

# HOW...

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## **ASRS Employees Deliver Service With PRIDE!**

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### **PROFESSIONALISM**

*We promote, strive for and expect individuals, teams, and divisions to possess professional qualities and skills to lead the organization.*

- Displays a friendly, respectful and courteous demeanor even when confronted by adversity
- Has proactive and responsive approach to internal and external customer needs
- Possesses good communication and active listening skills
- Is a trusted contributor (manager, leader, SME, analyst, teammate)
- Takes personal accountability • Has subject matter expertise
- Has critical thinking skills • Has an honest, fair, non-judgmental mind-set
- Is adaptable to beneficial change • Adheres to the ASRS Code of Conduct

### **RESULTS**

*We treasure the achievements of individuals, teams, divisions and the agency that energize the organization.*

- Meets goals and objectives
- Completes projects
- Produces quality work products
- Satisfies customers
- Attains individual accomplishments
- Manages risks successfully

### **IMPROVEMENT**

*We appreciate individuals, teams or divisions who drive the agency forward with new, innovative ideas and solutions.*

- Promotes new ideas
- Enhances outcomes and performance
- Solves problems
- Enhances morale
- Improves relationships
- Increases efficiency, effectiveness or reduces costs

### **DIVERSITY**

*We recognize that utilizing different talents, strengths and points of view, strengthens the agency and helps propel outcomes greater than the sum of individual contributors.*

- Encourages an attitude of openness and a free flow of ideas and opinions
- Treats others with dignity and respect
- Works effectively to accomplish goals with teams comprised of dissimilar individuals
- Recognizes and promotes skills in others attained on and off the job

### **EXCELLENCE**

*We celebrate individuals, teams and divisions who exceed expectations and deliver service with a PRIDE that permeates the organization.*

- Surpasses member, stakeholder and associate expectations
- Demonstrates a willingness to go the extra mile to engender a positive public image
- Embraces change in a manner that inspires others
- Accepts responsibility and challenges with enthusiasm
- Takes a personal interest in promoting teamwork through effective use of communication (verbal, non-verbal, written and technological techniques)
- Creates a motivated, healthy and productive work environment that celebrates and rewards the accomplishments of others



**ARIZONA STATE  
RETIREMENT SYSTEM**



# ARIZONA STATE RETIREMENT SYSTEM

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*Paul Matson*  
Director

## AGENDA NOTICE OF COMBINED 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

October 24, 2016  
1:30 p.m.

Pursuant to A.R.S. § 38-431.02, notice is hereby given to Trustees of the Arizona State Retirement System (ASRS) Investment Committee (IC) and to the general public that the IC will hold a public meeting on Monday, October 24, 2016, beginning at 1:30 p.m. in the 14<sup>th</sup> Floor Conference Room of the ASRS office, 3300 North Central Avenue, Phoenix, Arizona 85012. Trustees of the Committee may attend either in person or by telephone conference call.

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.

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 meeting will be teleconferenced to the ASRS Tucson at 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; Opening Remarks (estimated time 4 min.)..... Mr. Tom Connelly  
Chair, Investment Committee
2. Approval of the Minutes of the August 22, 2016, Public Meeting and Executive Session of the ASRS IC Meeting (Action item; estimated time 1 min.)..... Mr. Tom Connelly

3. Presentation, Discussion, and Appropriate Action Regarding the ASRS House Views and General Discussion (Informational and discussion item; estimated time 20 min.) .....  
..... Mr. Karl Polen  
Chief Investment Officer, ASRS  
..... 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 the ASRS team will discuss House Views and other matters of interest. *The House Views will be presented in a new format and members of the Committee may provide suggestions regarding the format.*

*Pursuant to A.R.S. §§ 38-431.03(A)(2) and 38-718(P), the IC may vote to discuss the following matter in executive session, which will not be open to the public, to consider specific investment manager data that is confidential proprietary commercial information and a record exempt by law from public inspection.*

4. Presentation, Discussion, and Appropriate Action Regarding the Portfolio Position and Performance (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

Objective:

The Committee will discuss portfolio positioning, current tactical views and investment performance. *No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.*

5. Presentation, Discussion, and Appropriate Action Regarding State Street's Risk Management Reporting (Informational and discussion item; estimated time 10 min.) ..... Mr. Steve Kim  
Assistant Vice President, Risk Services, State Street Analytics

Objective:

State Street will present a risk analysis report on the ASRS total fund investments.

