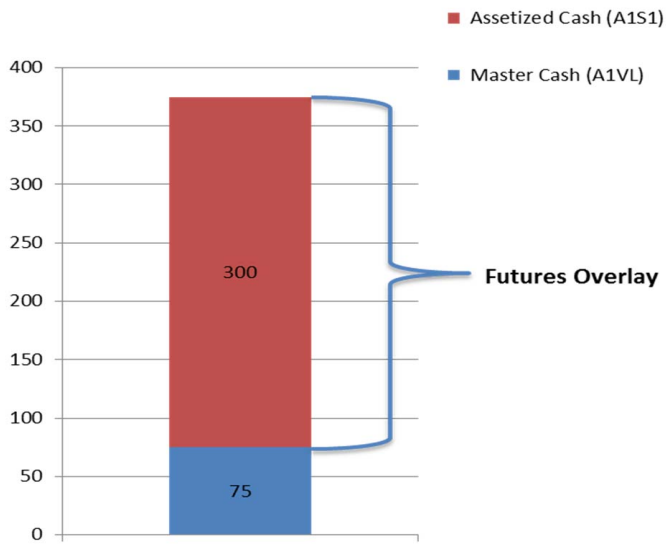
E-Portfolios - 2015 Dividends							
	A1RV	A1RW	A1VE	A1VN	A1VR	A1WV	Grand Total
Qtr1	$ 5,617,404	$ 3,423,983	$ 26,621,488	$ 1,377,963	$ 2,053,724	$ 1,633,710	$ 40,728,272
Qtr2	$ 5,902,602	$ 3,037,133	$ 26,793,890	$ 1,281,140	$ 1,812,705	$ 1,402,265	$ 40,229,735
Qtr3	$ 5,451,462	$ 3,228,162	$ 26,342,952	$ 1,256,174	$ 1,695,921	$ 1,313,869	$ 39,288,540
Qtr4	$ 5,210,702	$ 3,314,877	$ 27,072,106	$ 1,533,711	$ 1,915,198	$ 1,304,799	$ 40,351,393
Total	$ 22,182,170	$ 13,004,155	$ 106,830,436	$ 5,448,988	$ 7,477,548	$ 5,654,643	$ 160,597,941

	Estimated Annual Cash Flow	Estimated T-Cost Savings (bps)	Estimated T-Cost Savings ($)
F2 Portfolio	180,000,000	3.75	$ 67,500
E-Portfolios	120,000,000	6.50	$ 78,000
Total	300,000,000		$ 145,500

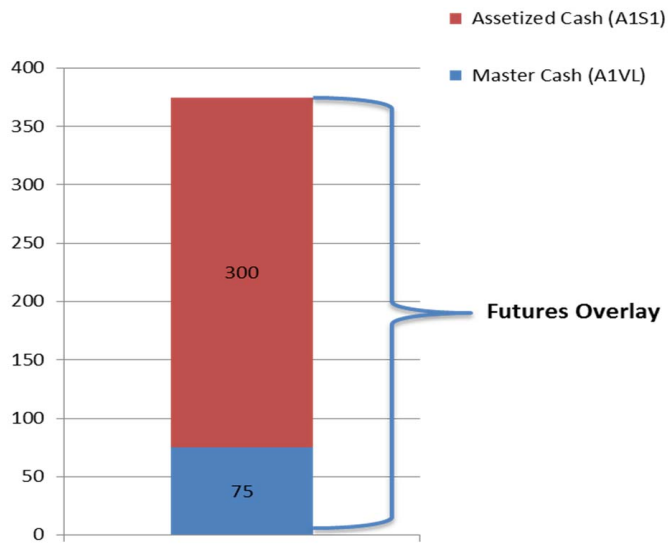
Cash Assetization Example

Cash Assetization Example
Late Distribution of $55 Million

Pre-modification



Post-modification



Agenda Item #9

IMD - Total Public Equity Asset Class Review

April 25, 2016

Cole Smith, Portfolio Manager John Kwon, Portfolio Manager

Table of Contents

- Asset Class Activity
- Asset Class Broad Summary
- Asset Class Review
  - Asset Allocation
  - Performance
- Appendix

Asset Class Activity

Asset Class Activity

Over the course of 2015, the Public Equity Team has facilitated the adoption of the new Strategic Asset Allocation Policy (SAAP), approved by the Board and implemented on April 1, 2015. In addition to re-allocating public equity assets, the Team also proceeded to analyze and ultimately defund three active managers. A timeline and brief description of the activities are as follows:

- April 2015: Reallocated $1.27B from Domestic Equity (Large, Mid and Small Cap), to International Equity (EAFE Large Cap).
  - Defunded two managers during the transition: CRM (U.S. Mid Cap), and Champlain (U.S. Small Cap)
- June/July 2015: $615M from EAFE Small Cap and $270M from Emerging Markets, totaling $885M, to EAFE Large Cap.
- September 2015: Reduction in Emerging Markets sub-asset class of $350M, to Cash Assetization.
- November 2015: $303M raised from U.S. Large Cap, to Cash Assetization.
- December 2015: $400M from U.S. Large Cap and U.S. Mid Cap, to Cash Assetization.
  - Defunded INTECH (U.S. Large Cap) during the transition, $350M.

These net result of the aforementioned reallocation activities are as follows:

Total Domestic Equity:		**Total International Equity:**	
U.S. Large Cap	-$933M	EAFE Large Cap	$2,159M
U.S. Mid Cap	-$611M	EAFE Small Cap	-$615M
U.S. Small Cap	-$433M	Emerging Markets	-$620M

Asset Class Broad Summary

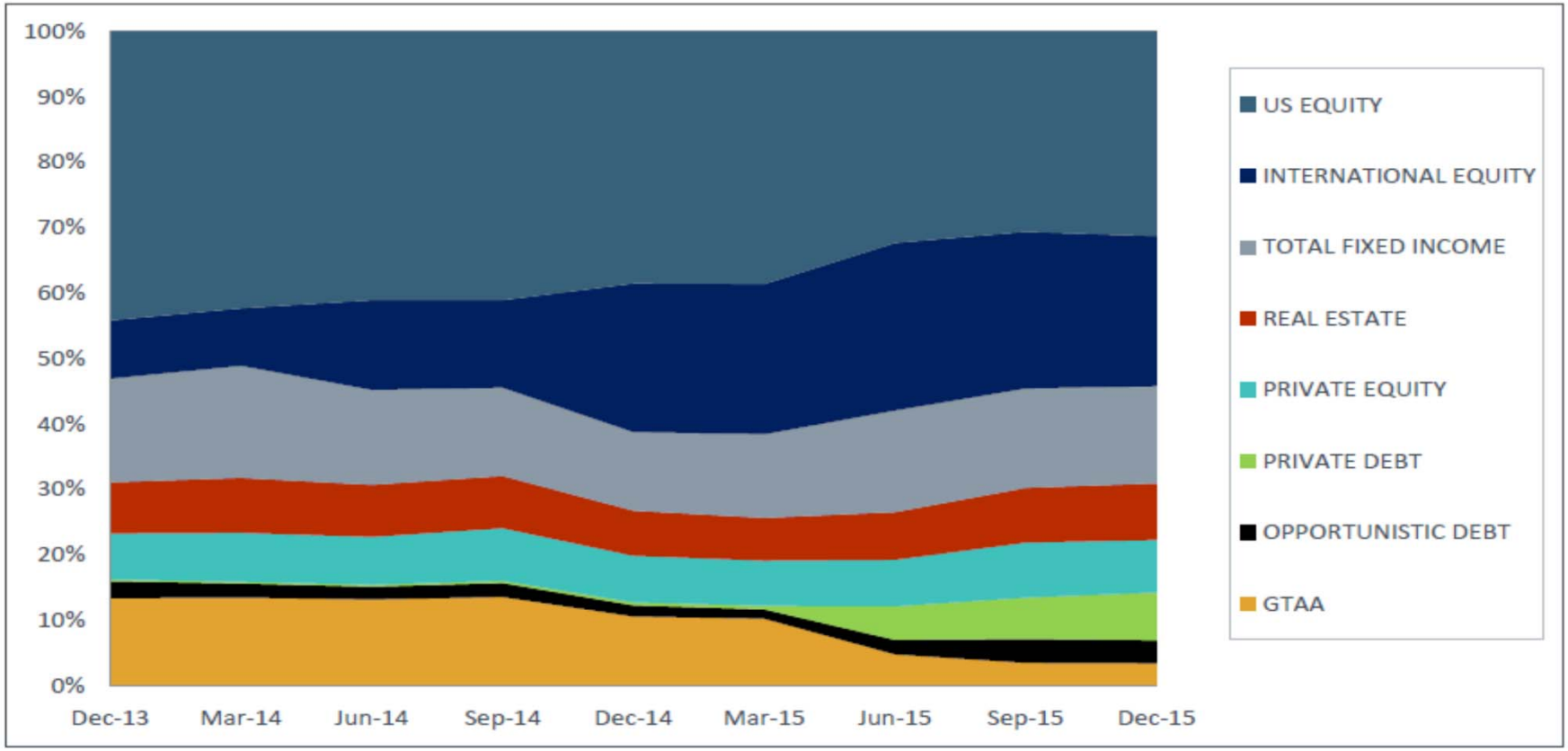
Broad Summary

- Total Public Equities remains the largest asset class at 49.6% of the overall Total Fund as of December 31, 2015.
- 24 mandates: Domestic Equity category – 10; International Equity category -13; "Global" - 1
- Predominate allocations to passive mandates throughout the asset class, coupled with some systematic and some risk-mitigating allocation, has resulted in strong tracking with the policy benchmarks, yet affords opportunity to derive variable, but additional contribution from more active strategies.
- The Public Equities Asset Class has tracked well with its overall benchmark over time with favorable risk/return characteristics.
  - The Total Domestic Equity category has performed similarly and also with favorable risk/return characteristics.
  - Replacement of three active mandates in mid-2014 served to improve relative performance of the Total International Equity category and had equally positive effects on volatility and tracking error.
- The E7 and E8 systematic passive strategies have since inception performed as hoped, generally adding value beyond the broad market.
- The risk factor overlay pilot program is also functioning as hoped, although its attribution is minimal.

Asset Class Review

Total Fund – Asset Class Historical Allocations

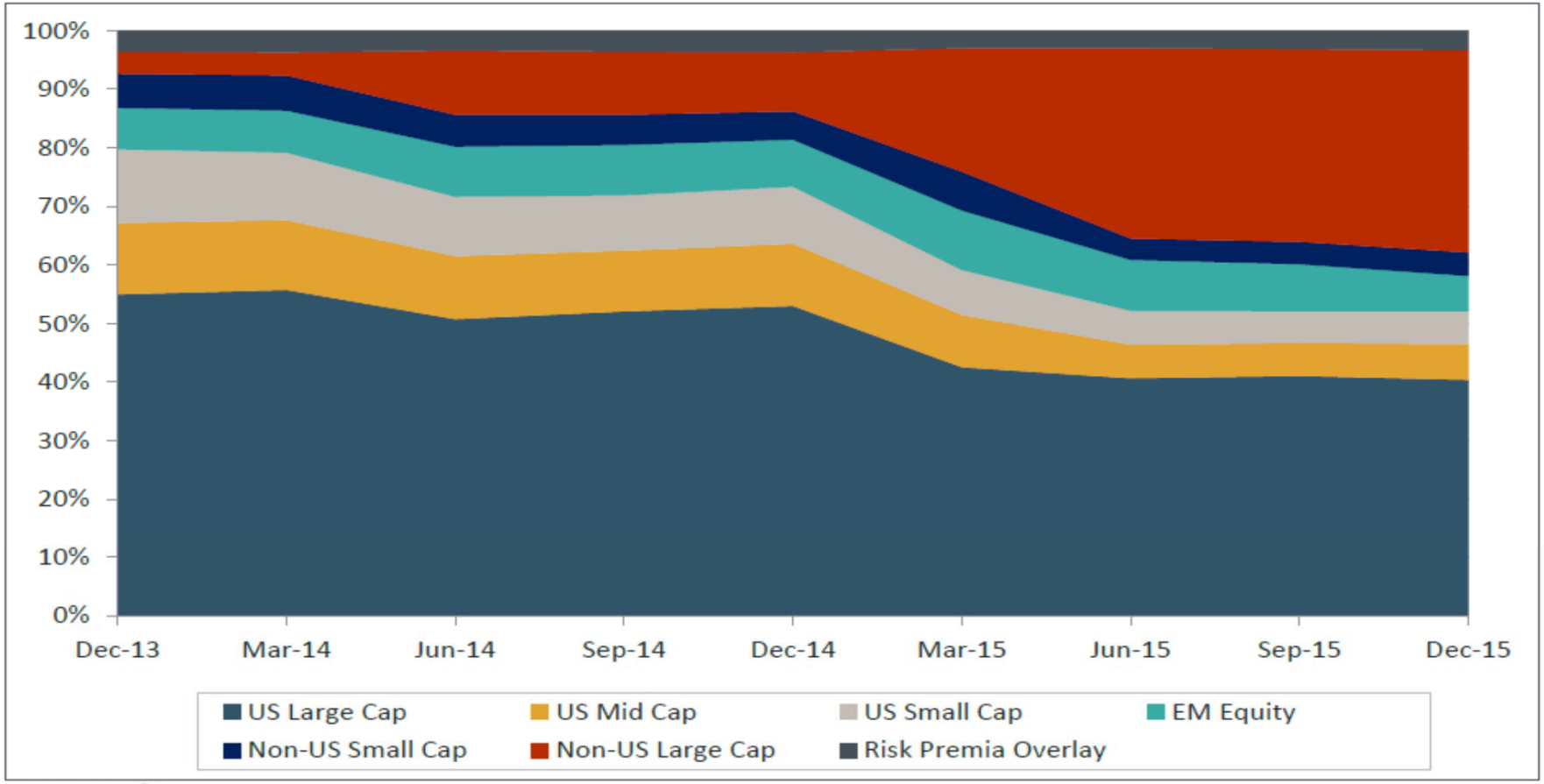
- The overall Public Equities component comprise half of the Total Fund.
- Assets were reallocated out of Public Equities as well as to other categories within the component.



MSCI

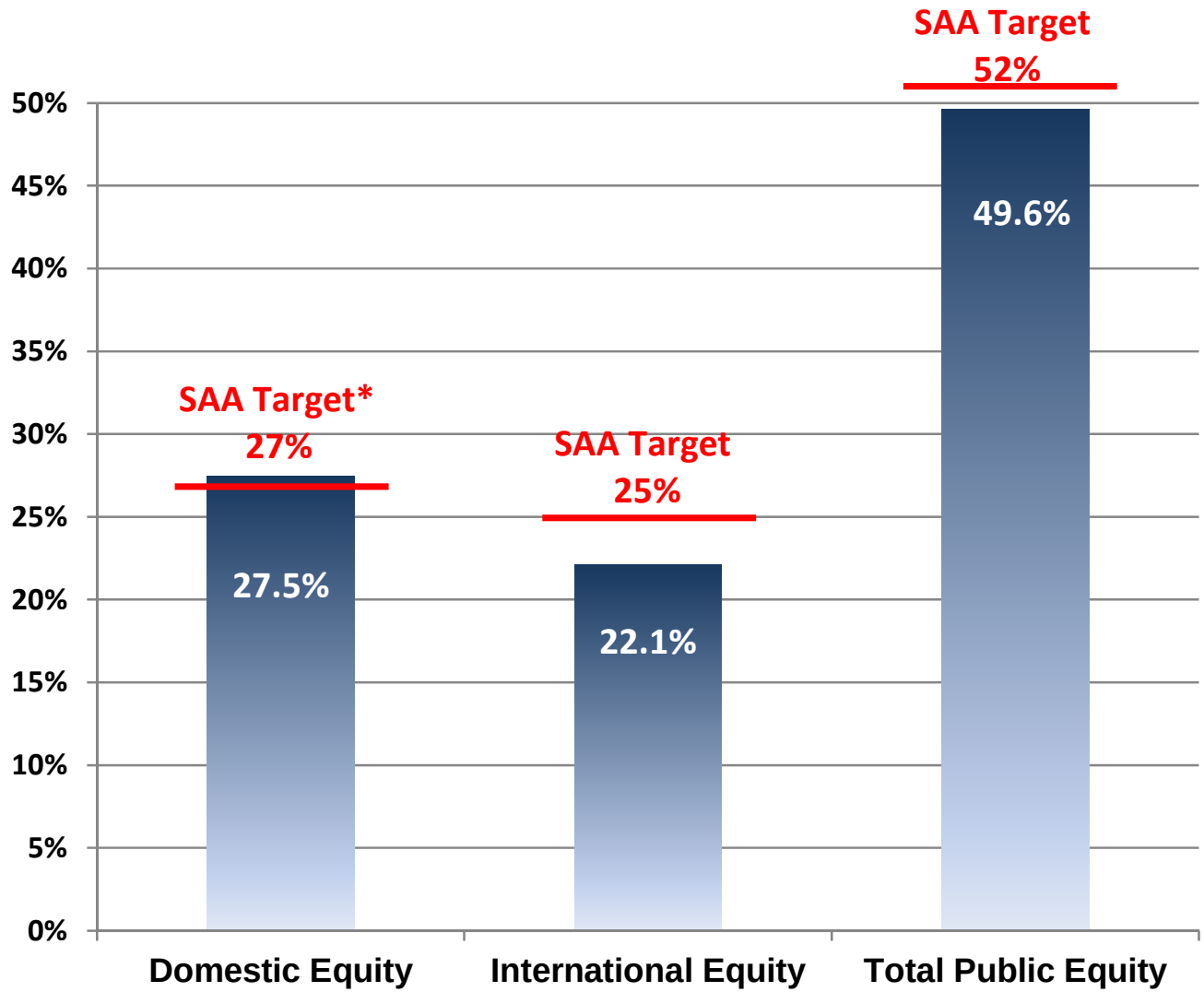
Total Public Equity - Historical Allocations

- The allocation to Non-U.S. large Cap (EAFE) has increased.
- Allocations to other equity asset subclasses have been reduced.