6. Presentation, Discussion, and Appropriate Action Regarding the ASRS Investment Compliance and Monitoring of Public and Private Market Investments (Informational and discussion item; estimated time 10 min.) ..... Mr. Dan Gillespie  
Vice President and Unit Head, State Street  
..... Mr. Jomar Ereso  
Director of Asset Management, RCLCO

Objective:

State Street will present the results of their compliance monitoring for public markets portfolios. RCLCO will present the results of their compliance reviews for the real estate separate accounts for calendar year 2015. *No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.*

*Pursuant to A.R.S. §§ 38-431.03(A)(2) and 38-718(P), the IC may vote to discuss the following matter in executive session, which will not be open to the public, to consider specific investment manager data that is confidential proprietary commercial information and a record exempt by law from public inspection.*

7. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight of the ASRS Investment Program (Informational and discussion item; estimated time 30 min.) ..... Mr. Allan Martin  
Partner, NEPC  
..... Mr. Dan LeBeau  
Consultant, NEPC

Objective:

NEPC will report on their monitoring of IMD activities. *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 IMD Activities and Asset Class Committee Reports (Informational and discussion item; estimated time 10 min.)..... Mr. Paul Matson  
..... Mr. Karl Polen

Objective:

The CIO will present recent activities and work plans for the IMD. The chairs of the asset class committees will report on any activity since the last IC meeting. *No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.*

*Pursuant to A.R.S. §§ 38-431.03(A)(2) and 38-718(P), the IC may vote to discuss the following matter in executive session, which will not be open to the public, to consider specific investment manager data that is confidential proprietary commercial information and a record exempt by law from public inspection.*

9. Presentation, Discussion, and Appropriate Action Regarding Workgroup Reports for the Internal Equity Portfolios (Informational and discussion item; estimated time 15 min.)..... Mr. Eric Glass  
..... Mr. Cole Smith  
..... Mr. John Kwon

Objective:

Members of the equities team will present the results of their work in analyzing and improving the performance of the internally managed equity portfolios. *No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.*

10. Presentation, Discussion, and Appropriate Action Regarding the Supplemental Salary Deferral Plan (SSDP) and the Supplemental Retirement Savings Plan (SRSP)(Informational and discussion item; estimated time 10 min.) ..... Mr. Pat Klein  
Assistant Director of External Affairs, ASRS  
.....Ms. Lupita Breland

Objective:

Mr. Klein and Ms. Breland will update the committee on the SRSP and SSDP plans. *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 (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, November 28, 2016 at 2:30 p.m., at 3300 N. Central Avenue, 14<sup>th</sup> 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 October 17, 2016

ARIZONA STATE RETIREMENT SYSTEM

Signed Copy on File

\_\_\_\_\_  
Gloria Montiel  
Committee Administrator

Signed Copy on File

\_\_\_\_\_  
Karl Polen  
Chief Investment Officer

**Confidential  
Meeting  
Materials  
Removed**

# 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, August 22, 2016  
2:30 p.m.

The Arizona State Retirement System (ASRS) Investment Committee (IC) met at 3300 N. Central Avenue, 14<sup>th</sup> 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, IC Chair, called the meeting to order at 2:35 p.m.

### 1. Call to Order; Roll Call; Opening Remarks

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

Absent: Mr. Lorenzo Romero

A quorum was present for the purpose of conducting business.

### 2. Approval of Minutes of the of the June 20, 2016, Public Meeting and Executive Sessions of the ASRS IC Meeting

**Motion:** Prof. Hoffman moved to approve the minutes of the June 20, 2016, public meeting and executive sessions of the IC meeting. Mr. Connelly seconded the motion.

By a vote of 2 in favor, 0 opposed, 0 abstention, and 1 excused, the motion was approved.

### 3. Presentation, Discussion, and Possible Action Item Regarding the Private Equity Consultant Request for Proposal (*This agenda item was taken out of order and was formerly listed as agenda item #10*)

Due to timing matters, the IC felt it was necessary to review agenda item #10 prior to agenda item #3 to ensure all required staff were available for the discussion.

Mr. Glass presented to the Committee the findings and evaluations of the contract award for the investment private equity consultant. Due to the discussion of proprietary information relating to the Request for Proposals submitted by all potential real estate consultants, the IC voted to go into executive session pursuant to A.R.S. § 38-431.03(A)(2) and 41-2534(D) for the purpose of considering and/or discussing records exempt by law from public inspection.

**Motion:** Prof. Hoffman moved to go into executive session. Mr. Connelly seconded the motion.

By a vote of 2 in favor, 0 opposed, 0 abstention, and 1 excused, the motion was approved.

The Committee convened to Executive Session at 2:40 p.m.

The Committee reconvened to Public Session at 3:19 p.m.

**Motion:** Prof. Hoffman moved to accept the recommendation of the Evaluation Committee on the ASRS private equity contract award. Mr. Connelly seconded the motion.

By a vote of 2 in favor, 0 opposed, 0 abstention, and 1 excused, the motion was approved.

#### **4. Presentation, Discussion, and Appropriate Action Regarding the ASRS House Views and General Discussion**

Mr. Karl Polen, Chief Investment Officer, introduced himself to the Committee and provided a brief overview of the format changes in the House Views and Portfolio Positioning presentation. He further provided the over and underweights of each asset class and his perspective on the global economy. He noted overall growth continues to be slow with muted inflation; however, the records show historically low rates of unemployment. Interest rates also continue to be very low, with continued strength in the U.S. dollar. He provided additional commentary regarding the market and turned the meeting over to ASRS Portfolio Managers to provide their perspectives on the market and an update on their respective asset classes.

Mr. Eric Glass, Senior Portfolio Manager of Equities and Real Estate, presented on Equities and Commodities, Mr. Al Alaimo, Sr. Portfolio Manager of Fixed Income, presented on the Fixed Income and Micheal Copeland, Assistance Portfolio Manager of Real Estate, presented on Real Estate.

#### **5. Presentation, Discussion, and Appropriate Action Regarding the Portfolio Position and Performance**

Mr. Polen briefly introduced the topic of discussion to the Committee but opted to skip this discussion item since the majority of the materials presented would be reviewed during agenda item #6.

#### **6. Presentation, Discussion, and Appropriate Action Regarding State Street's Risk Management Reporting**

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. He noted historical risk for all asset classes remains constant for prior months. In aggregate, Total Plan risk decreased 52 basis points with the drop largely driven by various factors such as the \$450 million increased allocation to Total Fixed Income focused more on the core, higher quality managers and the \$835 million decreased allocation in International Equity.

#### **7. Presentation, Discussion, and Appropriate Action Regarding the ASRS Investment Compliance and Monitoring of Public and Private Market Investments Discussion, and Appropriate Action Regarding IMD Activities and Asset Class Committee Reports**

Ms. Lupita Breland presented a brief review of the various Investment Compliance Programs currently in place for the ASRS' public and private investments. Ms. Breland mentioned that as reported at the June 20, 2016 IC Meeting, Meketa completed its 2014 Fund Review and will be presenting during today's meeting. Ms. Breland also confirmed that for today's meeting only State Street and Meketa will present to the IC.

Mr. Aaron Cugelman, Compliance Analyst at State Street Global Services Compliance

Operations, presented the results of the Daily Investment Compliance Program for the internally and externally managed portfolios, which is done on a post-trade basis, for the months of May through June 2016. Mr. Cugelmann noted since the Program has been in place, all the exceptions have been researched and resolved to both State Street and IMD's satisfaction. Mr. Cugelmann also presented the results of the Total Fund Monthly Statutory Investment Compliance Program for the months of May through June 2016, and noted since the program has been in place, the ASRS has passed all tests with results well below the statutory requirements. Ms. Breland addressed the IC to confirm that, as requested by the IC at the June 20, 2016 IC meeting, the State Street's Total Fund Monthly Statutory Investment Compliance Program will be included in the Board book materials as an informational item, effective the August 2016 Board meeting.

Mr. Steven McCourt, Managing Principle, and Mr. Steve Hartt, Principal at Meketa Investment Group, presented the 2014 Fund Reviews for the Annual Commingled Fund & Non-Real Estate Separate Accounts Investment Compliance Review. The Fund Review encompassed 42 funds (5 Separately Managed Accounts and 37 Commingled Funds), which represent 50% of the NAV as of December 31, 2014. Mr. McCourt concluded that the Review found no material deficiencies.

Mr. Polen, addressed the Committee regarding the Fund Review Reports on private investments by Meketa Investment Group and RCLCO, which will be presented to the IC on an annual basis.

**8. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight of the ASRS Investment Program – Includes Total Fund and Investment Performance Report Q2-16**

Mr. Allan Martin, NEPC Partner, provided the Committee with a brief overview of the fund performance as of June 30, 2016, and provided a detailed summary of the ASRS investment objectives, performance and the compliance of the fund in accordance with the SAA policy.