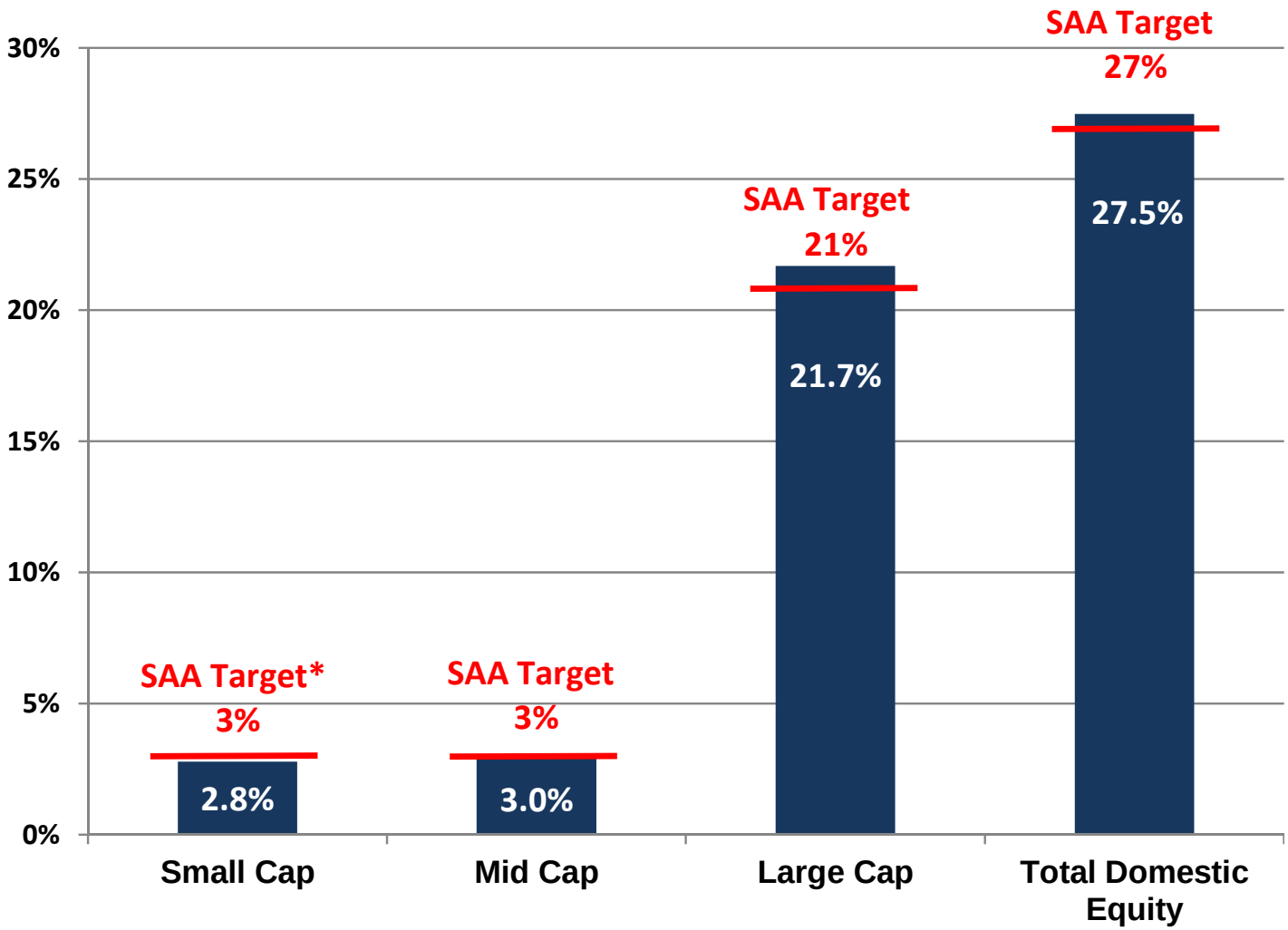
MSCI

Total Public Equity Allocation



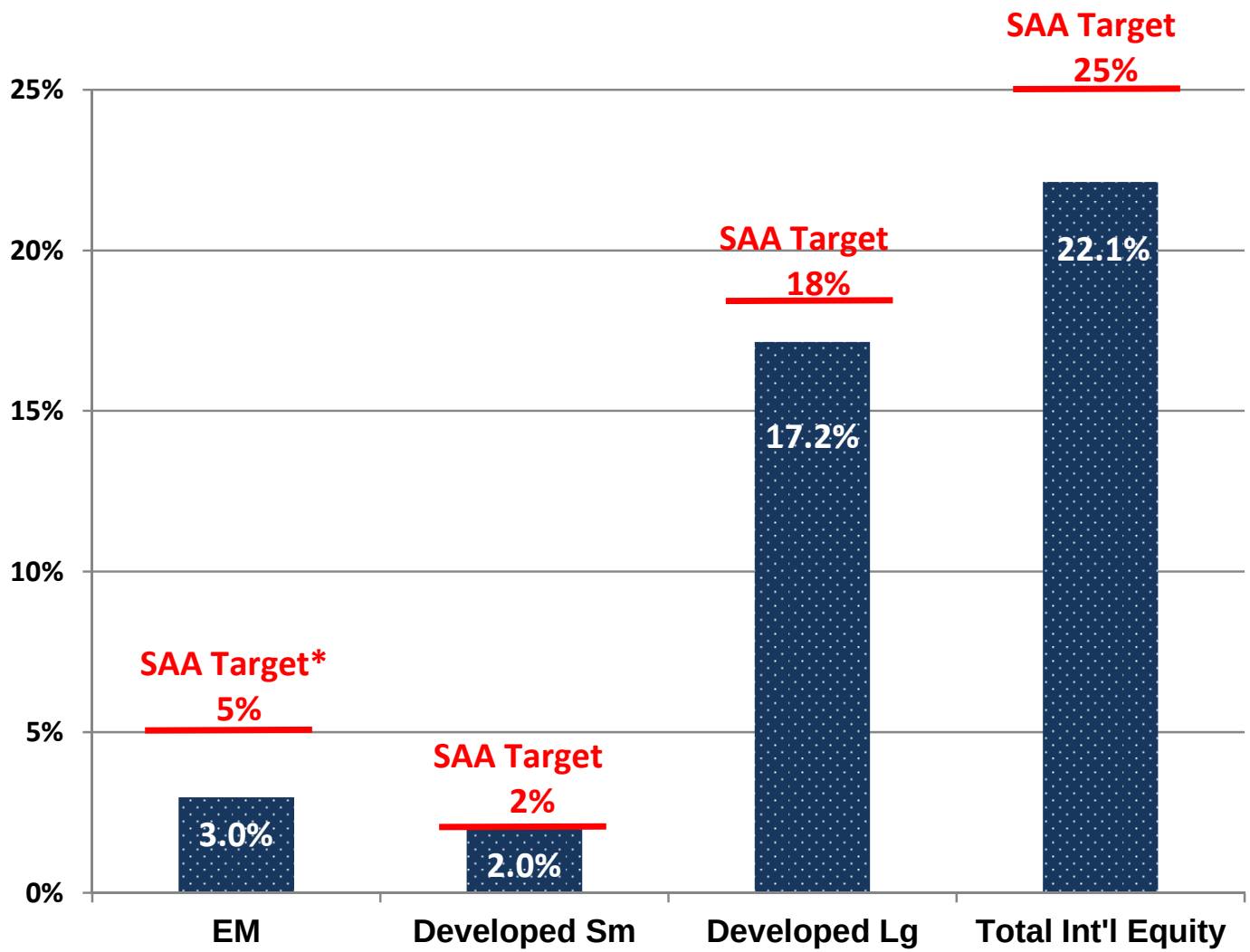
*SAA Targets shown are interim policy targets. The full SAA targets are 26% Domestic Equity, 24% Int'l Equity, 50% Total Public Equity.

Domestic Equity Allocation



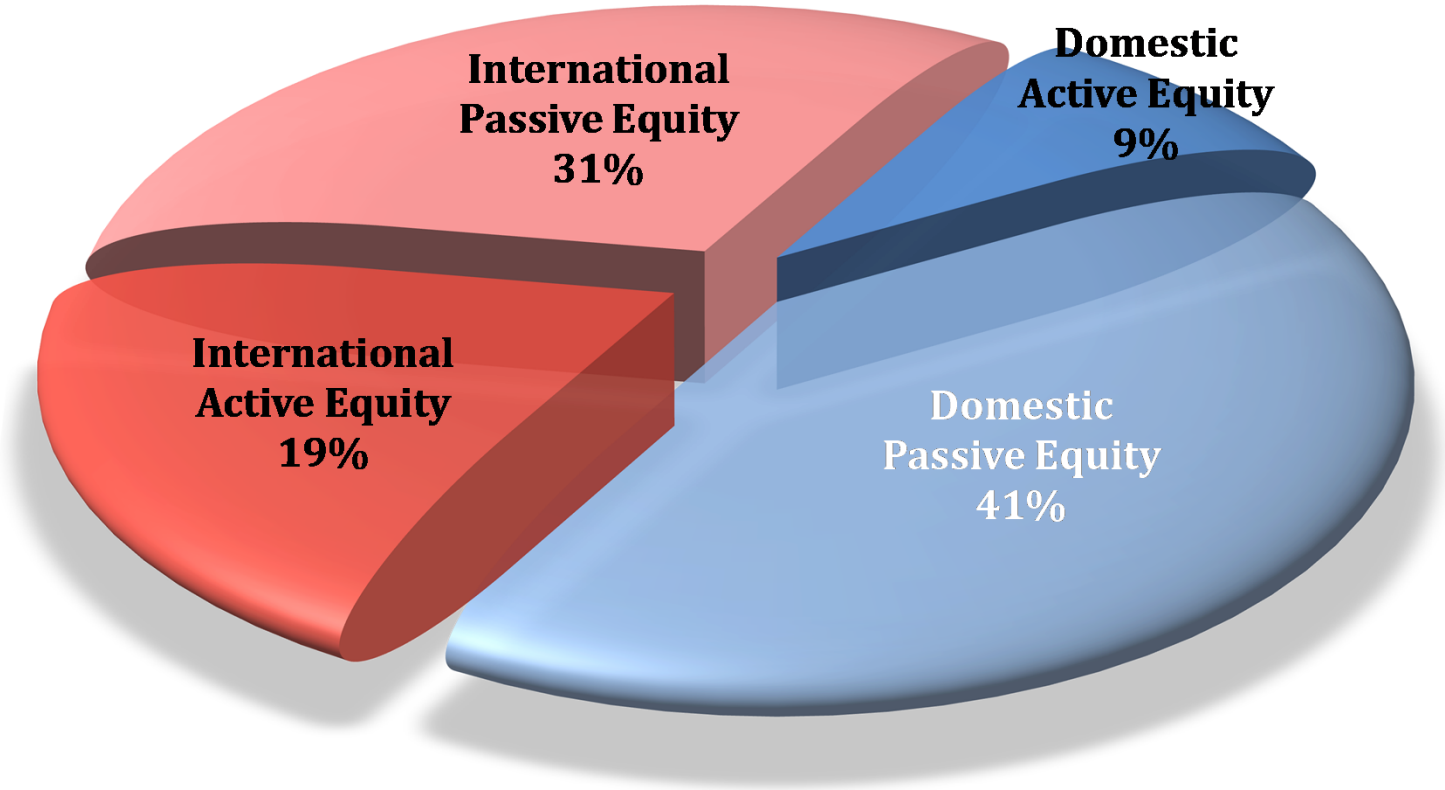
*SAA Targets shown are interim policy targets. The full SAA targets: 3% Sm Cap, 3% Mid, 20% Lg Cap with total U.S. equity at 26%.

International Equity Allocation

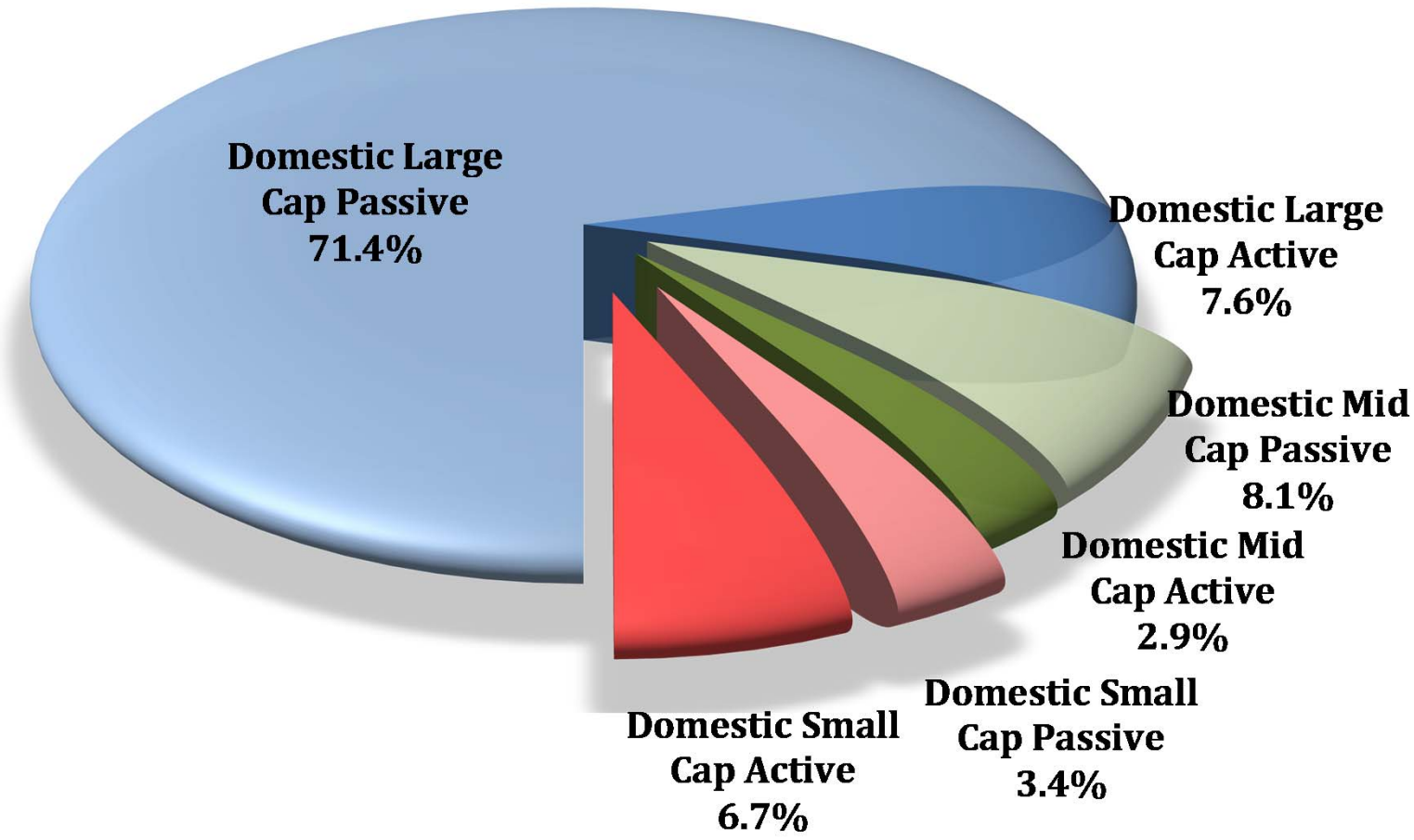


*SAA Targets shown are interim policy targets. The full SAA targets: 5% EM, 2% Dev'l Sm Cap, 17% Dev'l Lg and 24% for total.

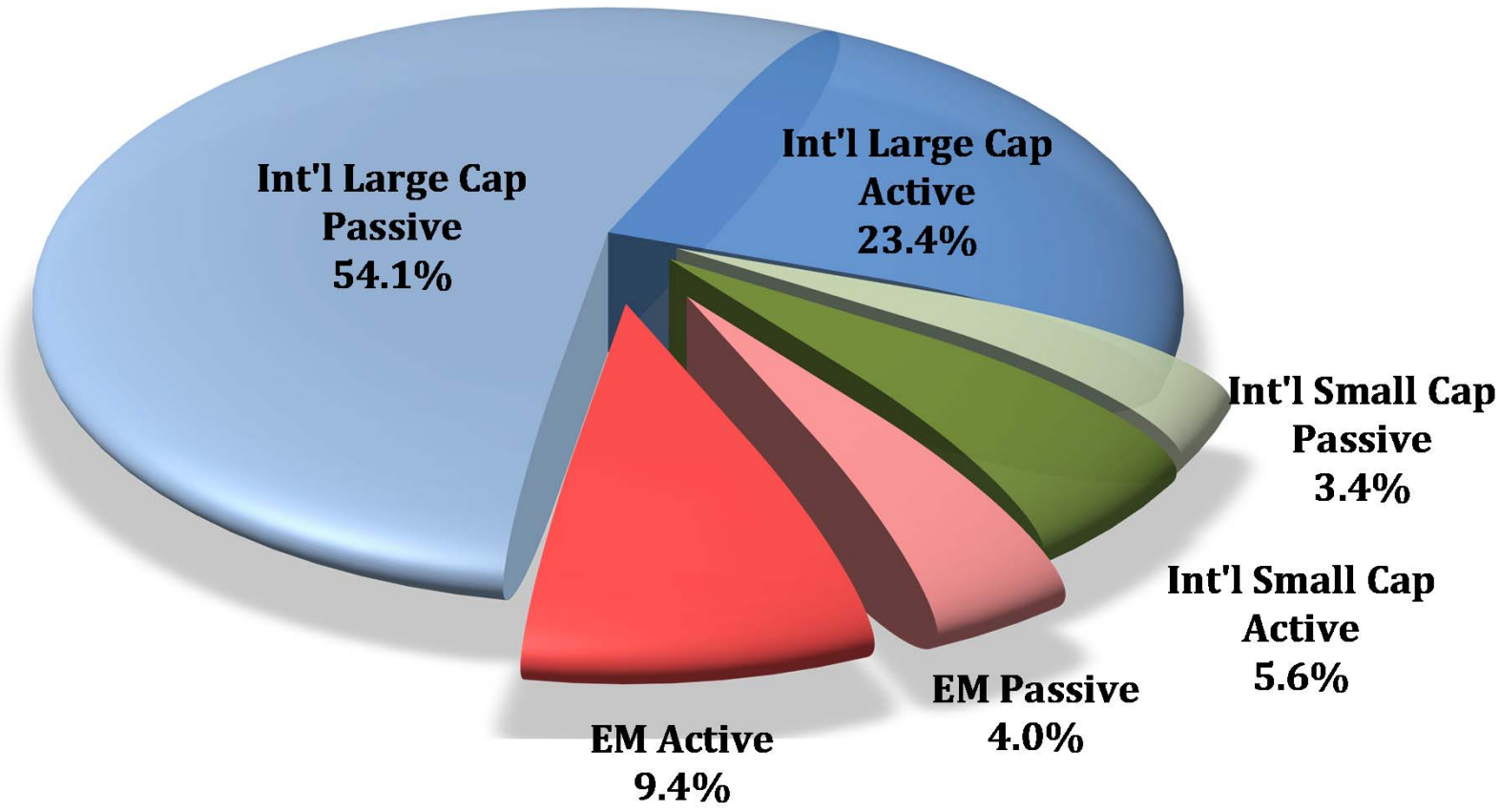
Total Public Equity Active/Passive Breakout