Performance results: (as of June 30, 2016)

- 7.3% (20-year annualized net return) vs. 8.0% (actuarial assumer interest rate.)

	Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception
<b>Total Fund</b>	1.2%	<b>0.5%</b>	<b>7.1%</b>	7.1%	6.0%	9.6%
<b>Interim SAA Policy*</b>	1.5%	<b>-0.6%</b>	<b>5.9%</b>	6.3%	5.6%	9.3%
<b>Excess Return</b>	-0.3%	<b>1.1%</b>	<b>1.2%</b>	0.8%	0.4%	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)/13% Barclays Capital Aggregate/4% Barclays Capital High Yield/7% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/2% Bloomberg Commodity Index/5% Multi-Asset Class Custom Index/9% NCREIF ODCE (lagged one quarter)

Note: Interim SAA Policy includes proration of 3% Private Debt and 1% Real Estate which are unfunded. Recently approved Strategic Asset Allocation Policy effective April 1, 2015.

### **9. Presentation, Discussion, and Appropriate Action Regarding IMD Activities and Asset Class Committee Reports**

Mr. Polen provided the Committee with the ongoing activities of the IMD, noting all Public and Private Market meetings have now been combined to ensure the IMD works as a team as opposed to separate teams for each area of investments. He advised the Committee the performance system for equity portfolios is now largely complete and includes returns based with Capital Asset Pricing Model (CAPM) related statistics, Brinson style attribution analysis, and holdings based analysis using Barra factors. Other recent accomplishments included internal equity improvements such as optimizing cash and equitization processes, research conducted related to index changes to identify improved trading strategies for name changes. In addition, July preliminary reports indicate all internal equity portfolios performed with positive excess returns.

### **10. Presentation, Discussion, and Appropriate Action Regarding Workgroup Reports**

Mr. Glass presented the Committee with a detailed explanation of the attribution and performance analysis at the Total Public Equity level, Asset Class, Sub-asset Class and manager specific levels. As noted in the prior agenda item, the Equity Performance System includes returns based with CAPM related statistics, Brinson style attribution analysis and holdings based analysis using Barra risk factors.

### **11. Request for Future Agenda Items**

There were no requests for future agenda items.

### **12. Call to the Public**

No members of the public requested to speak.

### **13. Adjournment**

The meeting adjourned at 5:43 p.m.

Respectfully submitted,

ARIZONA STATE RETIREMENT SYSTEM

\_\_\_\_\_  
Gloria Montiel Date  
Investment Committee Administrator

\_\_\_\_\_  
Karl Polen Date  
Chief Investment Officer

# Agenda Item #3

# House Views and Portfolio Positioning

Arizona State Retirement System

October 12, 2016

# Outline

- ① Summary View and Positioning
- ② Macro Environment
- ③ Equities
  - Commentary
  - Trends
  - Valuation
  - Private Equity
- ④ Fixed Income
  - Commentary
  - Interest Rate Sensitive Fixed Income
  - High Yield and Private Debt
- ⑤ Real Estate
  - Commentary
  - Supply and Demand
  - Capital Markets Dynamics
- ⑥ Commodities
- ⑦ Historic Data

# Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
  - Commentary
  - Trends
  - Valuation
  - Private Equity
- 4 Fixed Income
  - Commentary
  - Interest Rate Sensitive Fixed Income
  - High Yield and Private Debt
- 5 Real Estate
  - Commentary
  - Supply and Demand
  - Capital Markets Dynamics
- 6 Commodities
- 7 Historic Data

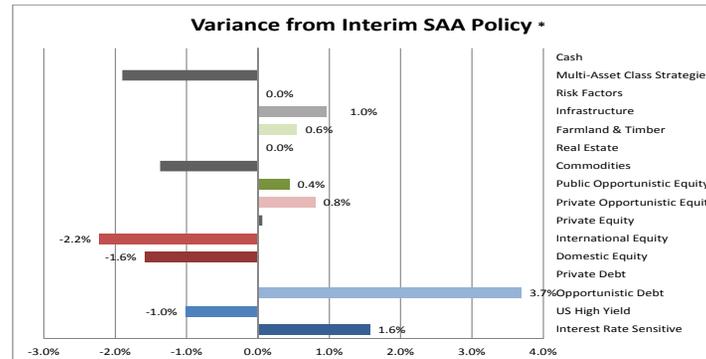
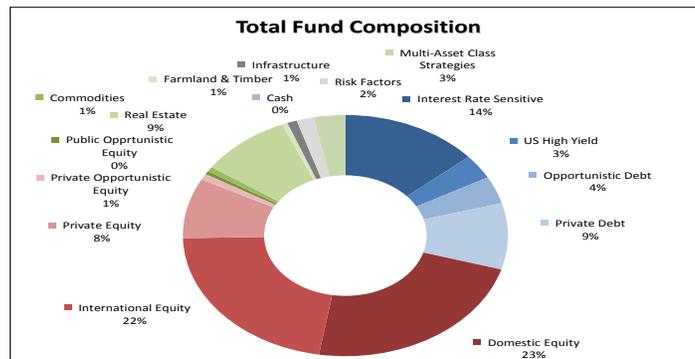
## Summary View

- Global economy continues to grow slowly with few warning signs of recession
- But. . .
  - Corporate profitability is soft
  - High levels of political and economic uncertainty in Europe
  - Slowing growth in China
  - Pricy valuations in US
  - Strong dollar is worrisome for US growth and problematic for international investments
- We think risks in equities are asymmetric to the downside
- Interest rates are likely to stay low and risks of inflation don't seem imminent
  - US rates are attractive compared to the rest of the world

# Portfolio Position

*We are positioned slightly defensively with excess liquidity available in core bonds ready to rebalance to equities should the opportunity arise.*

## Total Fund Positioning October 10, 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.

# Outline

- 1 Summary View and Positioning
- 2 **Macro Environment**
- 3 Equities
  - Commentary
  - Trends
  - Valuation
  - Private Equity
- 4 Fixed Income
  - Commentary
  - Interest Rate Sensitive Fixed Income
  - High Yield and Private Debt
- 5 Real Estate
  - Commentary
  - Supply and Demand
  - Capital Markets Dynamics
- 6 Commodities
- 7 Historic Data

## Commentary

- Growth is slow globally
  - Employment improving and becoming tight in some markets
  - China growth is slowing
- Inflation generally low
  - Wage inflation appearing in US
  - But moderated by low commodity costs
- Rates low everywhere as central banks attempt to stimulate

# Macro Indicators

*Slow growth, muted inflation but strong employment*

10/12/2016

<b>Economy</b>		Moving Average		
			2 Yr.	1 Yr.
EHUPUS Index	US Unemp	4.9	5.3	5.0
EHUPEUN Index	EUR Unemp	8.6	9.5	9.1
EHUPGB Index	UK Unemp	4.9	5.7	5.3
EHUPJP Index	Japan Unemp	3.2	3.4	3.3
GDP CYOY Index	US GDP	1.3	2.3	1.7
EHGDEUR Index	EUR GDP	1.8	1.6	1.9
EHGDGB Index	UK GDP	2.1	2.4	2.0
EHGDJP Index	Japan GDP	0.7	0.7	0.6
EHGDCN Index	China GDP	6.7	7.0	6.9
CPI YOY Index	US CPI	1.1	0.8	0.4
CPI XYOY Index	US CPI X fd nrg	2.3	1.9	2.0
CPEXEUY Index	EU CPI X fd nrg	0.8	0.9	0.9
JCPNEFEY Index	Jpn CPI X fd nrg	0.2	1.5	0.8
CNCPIYOY Index	China CPI	1.3	1.7	1.7

# Global Interest Rates

*Interest rates at or near record lows. Comparative attractiveness of US rates drawing foreign capital.*

October 12, 2016

		Price	100 day moving average	50 day moving average	30 day relative strength	Hurst Exponent
<b>Global Interest Rates</b>						
USGG10YR Index	US 10 Year	1.78	1.60	1.61	59	66
GDBR10 Index	German 10 Year	0.07	-0.04	-0.05	56	53
GUKG10 Index	UK 10 Year	1.04	0.86	0.71	60	98
JGBS10 Index	Japan 10 Year	-0.05	-0.13	-0.07	55	99

# Currency

*Strong dollar and yen, but euro, renminbi and pound are weak*

August 9, 2016

Currency		Price	200 day moving average	100 day moving average	50 day moving average	30 day relative strength	Hurst Exponent	6 month return	6 month volatility annualized	Momentum Index
EURUSD Curncy	Euro/USD	1.11	1.11	1.12	1.12	48	67	-1.25	9.42	-0.13
GBPUSD Curncy	GBP/USD	1.30	1.43	1.40	1.36	40	105	-10.15	15.39	-0.66
JPYUSD Curncy	Yen/USD	0.0098	0.0089	0.0094	0.0096	57	44	11.94	13.16	0.91
CNY BGN Curncy	CNY/USD	0.1502	0.1533	0.1522	0.1507	56	65	-2.40	3.43	-0.70