Domestic Equity Active/Passive Breakout

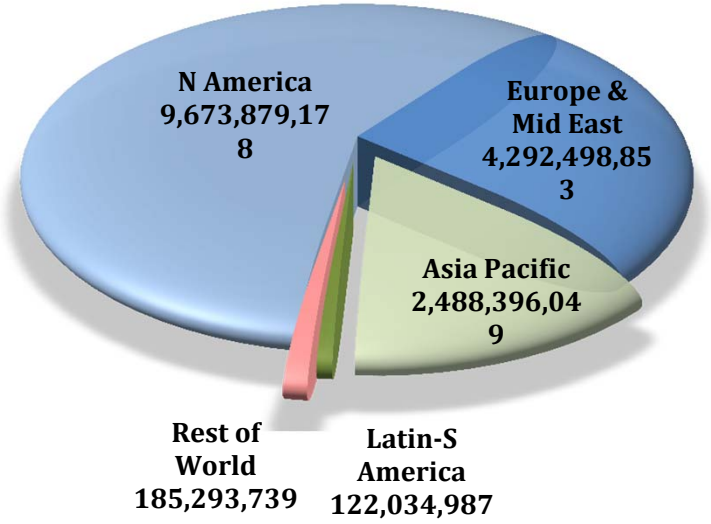


International Equity Active/Passive Breakout

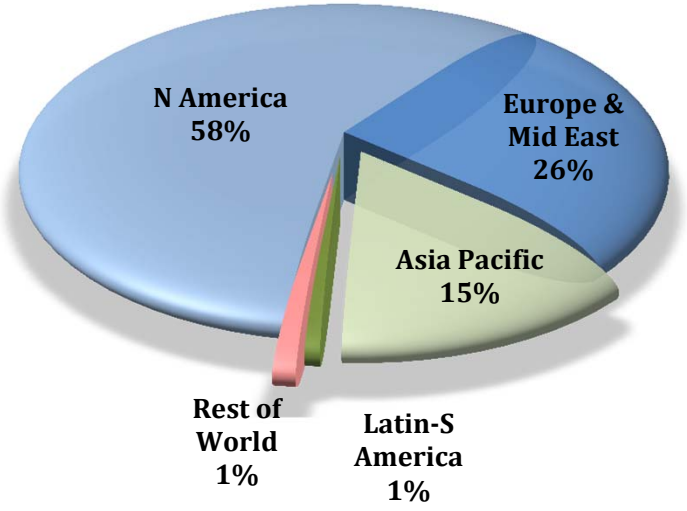


Total Public Equities – Global Exposures

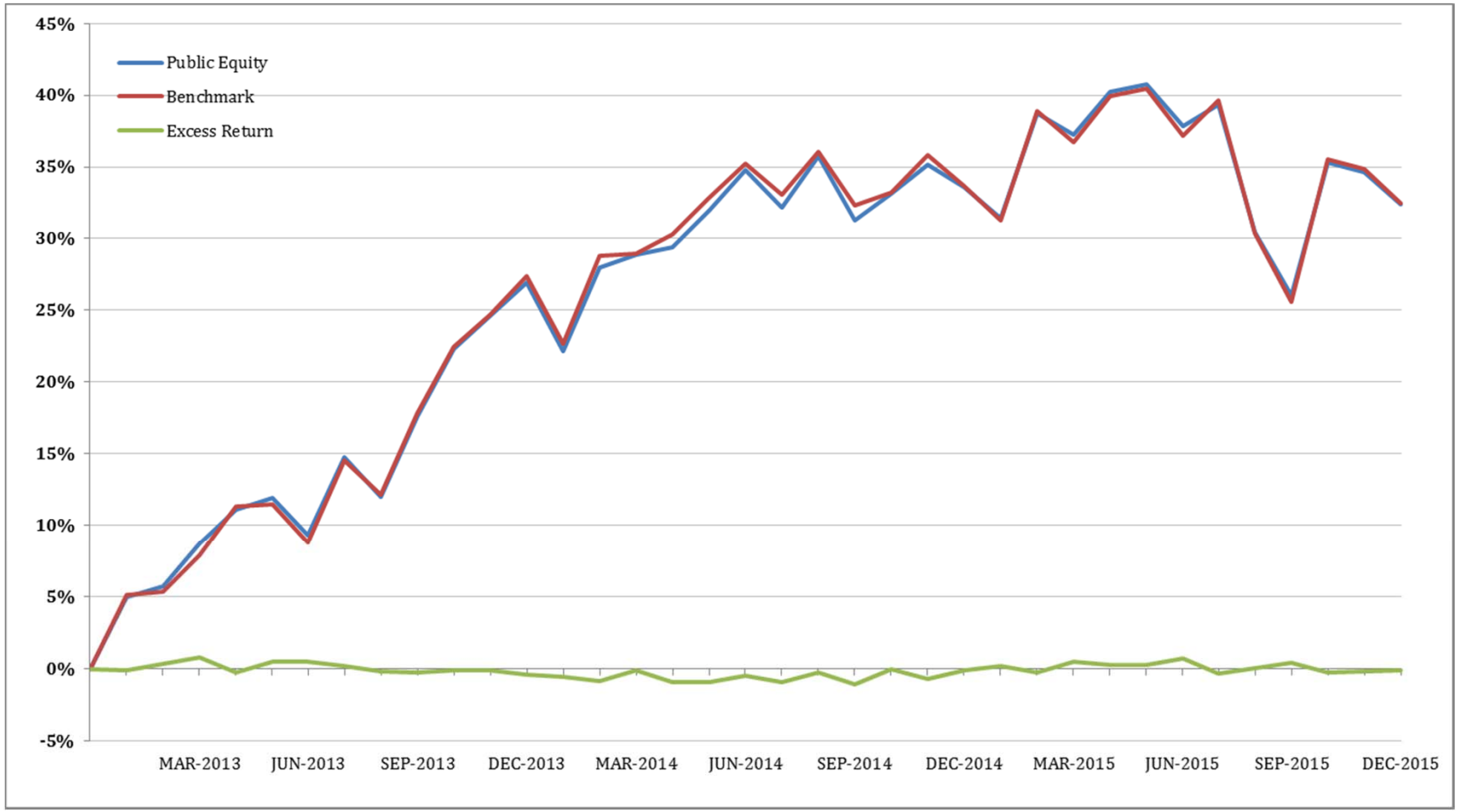
Total Public Equity - By Regional $



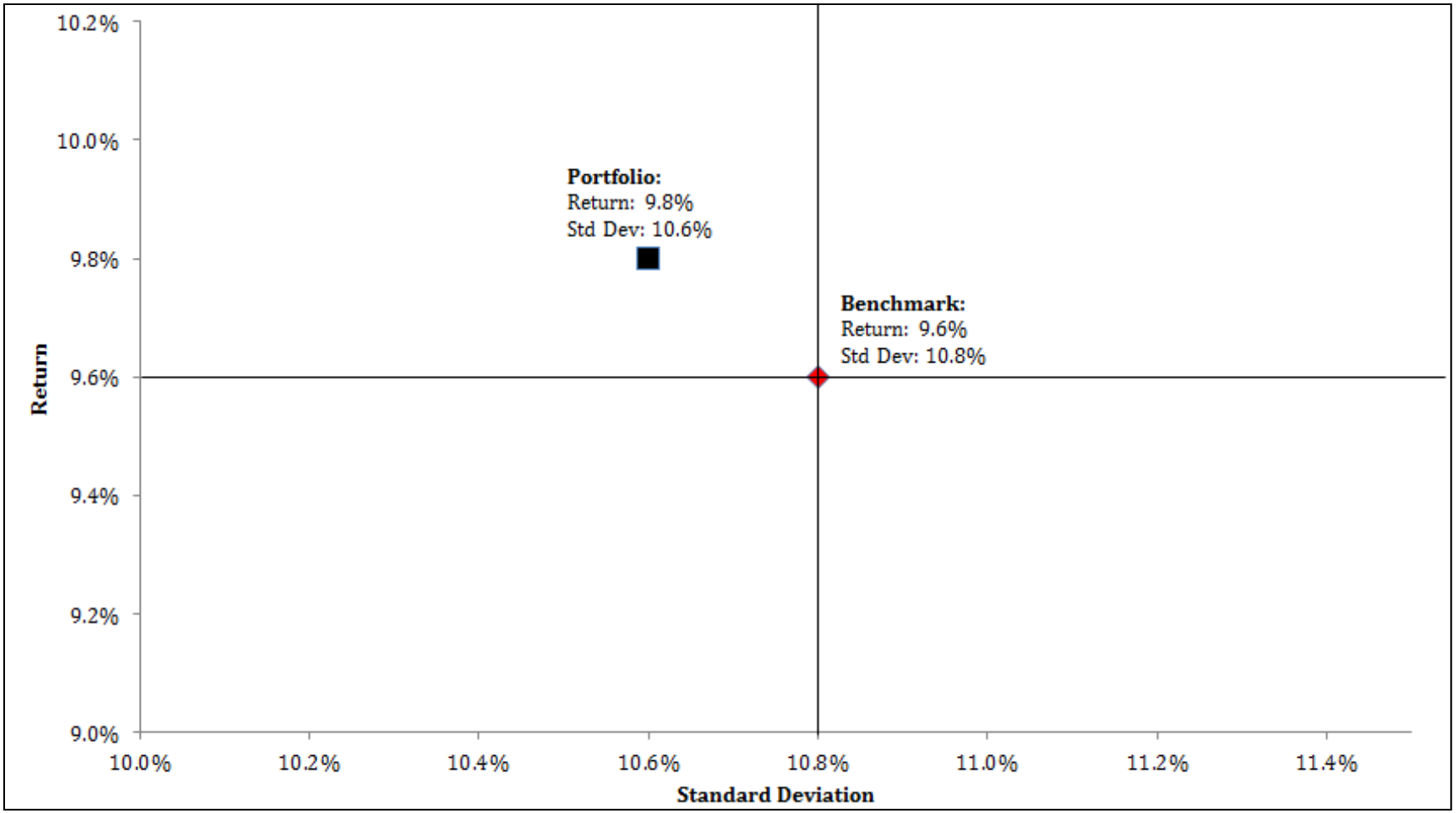
Total Public Equity - By Regional %



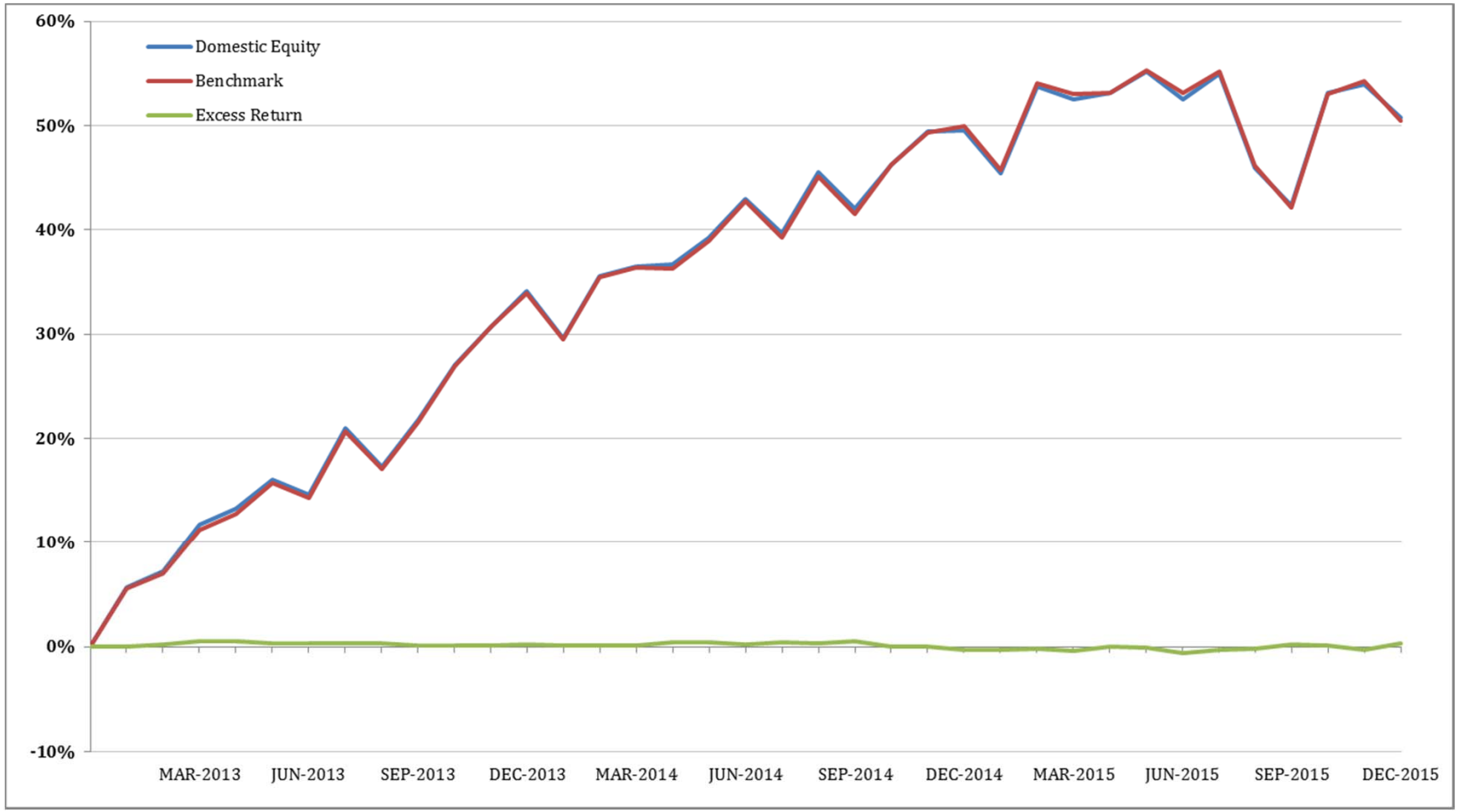
Total Public Equity – 3 YR Cumulative Performance



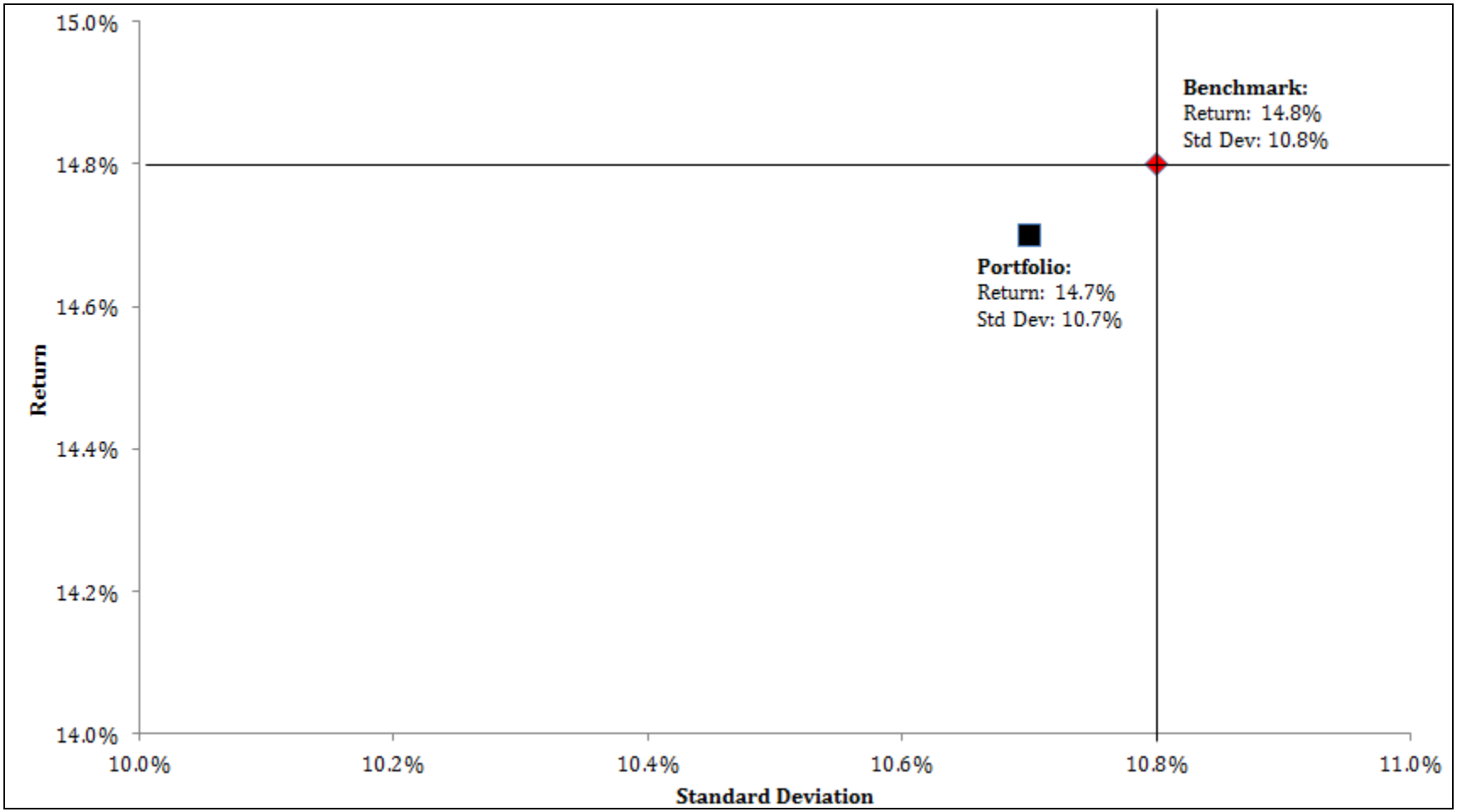
Total Public Equity – 3 YR Risk/Return



Total Domestic Equity – 3 YR Cumulative Performance

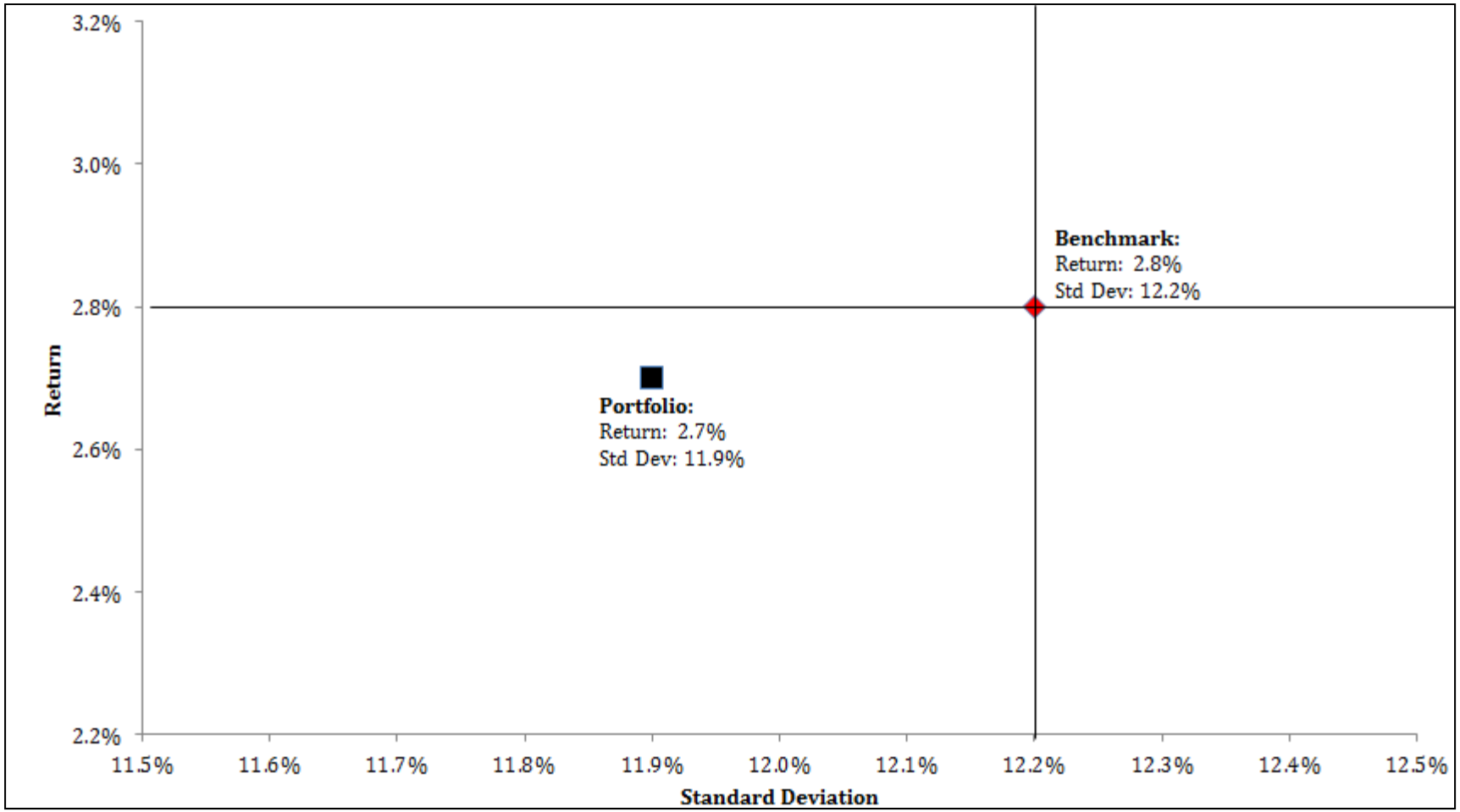


Total Domestic Equity – 3 YR Risk/Return



Total International Equity – 3 YR Cumulative Performance

Total International Equity – 3 YR Risk/Return



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ASRS Pension and HBS Assets

Public Securities Markets

Investment Managers Performance Summary

	Benchmark	Market Value ($mil.)	1 Mth	3 Mth	1 Year	3 Year	5 Year	10 Year	ITD	Inception Date
US EQUITY LARGE CAP										
E2 MODEL	S&P 500 INDEX (DAILY)	4,886	-1.58	7.09	1.36	15.09	12.55	7.35	7.48	04-01-1997
Excess			-0.01	0.05	-0.03	-0.04	-0.02	0.05	0.07	
LSV ASSET MANAGEMENT	LSV CUSTOM INDEX	698	-2.63	4.48	-3.82	14.76	12.27	7.32	10.38	01-01-2003
Excess			-0.95	-1.58	-0.68	1.93	1.31	1.51	2.03	
E7	MSCI USA High Dividend Yield Index	584	-0.56	7.99	0.57	14.25			12.64	08-01-2012
Excess			-0.05	-0.00	-0.14	-0.01			-0.00	
E8	MSCI USA Minimum Volatility Index	562	0.46	6.38	5.55	15.77			13.85	08-01-2012
Excess			-0.06	0.07	-0.09	0.21			0.37	
TOTAL US EQUITY LARGE CAP	**S&P 500 INDEX (DAILY)**	**6,730**	**-1.36**	**6.87**	**1.24**	**14.95**	**12.32**	**7.27**	**7.68**	**06-01-2002**
Excess			0.21	-0.18	-0.14	-0.18	-0.25	-0.03	0.63	
US EQUITY MID CAP										
WELLINGTON MANAGEMENT COMPANY LLP	S&P 400 MIDCAP INDEX (DAILY)	271	-4.50	2.64	2.01	16.39	11.53	9.28	10.87	07-01-2002
Excess			-0.33	0.04	4.18	3.63	0.85	1.10	1.27	
E3 MODEL	S&P/CITIGROUP 400 GROWTH	396	-3.45	2.83	1.92	13.38	11.28	9.36	8.28	12-01-2000
Excess			-0.09	-0.08	-0.10	0.01	0.18	0.50	0.51	
E4 MODEL	S&P/CITIGROUP 400 VALUE	348	-5.14	2.20	-6.66	11.92	10.10	7.65	9.42	07-01-2002
Excess			-0.04	-0.01	-0.01	-0.07	-0.10	0.24	0.17	
TOTAL US EQUITY MID CAP	**S&P 400 MIDCAP INDEX (DAILY)**	**1,015**	**-4.32**	**2.56**	**-1.33**	**13.49**	**10.75**	**8.31**	**9.61**	**06-01-2002**
Excess			-0.15	-0.04	0.84	0.73	0.07	0.13	0.69	
US EQUITY SMALL CAP										
DIMENSIONAL FUND ADVISORS EQFD	DFA BLENDED BENCHMARK	262	-5.72	1.58	-7.33	11.39	9.21	7.08	11.06	09-01-1998
Excess			-0.62	-2.12	-0.66	-0.61	-1.16	-0.43	0.81	
E6	S&P 600 SMALL CAP (DAILY)	318	-4.76	3.78	-1.75	13.62	11.43		7.41	02-01-2007
Excess			0.02	0.05	0.23	0.04	-0.04		0.34	
TIMESSQUARE CAPITAL MANAGEMENT	TIMESSQUARE BLENDED BENCHMARK	354	-3.91	3.86	1.16	13.47	12.66	10.62	11.29	04-01-2005
Excess			0.86	-0.46	1.79	-0.90	1.33	2.18	2.23	
TOTAL US EQUITY SMALL CAP	**ASRS SMALL CAP CUSTOM INDEX**	**934**	**-4.72**	**3.19**	**-2.49**	**12.77**	**11.03**	**8.32**	**9.79**	**06-01-2002**
Excess			0.07	-0.54	-0.52	-0.80	-0.44	0.02	0.84	

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Public Securities Markets

Investment Managers Performance Summary

	Benchmark	Market Value ($mil.)	1 Mth	3 Mth	1 Year	3 Year	5 Year	10 Year	ITD	Inception Date
TOTAL US EQUITY	COMBINED DOMESTIC EQUITY INDEX	8,679	-2.04	5.98	0.85	14.68	12.07	7.76	11.11	07-01-1975
Excess			0.40	0.10	0.46	0.09	-0.10	0.15	-0.07	
INTERNATIONAL DEVELOPED LARGE CAP										
BRANDES INVESTMENT PARTNERS INT EQ	BRANDES CUSTOM INDEX	560	-2.14	3.20	2.14	7.92	4.40	3.46	8.47	10-01-1998
Excess			-0.79	-1.51	2.95	2.76	0.93	-0.92	2.80	
AMERICAN CENTURY	MSCI EAFE NET (BLENDED)	562	-0.63	4.40	2.42				-2.65	07-01-2014
Excess			0.72	-0.31	3.23				4.10	
BGI EAFE INDEX	MSCI EAFE NET (BLENDED)	4,003	-1.35	4.72	-0.54	5.27	3.89		7.47	07-01-2009
Excess			-0.00	0.01	0.27	0.11	0.00		-0.02	
THOMSON, SIEGEL & WALMSLEY	MSCI EAFE NET (BLENDED)	297	-0.89	4.81	2.07				-4.52	07-01-2014
Excess			0.46	0.10	2.88				2.23	
TRINITY STREET	MSCI EAFE NET (BLENDED)	321	-1.31	3.51	3.12				-5.58	07-01-2014
Excess			0.04	-1.20	3.93				1.17	
TOTAL INTERNATIONAL DEVELOPED LARGE CAP	MSCI EAFE NET (BLENDED)	5,743	-1.33	4.47	0.28	5.10	3.72			09-01-2009
Excess			0.02	-0.24	1.09	-0.06	-0.17			
INTERNATIONAL DEVELOPED SMALL CAP										
AQR CAPITAL	MSCI EAFE SMALL CAP NET (BLENDED)	99	2.14	6.90	12.69				10.56	06-01-2013
Excess			1.41	0.11	3.10				2.25	
BLACKROCK EAFE SMALL CAP	MSCI EAFE SMALL CAP NET (BLENDED)	254	0.71	6.79	9.64	10.57	6.37		10.94	06-01-2010
Excess			-0.02	0.01	0.06	0.02	-0.16		-0.12	
DIMENSIONAL FUND ADVISORS INTL SC	MSCI EAFE SMALL CAP NET (BLENDED)	102	0.03	3.45	1.15	7.46	3.69	4.21	4.81	09-01-2005
Excess			-0.70	-3.34	-8.44	-3.08	-2.84	-0.62	-1.05	
FRANKLIN TEMPLETON INVESTMENTS	MSCI EAFE SMALL CAP NET (BLENDED)	217	-0.13	1.44	6.06	7.83			6.69	04-01-2011
Excess			-0.86	-5.35	-3.53	-2.71			0.47	
TOTAL INTERNATIONAL DEVELOPED SMALL CAP	MSCI EAFE SMALL CAP NET (BLENDED)	672	0.54	4.52	7.23	9.50	6.81		7.92	10-01-2009
Excess			-0.19	-2.27	-2.36	-1.04	0.28		-0.55	
INTERNATIONAL EMERGING MARKETS										
BLACKROCK EMERGING MARKETS	MSCI EMF NET (BLENDED)	299	-2.24	0.68	-15.07	-6.93	-5.00		-3.47	10-01-2010
Excess			-0.01	0.02	-0.15	-0.28	-0.38		-0.37	
EATON VANCE EMERGING MARKET EQUITY	MSCI EMF NET (BLENDED)	252	-2.04	-1.38	-16.60	-6.83	-4.77		-3.53	12-01-2010

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ASRS Pension and HBS Assets

Public Securities Markets

Investment Managers Performance Summary

	Benchmark	Market Value ($mil.)	1 Mth	3 Mth	1 Year	3 Year	5 Year	10 Year	ITD	Inception Date
Excess			0.19	-2.04	-1.68	-0.17	-0.16		-0.29	
LSV EMERGING MARKET EQUITY	MSCI EMF NET (BLENDED)	108	-2.94	-2.48	-20.16	-7.68	-4.79		-3.51	12-01-2010
Excess			-0.71	-3.14	-5.24	-1.02	-0.17		-0.27	
WILLIAM BLAIR & COMPANY	MSCI EMF NET (BLENDED)	344	-2.77	1.14	-14.63	-2.74	-1.37		-0.98	11-01-2010
Excess			-0.54	0.48	0.29	3.91	3.25		2.71	
TOTAL INTERNATIONAL EMERGING MARKETS	**MSCI EMF NET (BLENDED)**	**1,003**	**-2.45**	**-0.07**	**-16.03**	**-6.00**	**-4.05**		**-2.97**	**10-01-2010**
Excess			-0.22	-0.73	-1.12	0.66	0.57		0.13	
TOTAL INTERNATIONAL EQUITY	**INTERNATIONAL EQUITY INDEX**	**7,419**	**-1.32**	**3.82**	**-2.15**	**2.73**	**2.14**	**2.98**	**5.81**	**04-01-1987**
Excess			-0.01	-0.10	1.16	0.00	-0.05	-0.74	0.33	
RISK FACTOR PORTFOLIO										
RISK FACTOR PORTFOLIO		562	-1.19	6.31	3.06				12.09	06-01-2013
TOTAL EQUITY W/ RISK FACTOR OVERLAY	**MSCI WORLD NET (BLENDED)**	**16,660**	**-1.69**	**5.06**	**-0.88**	**9.80**	**8.38**	**5.95**	**6.35**	**01-01-1998**
Excess			0.07	-0.44	-0.01	-0.03	0.42	0.50	0.82	
TOTAL EQUITY W/O RISK FACTOR	**MSCI WORLD NET (BLENDED)**	**16,098**	**-1.71**	**5.02**	**-1.00**	**9.75**	**8.35**	**5.93**	**6.34**	**01-01-1998**
Excess			0.05	-0.48	-0.13	-0.08	0.39	0.48	0.81	

Appendix

Total Public Equity Asset Class

Asset Categories & Risk Factors as of 12-31-15

	Market Value ($ Millions)	Pct of Public Equity	Category Weight	ASRS SAA Policy	Proportion Indexed
U.S. Equity	8,679	52.09%	25.81%	26.00%	81.74%
Non-U.S. Equity	7,419	44.53%	22.07%	24.00%	61.42%
Risk Factors Overlay	562	3.37%	1.67%	- - -	- - -
Total Asset Category	**16,660**	100.00%	49.55%	50.00%	69.93%
Total Fund	**33,621**				

Risk Factors Overlay Detail

ISHARES MSCI MOMENTUM FACTOR ETF	148	26.29%
ISHARES MSCI VALUE FACTOR ETF	126	22.44%
ISHARES MSCI SIZE FACTOR ETF	131	23.38%
ISHARES MSCI QUALITY FACTOR ETF	141	25.09%
GOVERNMENT STIF	16	2.80%
	562	100.00%

Domestic Equity Category Summary

Asset Sub-Classs as of 12-31-15

	Market Value	Asset Sub-Class Weight	Asset Category Weight	ASRS SAA Policy	Proportion Indexed
Large-Cap	6,730	77.54%	20.02%	20.00%	89.63%
Mid-Cap	1,015	11.69%	3.02%	3.00%	73.30%
Small-Cap	934	10.76%	2.78%	3.00%	34.05%
Total Asset Category	**8,679**	100.00%	25.81%	26.00%	81.74%

International Equity Category Summary

Asset Sub-Classs as of 12-31-15

	Market Value	Asset Sub-Class Weight	Asset Category Weight	ASRS SAA Policy	Proportion Indexed
EAFE Large Cap	5,743	77.42%	16.28%	17.00%	69.70%
EAFE Small-Cap	672	9.06%	1.91%	2.00%	37.80%
Emerging Markets	1,003.00	13.52%	2.94%	5.00%	29.81%
Total Asset Category	**7,418**	100.00%	21.13%	24.00%	61.42%

Public Equity Passive Mandates

Passive Mandates Summary as of 12-31-15

	Market Value	% Total Equity	% U.S. Equity	Benchmark
E2	4,886	29.33%	56.30%	S&P 500
E3	396	2.38%	4.56%	S&P 400 Growth
E4	348	2.09%	4.01%	S&P 400 Value
E6	318	1.91%	3.66%	S&P 600
E7	584	3.51%	6.73%	MSCI USA High Dividend Yield Index
E8	562	3.37%	6.48%	MSCI USA Minimum Volatility Index
Total Asset Sub-Class	**7,094**	42.58%	81.74%	
BlackRock EAFE	4,003	24.03%	53.96%	MSCI EAFE (Net)
BlackRock EAFE Small Cap	254	1.52%	3.42%	MSCI EAFE Small Cap (Net)
BlackRock Emerging Market	299	1.79%	4.03%	MSCI Emerging Markets (Net)
Total Asset Sub-Class	**4,556**	27.35%	61.42%	

NEPC Performance

Arizona State Retirement System

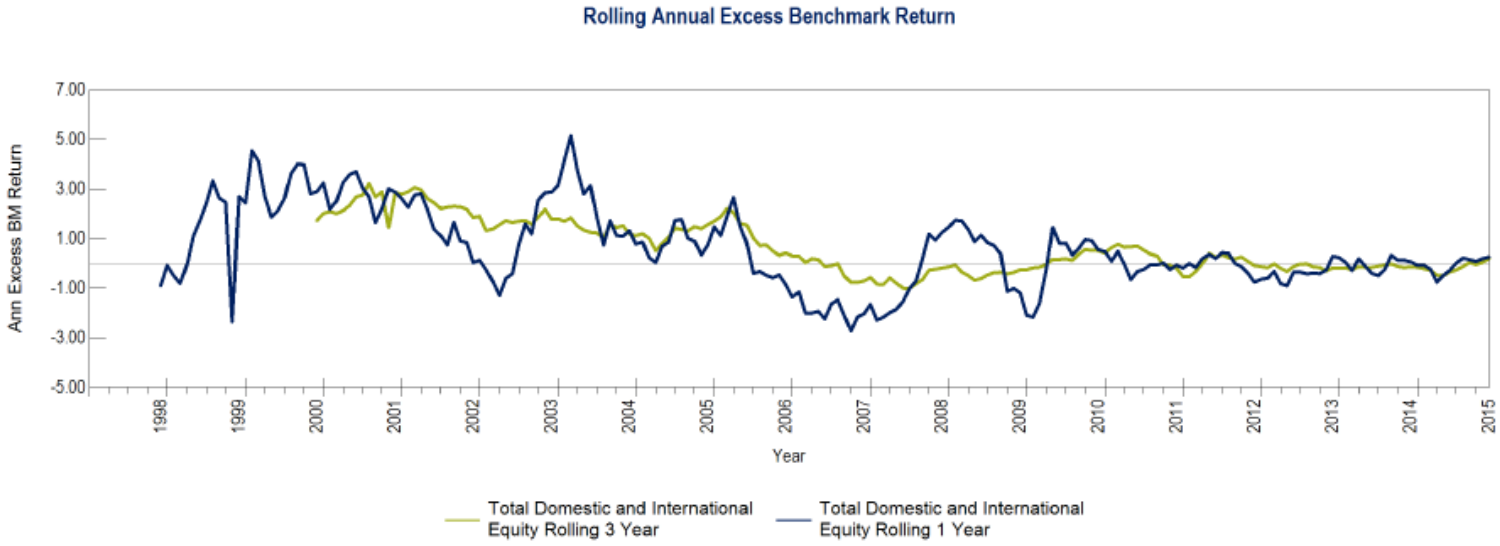
Public Market Asset Class Analysis

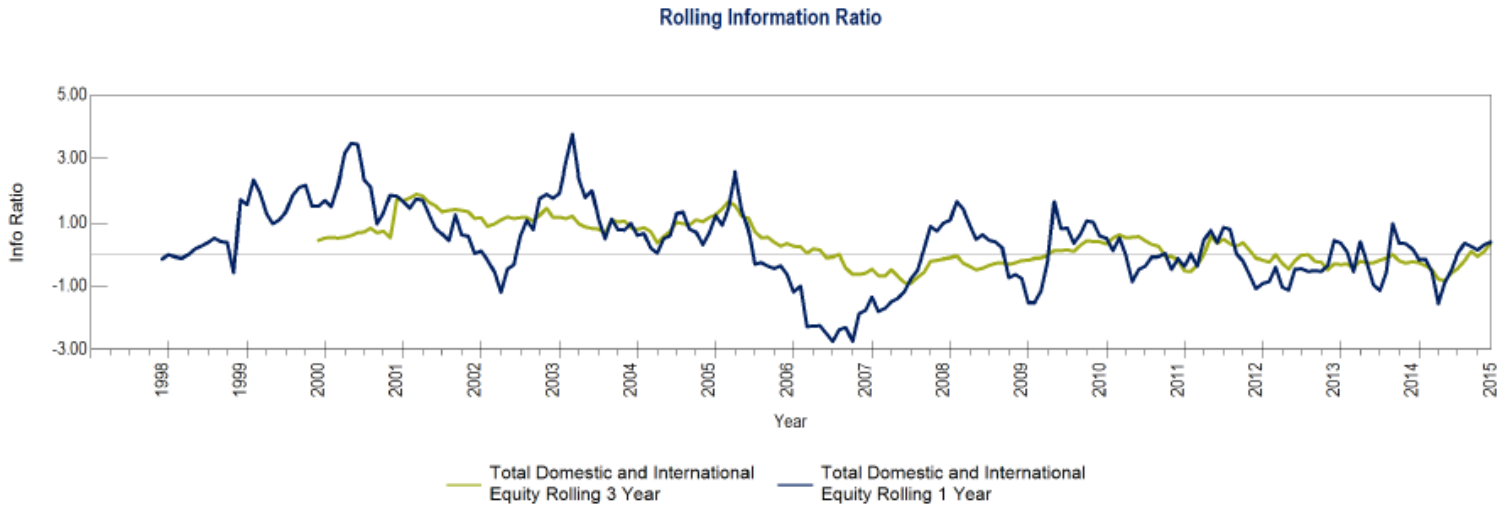
3 Years Ending December 31, 2015

	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Tracking Error	Rank	Info Ratio	Rank	Anlzd AJ	Rank	Beta	Sharpe Ratio
Total Fund	100.0%	8.3%	--	6.6%	--	1.2%	--	1.3	--	1.7%	--	1.0	1.2
Interim SAA Policy	--	6.7%	--	6.7%	--	--	--	--	--	--	--	--	1.0
Total Domestic and International Equity	49.6%	9.8%	--	10.6%	--	0.6%	--	0.4	--	0.4%	--	1.0	0.9
ASRS Custom Total Equity Benchmark	--	9.6%	--	10.8%	--	--	--	--	--	--	--	--	0.9
Total Domestic Equity	25.8%	14.7%	34	10.7%	19	0.5%	1	-0.3	--	0.0%	34	1.0	1.4
ASRS Custom Domestic Equity Benchmark	--	14.8%	33	10.8%	22	--	--	--	--	--	34	--	1.4
Total International Equity	22.1%	2.7%	76	11.9%	57	0.7%	1	-0.1	--	0.0%	76	1.0	0.2
ASRS Custom Int'l Equity Benchmark	--	2.8%	76	12.2%	69	--	--	--	--	--	76	--	0.2

Arizona State Retirement System

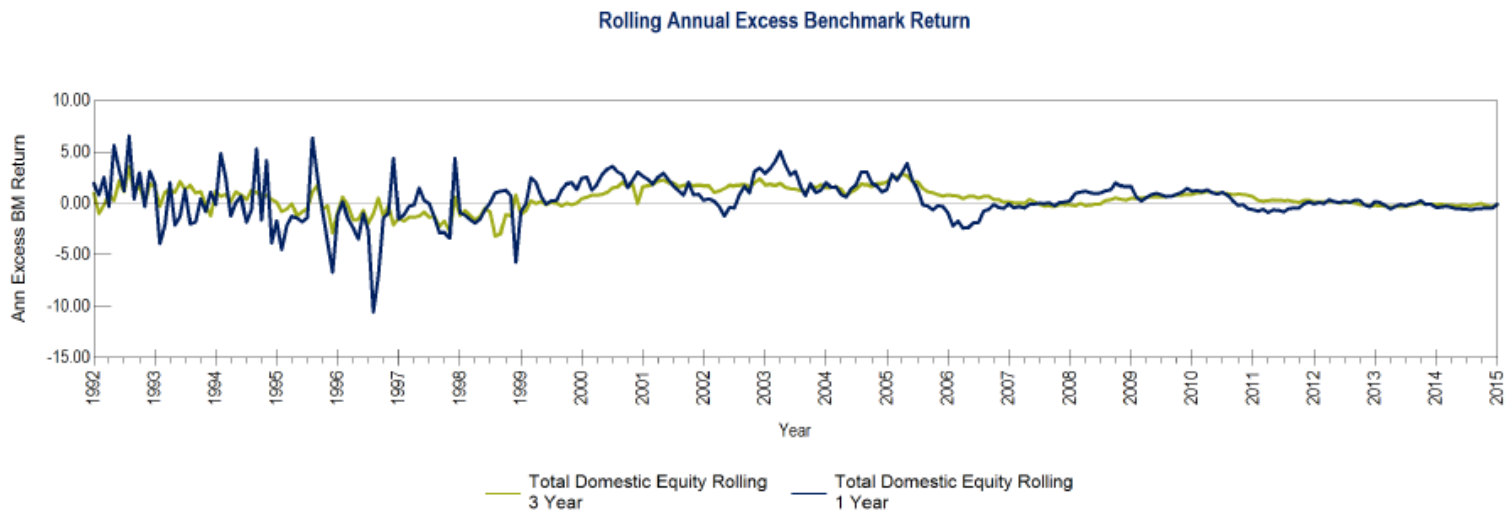
Asset Class Analysis - Total Domestic and International Equity