# Consensus Economic Forecasts

## Economic Forecasts

**Contributor**

Composite

See Previous forecasts

**Period**

Yearly

See Last Actuals

	Real GDP (yoy %)			CPI (yoy %)			Unemployment (%)			Curr Acct (% of GDP)			Budget (% of GDP)		
	16	17	18	16	17	18	16	17	18	16	17	18	16	17	18
LatAm	-1.7	1.73	2.68	38.6	30.86	11.27	9.52	9.86		-2.56	-1.99	-2.12	-7.15	-6.5	
E. Europe & Africa	1.47	2.39	2.77	5.87	5.43	5.56	9.13	8.85	8.74	-0.35	-0.43	-0.75	-3.13	-2.77	-2.46
Middle East	2.18	2.52	2.66	3.88	3.92	4.42				-3.78	-1.23	0.36	-8.5	-5.26	-4.6
Asia	5.64	5.79	5.76	1.92	2.51	2.73	4.04	4.09	4.05	3.49	2.77	2.73	-2.62	-2.94	-3.01
China	6.6	6.3	6.1	2	2	2.2	4.1	4.2	4.15	2.5	2.5	2.6	-3.1	-3.5	-3.5
G-10	1.46	1.69	1.75	0.73	1.71	1.85	6.28	6.06	5.96	-0.15	-0.18	-0.29	-2.8	-2.68	-2.41
USA	1.5	2.2	2.1	1.2	2.2	2.2	4.9	4.6	4.6	-2.7	-2.7	-2.7	-3	-3	-3
Japan	0.6	0.8	0.7	-0.2	0.6	1.05	3.2	3.1	3.1	3.6	3.3	2.85	-5.7	-5.4	-3.2
Euro	1.5	1.3	1.5	0.2	1.3	1.5	10.1	9.8	9.4	3.2	2.8	2.7	-1.9	-1.7	-1.75
United Kingdom	1.8	0.7	1.5	0.7	2.2	2.25	5.1	5.5	5.85	-5.7	-4.4	-3	-3.7	-3.5	-3.4
Canada	1.2	1.9	1.95	1.6	2	2	7	6.9	6.65	-3.2	-2.5	-2.3	-1.45	-1.4	-1.3
Australia	2.9	2.8	2.9	1.2	2	2.4	5.8	5.7	5.6	-3.7	-3.5	-3.85	-2.5	-2	-1.35
Sweden	3.1	2.3	2.1	1	1.6	1.75	6.9	6.7	6.5	5	4.7	4.85	-0.5	-0.5	0.4
New Zealand	2.7	2.6	2.4	0.75	1.8	2.1	5.7	5.5	5.5	-3.1	-3.5	-3.4	0.35	0.3	
Switzerland	1.4	1.4	1.6	-0.4	0.3	0.8	3.4	3.5	3.4	9.7	9.65	10.9	-0.2	-0.05	0.35
Denmark	1	1.4	1.5	0.4	1.3		4.3	4.3		6.15	6.1		-2.3	-1.95	
Norway	1	1.6	1.9	3.25	2.3	1.8	4.8	4.8	5	6.5	6.3	8	5.5	5.7	6
Germany	1.8	1.3	1.45	0.4	1.5	1.75	6.15	6.3	6.25	8.6	8	7.95	0.4	0.3	0.3
France	1.3	1.2	1.3	0.3	1.3	1.5	10	9.8	9.1	-0.5	-0.45	-0.6	-3.4	-3.2	-3
Italy	0.8	0.8	1	0	1	1.3	11.5	11.2	11.2	2.6	2.15	2.4	-2.5	-2.3	-2.2
Europe	1.66	1.29	1.53	0.41	1.45	1.63	8.54	8.43	8.15	2.79	2.8	2.75	-1.92	-1.71	-1.47

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## Commentary

- We are 3.4% of total fund underweight public equities (net of public opportunistic equities - MLPs) with 2/3 of the underweight in international equities
  - Reflects recent rebalance of 50 bps from US small cap to emerging markets
- On a valuation basis, US looks expensive vs ROW
- However. . .
  - Economic fundamentals of Europe are weak and Japan continues to try to stimulate
  - Likelihood of continued strengthening of the dollar is negative for international equities
  - EM has shown signs of improvement
- Fund flows have favored US vs ROW
- Comparatively strong economic fundamentals justify, to some extent, the differential valuation between US and international equities