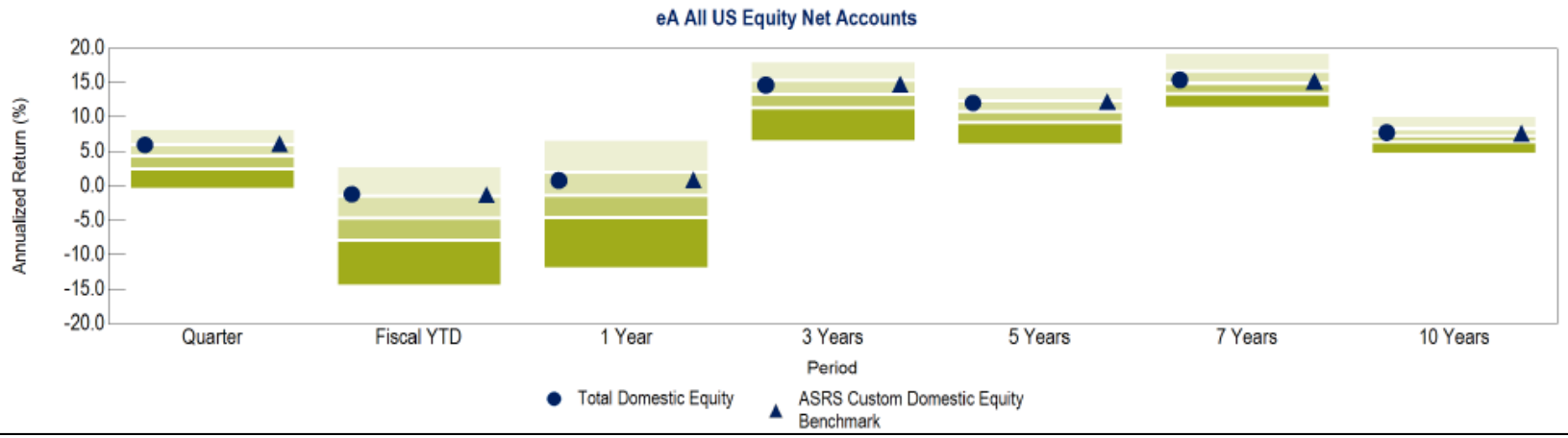




Arizona State Retirement System

Asset Class Analysis - Total Domestic Equity

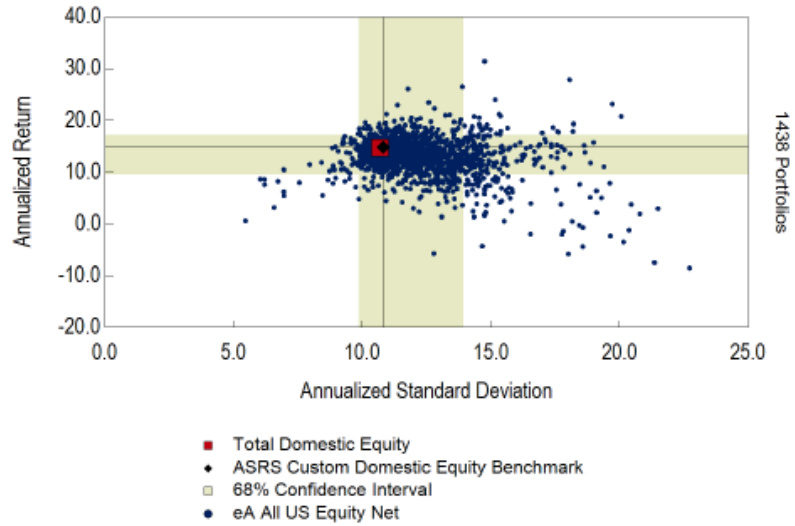




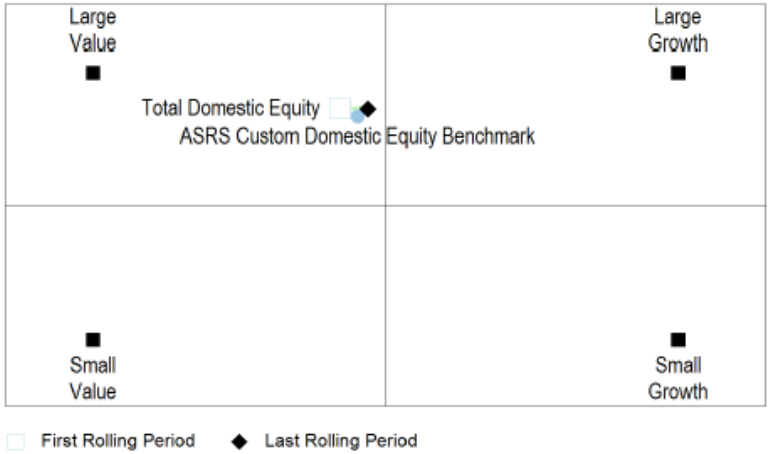
Arizona State Retirement System

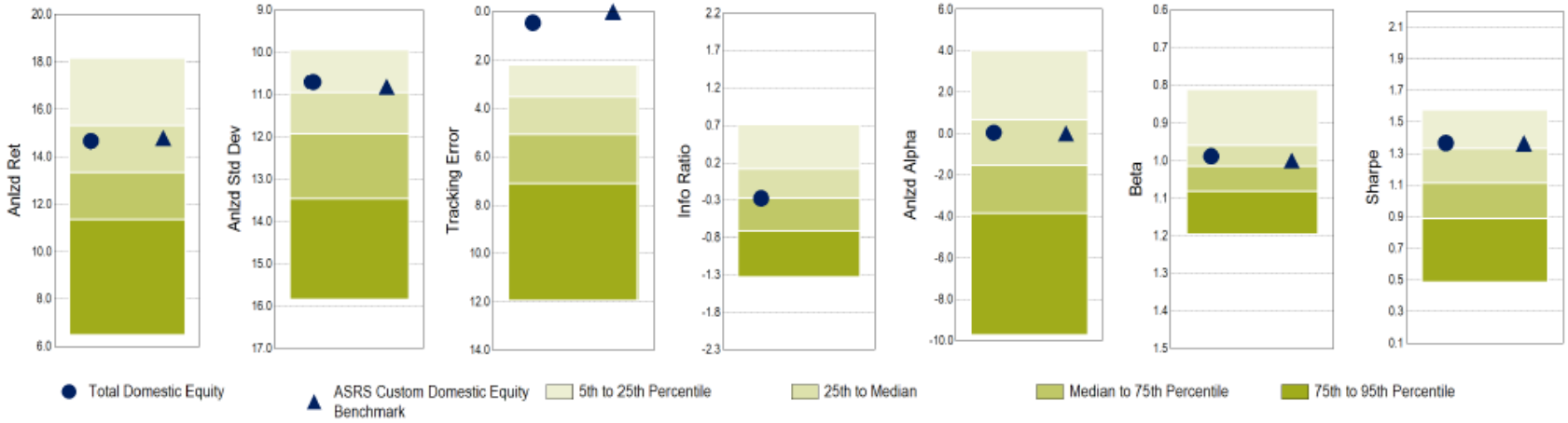
Asset Class Analysis - Total Domestic Equity

3 Years Ending December 31, 2015



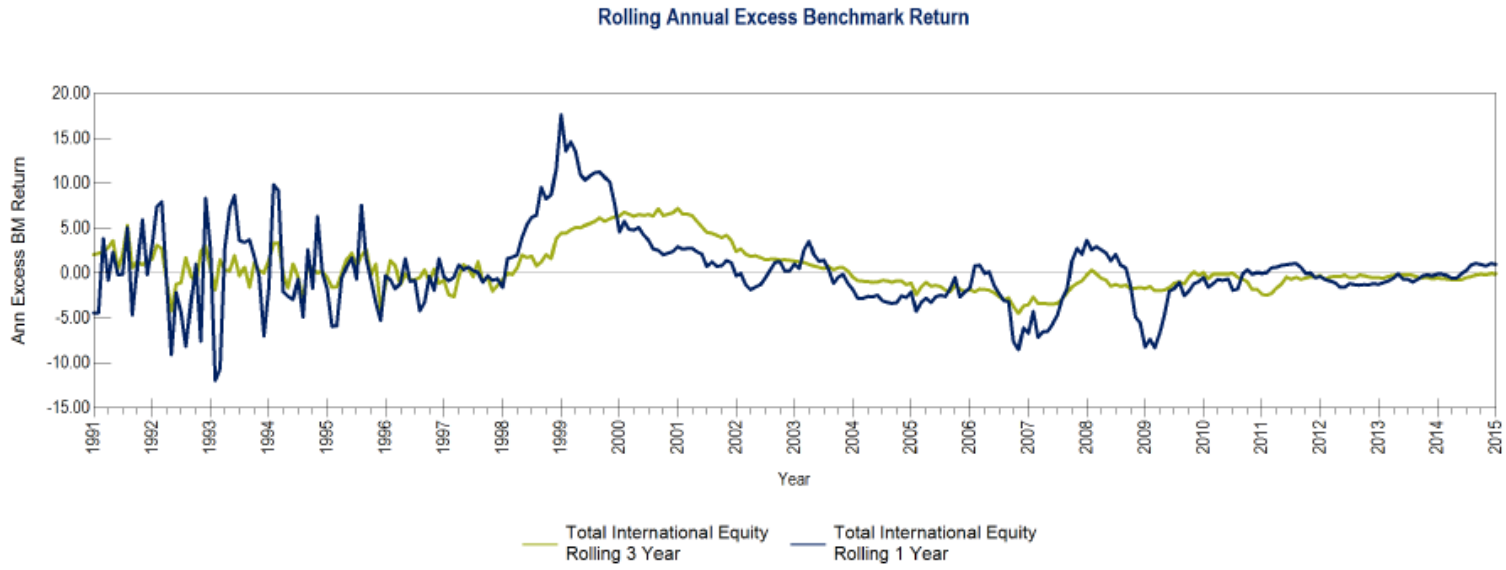
3 Year Style Map

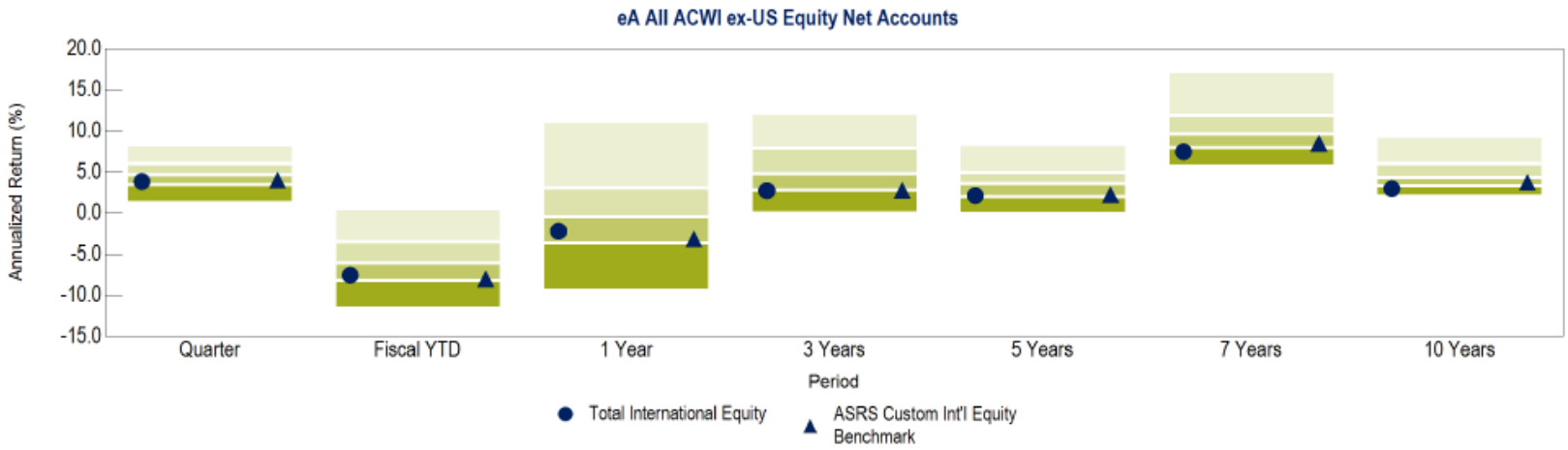




Arizona State Retirement System

Asset Class Analysis - Total International Equity

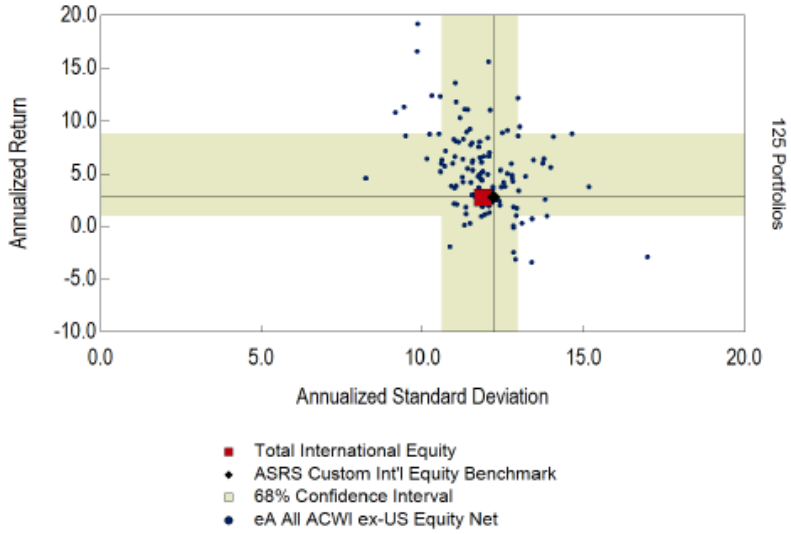




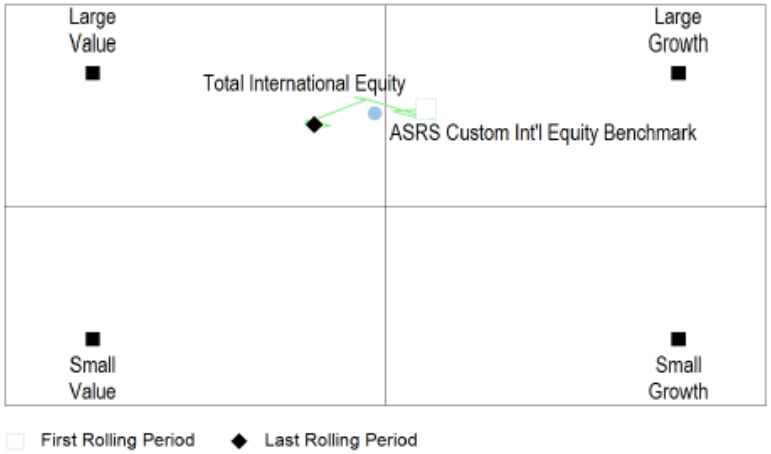
Arizona State Retirement System

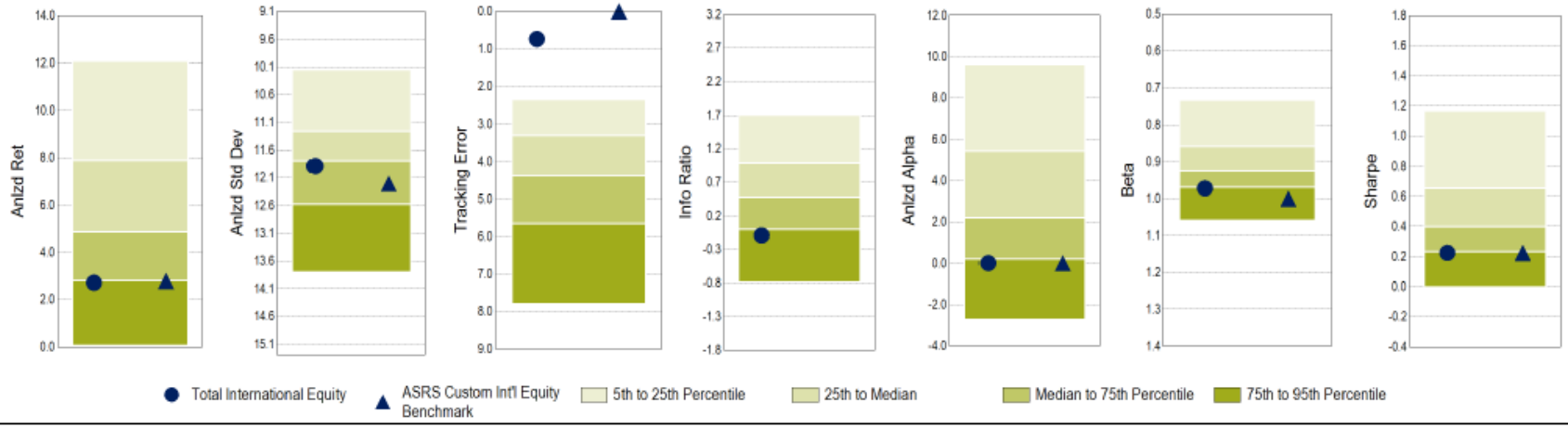
Asset Class Analysis - Total International Equity

3 Years Ending December 31, 2015



3 Year Style Map





Active Managers

Domestic Equity - U.S. Large Cap							
LSV	($MM)	% Total Equity	% Domestic Equity	Benchmark	Net Excess Return (bps)		
Quantitative,					3 Mo	1 Yr	3 Yr
Value+Momentum-Derived Expected Return Diversified LC "Value"	698	4.2%	7.6%	S&P 500 Value	-158	-68	193

Domestic Equity - U.S. Mid Cap							
Wellington	($MM)	% Total Equity	% Domestic Equity	Benchmark	Net Excess Return (bps)		
Fundamental					3 Mo	1 Yr	3 Yr
MC "Quality Opportunities Core/Growth"	271	1.6%	2.9%	S&P 400	4	418	363

Domestic Equity - U.S. Small Cap							
DFA	($MM)	% Total Equity	% Domestic Equity	Benchmark	Net Excess Return (bps)		
Quantitative					3 Mo	1 Yr	3 Yr
Fama/French -Based SC "Value"	262	1.6%	2.8%	S&P 600 Value	-212	-66	-61
TimesSquare	($MM)	% Total Equity	% Domestic Equity	Benchmark	Net Excess Return (bps)		
Fundamental					3 Mo	1 Yr	3 Yr
Quality Management-Focused SC "Growth"	354	2.1%	3.8%	Russell 2000 Growth	-46	179	-90

Active Managers

International Equity - Developed Large Cap							
Brandes	($MM)	% Total Equity	% Int'l Equity	Benchmark	Net Excess Return (bps)		
Fundamental					3 Mo	1 Yr	3 Yr
Graham & Dodd Discount To Intrinsic Worth Companies EAFE "Value"	560	3.4%	7.5%	Custom Index	-151	295	276
American Century	($MM)	% Total Equity	% Int'l Equity	Benchmark	Net Excess Return (bps)		
Fundamental					3 Mo	1 Yr	3 Yr
Accelerating Revenues & Earnings Within a Riak-Aware Framework EAFE "Growth"	562	3.4%	7.6%	MSCI EAFE	-31	323	-
Thompson, Siegel & Walmsley	($MM)	% Total Equity	% Int'l Equity	Benchmark	Net Excess Return (bps)		
Fundamental					3 Mo	1 Yr	3 Yr
Proprietarily-Screened, Cash Flow-Defined Positive Change Companies EAFE "Value"	297	1.8%	4.0%	MSCI EAFE	10	288	-
Trinity Street	($MM)	% Total Equity	% Int'l Equity	Benchmark	Net Excess Return (bps)		
Fundamental					3 Mo	1 Yr	3 Yr
Bottom-Up, High Conviction, Rapidly Changing Companies EAFE "Growth"	321	1.9%	4.3%	MSCI EAFE	-120	393	-

Active Managers

International Equity - Developed Small Cap							
AQR	($MM)	% Total Equity	% Int'l Equity	Benchmark	Net Excess Return (bps)		
Quantitative + Fundamental					3 Mo	1 Yr	3 Yr
Value+Momentum GARP EAFE SC "Growth"	99	0.6%	1.3%	MSCI EAFE Small Cap	11	310	-
DFA	($MM)	% Total Equity	% Int'l Equity	Benchmark	Net Excess Return (bps)		
Quantitative					3 Mo	1 Yr	3 Yr
Fama/French -Based EAFE SC "Value"	102	0.6%	1.4%	MSCI EAFE Small Cap	-334	-844	-308
Franklin Templeton	($MM)	% Total Equity	% Int'l Equity	Benchmark	Net Excess Return (bps)		
Fundamental					3 Mo	1 Yr	3 Yr
Sustainable Business Model EAFE SC "Growth"	217	1.3%	2.9%	MSCI EAFE Small Cap	-535	-353	-271

International Equity -Emerging Markets							
Eaton Vance	($MM)	% Total Equity	% Int'l Equity	Benchmark	Net Excess Return (bps)		
Quantitative,					3 Mo	1 Yr	3 Yr
Rules-Based Systematically Rebalanced Broad-Exposure Emerging Markets "Value"	252	1.5%	3.4%	MSCI Emerging Markets	-204	-168	-17
LSV	($MM)	% Total Equity	% Int'l Equity	Benchmark	Net Excess Return (bps)		
Quantitative,					3 Mo	1 Yr	3 Yr
Value+Momentum-Derived Expected Return Diversified Emerging Markets "Value"	108	0.6%	1.5%	MSCI Emerging Markets	-314	-524	-102
William Blair	($MM)	% Total Equity	% Int'l Equity	Benchmark	Net Excess Return (bps)		
Fundamental					3 Mo	1 Yr	3 Yr
Quality Management-Focused Broad Emerging Markets "Growth"	344	2.1%	4.6%	MSCI Emerging Markets	48	29	391

Agenda Item #10

Private Equity Program Review

ASRS Staff Presentation

Eric Glass

April 25, 2016

Outline

1. Background
   - The Private Equity Program
   - Private Equity Investment Approach
2. Private Equity Performance
3. Portfolio Composition

Private Equity

- ASRS has allocated 8% of total assets (+/- 2%) to private equity as part of its strategic asset allocation
- ASRS began investing in private equity in 2007
- The NAV of PE assets was $ 2613 million on September 30, 2015
  - This is 7.83% of total fund and the NAV is $ 55 million below target funding
- We update pacing plans annually to adjust investment levels to achieve and maintain target funding
- Investment pace for 2016 is $700 million in new commitments, although this will be reevaluated in light of the denominator effect from the public markets

Investment Philosophy

We believe successful private equity investing hinges on three considerations

- Strategy
- Track Record
- Organizational Dynamics

Strategy

- Academic research provides evidence on the performance of private equity[1]
  - Private Equity buyout funds outperform public markets by about 20% in total value over the life of a fund
  - Venture Capital has underperformed
- A review of the ASRS portfolio leads to conclusions about comparative performance
  - Mid sized buyout funds deliver the best and most consistent returns
  - Firms with specialized expertise in restructuring or an industry sector often do well

[1] Harris, Jenkinson and Kaplan. Private Equity Performance: What Do We Know? The Journal of Finance, October 2014.

Strategy

- ASRS favors
  - Buyout strategies that emphasize organizational transformation instead of mere financial engineering
  - Investments in growing sectors with high revenue growth potential (technology, healthcare)
  - Investments in sectors impacted by regulatory change (financial services)
  - Investments with sponsors having specialized expertise in restructuring, bankruptcy and turnaround situations
- ASRS is underweight
  - Venture Capital
  - Europe
  - Emerging Markets

Track Record

- Private equity performance has a fairly high level of dispersion
  - "Top quartile" funds outperform median funds by 5% to 10% depending on vintage
  - It is exceedingly rare for managers to perform persistently in the top quartile, but we do find managers persistently above median
  - ASRS implements private equity to provide diversification by manager, strategy and vintage year
- ASRS utilizes "PME" methods for performance assessment
  - PME (public market equivalent) measurements compare private equity returns to returns in public markets as if you invested in the public markets on the same days and in the same amounts as were invested in the PE fund
  - ASRS has been a leader in this realm, implementing software for PME methods nearly two years before it was commercially available through Bloomberg and other services[2]

[2] For a detailed explanation of PME methods, see this conference presentation http://www.rinfinance.com/agenda/2014/talk/KarlPolen.pdf

Performance Tracking

- In connection with creation of the software for the PME calculations, ASRS has built a performance tracking and reporting system for private assets
- State Street is the official book of the record and the ASRS system works from information downloaded from the State Street system
- The ASRS system generates
  - a monthly reporting package
  - a quarterly performance chart pack
  - an internal website with cash flow and performance metrics on each partnership

"Hunter, not hunted"

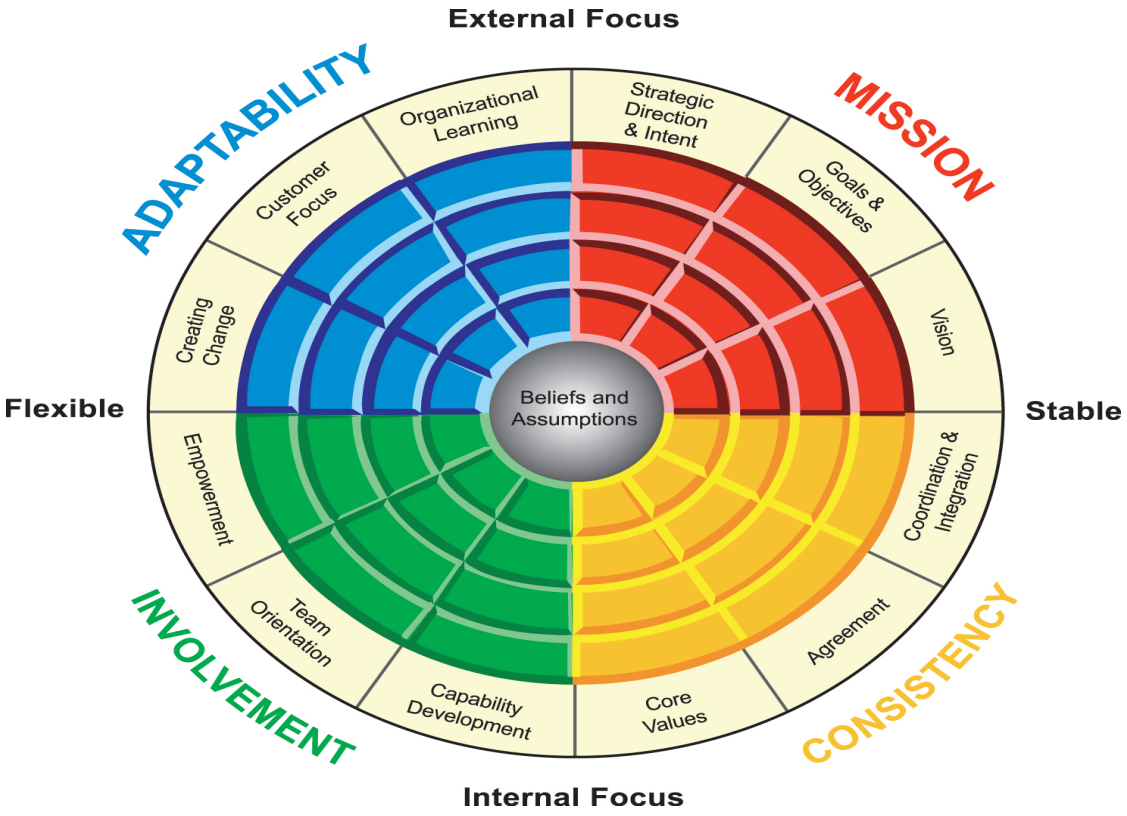
- ASRS uses quantitative screens from the Preqin database and PME methods to discern private equity sponsors with persistent excellent results
- ASRS has established an outbound program to pursue investments with the most highly qualified sponsors

Organizational Dynamics

- Although we place much emphasis on quantitative analysis to discern performance
  - this analysis is not securities analysis
  - the new investor does not participate in the track record deals
  - private equity investing is best thought of as a team hiring decision
- Traditional private equity diligence places emphasis on stability
  - But common sense suggests that the best firms will by dynamic, evolving with changing conditions, weeding out weak performers and promoting high performers
  - Research has found that stability is a negative indicator of performance[3]

[3] Cornelli, Simintzi and Vig. Team Stability and Performance in Private Equity. 2014 Working Paper. http://www.collerinstitute.com/Research/Paper/264

Organization Assessment



- ASRS has adopted a framework for organizational assessment modeled from Denison Consulting
  - Developed interview questions to explore organizational attributes of adaptability, mission, involvement and consistency
  - Ongoing work to explore deeper dive organizational assessment

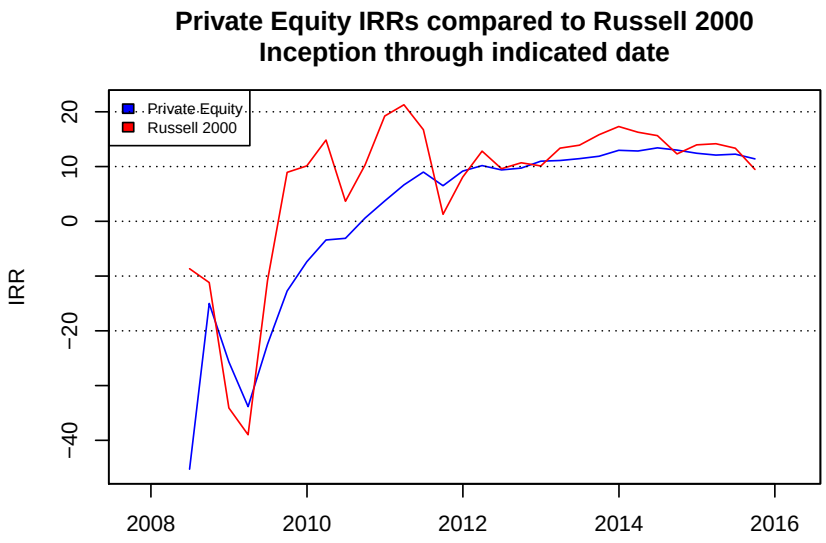
Comparison to Russell 2000 (September 30, 2015)

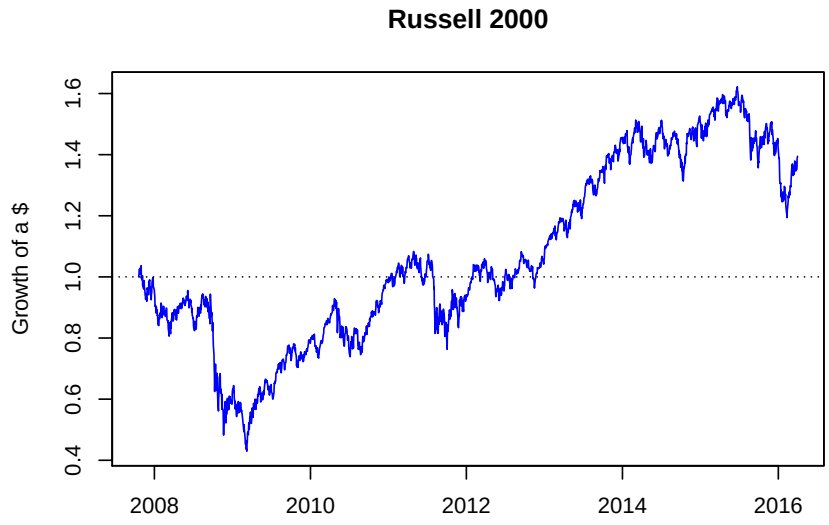
TWRs and IRRs Compared to Russell 2000

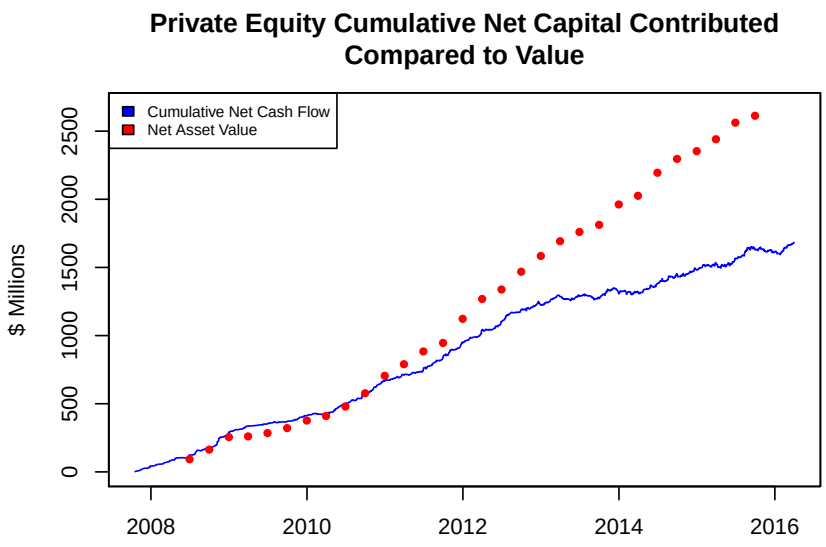
	One Quarter	One Year	Three Years	Five Years	Inception
Private Equity TWR	-0.70%	5.40%	12.60%	13.29%	11.39%
Russell 2000 TWR	4.00%	8.00%	16.00%	14.00%	7.00%
Private Equity IRR	-0.69%	5.44%	12.62%	13.30%	11.40%
Russell 2000 IRR	-12.25%	-0.76%	8.63%	9.39%	9.47%