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# Equity Price Trends

## *US and EM outperforming Europe*

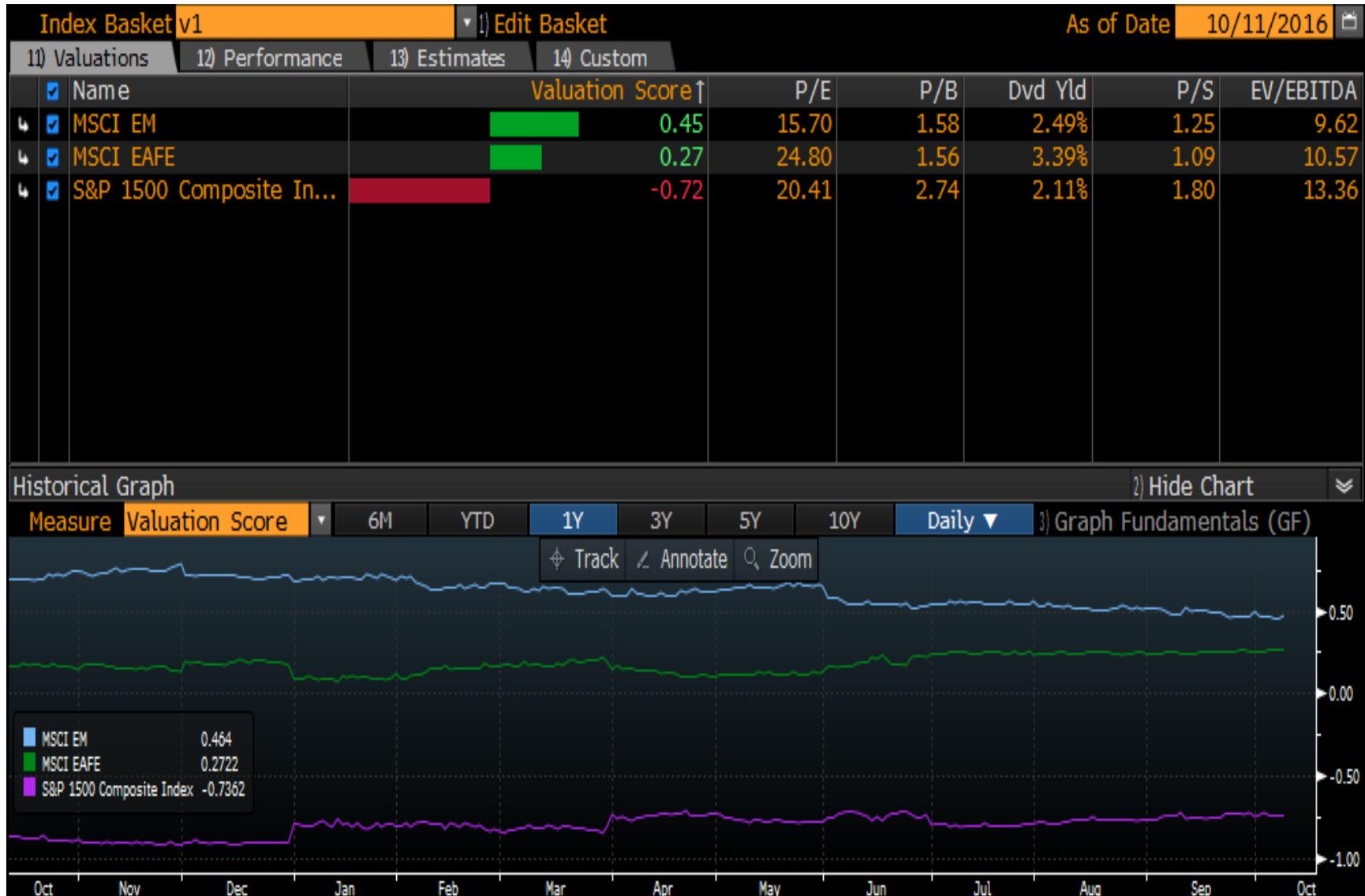
October 12, 2016

		Price	200 day moving average	100 day moving average	50 day moving average	30 day relative strength	Hurst Exponent	6 month return	6 month volatility annualized	Momentum Index
<b>Stocks</b>										
SPX Index	S&P 500	2141	2068	2139	2166	48	31	3.04	13.11	0.23
MID Index	S&P Mid	1527	1455	1529	1551	47	25	4.79	16.03	0.30
SML Index	S&P Small	744	694	733	750	50	74	8.02	17.41	0.46
MXEA Index	EAFE	1678	1641	1667	1697	48	99	0.47	18.31	0.03
MSDLEAFE Index	EAFE Local	983	944	955	972	56	57	3.80	16.18	0.24
MXEASC Index	EAFE Small	208	201	206	210	49	146	1.75	17.37	0.10
NCLDEAFE Index	EAFE Small Local	304	288	294	299	58	87	5.61	15.16	0.37