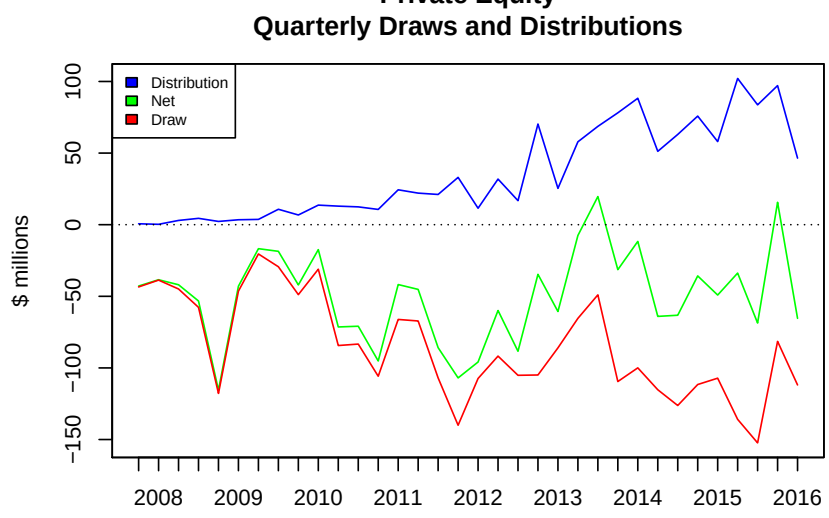
Current and Legacy Portfolios

Fund	R2K PME	Fund IRR	R2K $Mtch IRR	Fund TVPI
Total PE	1.06	11.40%	9.47%	1.36
Total PE Legacy Portfolio	1.03	11.76%	10.76%	1.50
Total PE Current Portfolio	1.09	9.97%	4.57%	1.15


Private Equity IRRs compared to Russell 2000
Inception through indicated date
Private Equity
Russell 2000
IRR
20
10
0
−20
−40
2008
2010
2012
2014
2016


Russell 2000
Growth of a $
1.6
1.4
1.2
1.0
0.8
0.6
0.4
2008
2010
2012
2014
2016


Private Equity Cumulative Net Capital Contributed
Compared to Value
Cumulative Net Cash Flow
Net Asset Value
$ Millions
2500
2000
1500
1000
500
0
2008
2010
2012
2014
2016


Private Equity
Quarterly Draws and Distributions
Distribution
Net
Draw
$ millions
100
50
0
−50
−100
−150
2008
2009
2010
2011
2012
2013
2014
2015
2016

Performance Compared to Other PE (September 30, 2015)

Private Equity Comparative Performance

	One Quarter	One Year	Three Years	Five Years	Inception
Private Equity TWR	-0.700%	5.400%	12.600%	13.290%	11.390%
Russell 2000 TWR	4.000%	8.000%	16.000%	14.000%	7.000%
Burgiss TWR	0.993%	8.260%	13.110%	12.670%	5.560%
Private Equity IRR	-0.69%	5.44%	12.62%	13.30%	11.40%
Russell 2000 IRR	-12.25%	-0.76%	8.63%	9.39%	9.47%
Burgiss IRR	-0.70%	8.16%	12.86%	12.33%	10.71%

Private Opportunistic Equity (September 30, 2015)

Private Opportunistic Performance

	One Quarter	One Year	Three Years	Five Years	Inception
Private Opportunistic TWR	0.31%	6.45%	20.28%	NA%	21.25%
Absolute 8 TWR	2.00%	8.00%	8.00%	NA%	8.00%
Private Opportunistic IRR	0.30%	12.02%	23.18%	NA%	23.90%
Absolute 8 IRR	1.96%	8.00%	8.00%	NA%	8.00%

- The NAV in private opportunistic equity assets was $482 million as of September 30, 2015
- While we customarily compare opportunistic investments to an absolute return benchmark
  - The inception to date dollar matched IRR for an investment in Russell 2000 would have been 6.93%

Performance Outlook

- Performance above is reported for periods ending September 30, 2015
  - As of the date of preparation of this report, 22 out of 96 funds have year end results in the State Street back office system
    - among those 22, 19 are up in performance and 3 are down
- Energy price changes are expected to impact performance in Q4 numbers
  - While the recent price environment has been tough on energy-related investments, only 15% of the portfolio in the ground is in energy
  - Current mandates still retain considerable dry powder and ASRS was keen to identify managers with the capability to invest up and down the capital structure
  - Four of the funds with reported year end results are energy funds
    - 3 reported positive inception IRRs; 1 was a 2015 vintage and still in its J curve
    - Portfolio writedowns expected but we remain confident in managers' skill

ASRS Portfolio by Vintage

ASRS Portfolio Commitments by Vintage

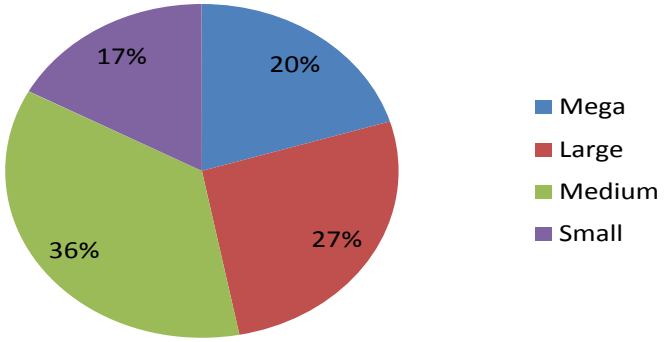
	Commitment $	# of Funds	Commitment/Fund
2006	50	1	50
2007	483	15	32
2008	688	15	49
2009	386	8	48
2010	370	8	44
2011	659	12	55
2012	325	5	58
2013	550	10	61
2014	620	11	52
2015	690	12	58
	4,821	97	50

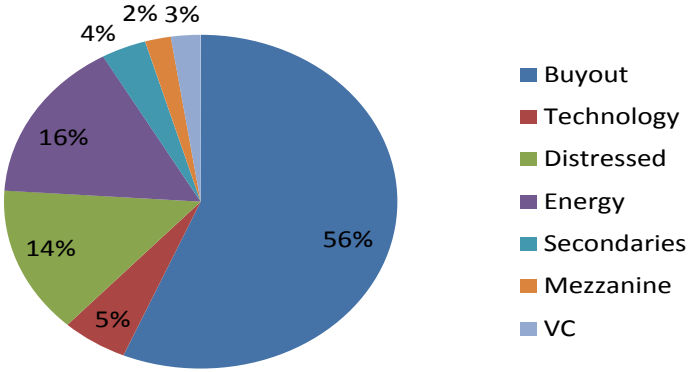
1

ASRS Commitments by Style

ASRS Portfolio Commitments by Style

	Commitment $
Total Mega Buyout	538
Total Large Buyout	711
Total Medium Buyout	956
Total Small Buyout	455
Total Buyout	2,660
Total Technology	255
Total Distressed	671
Total Energy	740
Total Secondaries	174
Total Mezzanine	100
Total Venture Capital	115
Total	4,715





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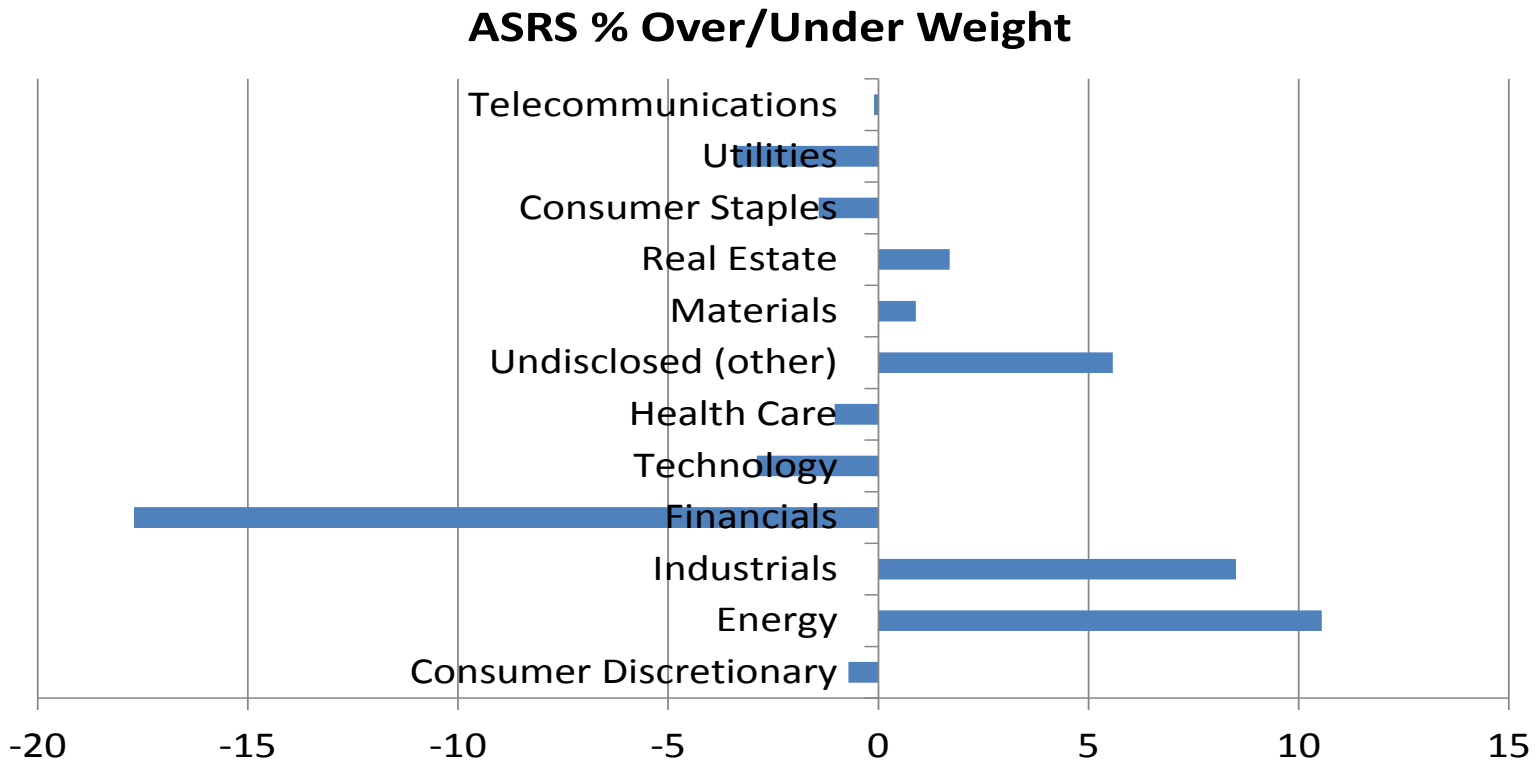
ASRS PE Industry Sectors Compared to R2K

ASRS Portfolio Commitments vs R2K



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Arizona State Retirement System
Investment Beliefs

FRAME OF REFERENCE

The following *Investment Beliefs* have been established to ensure the development of congruent and synergistic investment strategies, and to ensure the effective and efficient allocation of resources. These *Investment Beliefs* determine the general paradigm within which investment strategies are developed, investment ideas are reviewed, and investment decisions are implemented.

Modifications to these *Investment Beliefs* will occur if experiential, academic, conceptual, and/or practical perspectives suggest that a superior belief system exists.

INVESTMENT BELIEFS

1. Asset Class Decisions are Key

In general, decisions with respect to which asset classes and sub-asset classes to invest in, and the allocations to these asset classes and sub-asset classes, have a greater impact on total fund investment returns than decisions in which specific securities to invest.

2. Theories and Concepts Must be Sound

Over longer periods of time, investment outcomes (e.g. rates of return, volatility) conform to logical theories and concepts. Significant deviations (e.g. internet bubble, pre-subprime erosion of risk premiums) from theoretically and conceptually sound investment constructs are usually not sustainable and are typically self-reverting.

3. House Capital Market Views Are Imperative

The development and articulation of sound *House Views* (e.g. views on interest rates, corporate spreads, asset valuations) will ensure consistency among investment decisions, clarity of investment direction, baselines for debates, and conformity of understanding.

4. Investment Strategies Must be Forward Looking

Investment strategies will be developed based on forward-looking insights, rather than simply on successful strategies of the past.

Asset class valuations and security valuations are significantly affected by endogenous outcomes (e.g. earnings, GDP growth rates, competitive barriers) that are probabilistic, and these outcomes are typically well analyzed by the investment industry.

Asset class valuations and security valuations are also significantly affected by random outcomes (e.g. natural disasters, certain supply & demand shocks) that are virtually unpredictable, and these outcomes are typically not analyzed directly by the investment industry.

Asset class valuations and security valuations are also significantly affected by exogenous outcomes (e.g. foreign policies, global cultural interactions) that can possibly be modeled, and these outcomes are typically not analyzed by the investment industry.

5. Public Markets are Generally Informationally Efficient

Asset Class Valuations

Asset class valuations (e.g. stock market levels versus interest rate levels) are often in equilibrium with one another, but anomalous situations do occur which result in disequilibria between asset class valuations. These disequilibria offer valuable investment opportunities which we will pro-actively seek and capitalize on.

Created June 2008; Revised June 2013

Security Valuations

Security valuations (e.g. IBM versus Cisco) are often in equilibrium with one another, but private markets and anomalous public market situations do occur which result in disequilibria between security valuations. These disequilibria offer valuable investment opportunities which we will pro-actively seek and capitalize on.

The extent of informational efficiency varies across asset classes.

Private markets offer significant opportunities for asset mispricing and manager excellence which we will pro-actively seek and capitalize on.

6. Market Frictions are Highly Relevant

Market frictions (e.g. management fees, carried interest, revenue sharing, expenses, costs, transaction spreads, market impacts, taxes, commissions) can be significantly detrimental to investment performance and as a result transactions will be initiated only to the extent there is a strong level of conviction that they will result in increased investment returns or decreased risks net of all market frictions.

7. Internal Investment Professionals are the Foundation of a Successful Investment Program

In-house investment management capability engaged in direct portfolio management results in superior investment decision-making.

In-house investment management pro-actively monitors capital markets in order to determine mispricing opportunities & allocate capital and will successfully increase risk adjusted returns.

In-house investment professionals are more closely aligned with, and have a better understanding of, the purpose and risk & reward tolerance of the ASRS than external parties.

In-house investment professionals will impact direct investment negotiations, better align economic interests, and influence investment industry conditions (e.g. private deal structures, fee levels, introduction of innovative products & strategies).

8. External Investment Management is Beneficial

External investment organizations can often offer greater expertise, resources, and/or flexibility than internal personnel for various investment strategies.

9. Investment Consultants

Investment consultants will be effectively utilized in the following four general categories, and utilization of consultants will be focused on situations where there is a demonstrable need in at least one of the four areas:

- Independence: When oversight or controls should be enhanced
- Perspective: When internal perspectives are not broad enough
- Special Skills: When internal skills are not deep enough
- Resource Allocation: When internal resources are not broad enough

10. Trustee Expertise

Trustees often have expertise in various areas of investment management, and this expertise should be utilized while ensuring separation between Board oversight and staff management.