MXEF Index	EM	906	825	870	904	53	96	7.67	15.81	0.49
NDLEEGF Index	EM Local	462	423	443	458	56	89	8.56	11.35	0.75

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# Relative Valuation of Global Indices

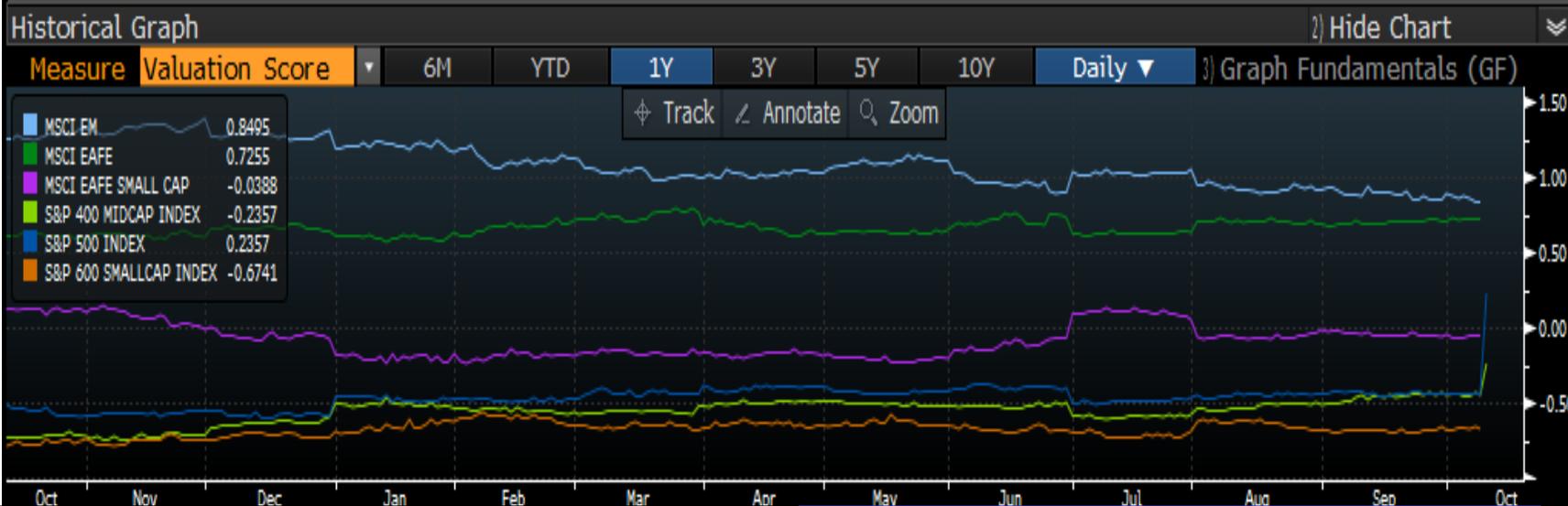


# Relative Valuation of Global Indices (Continued)

Index Basket v2 As of Date 10/11/2016

1) Valuations 2) Performance 3) Estimates 4) Custom

Name	Valuation Score ↑	P/E	P/B	Dvd Yld	P/S	EV/EBITDA
MSCI EM	0.84	15.70	1.58	2.49%	1.25	9.62
MSCI EAFE	0.72	24.80	1.56	3.39%	1.09	10.57
MSCI EAFE SMALL CAP	-0.04	43.24	1.51	2.61%	0.87	12.62
S&P 400 MIDCAP INDEX	-0.41	22.21	2.27	1.93%	1.23	15.01
S&P 500 INDEX	-0.41	20.19	2.83	2.15%	1.92	13.17
S&P 600 SMALLCAP INDEX	-0.69	24.76	2.12	1.45%	1.03	15.20

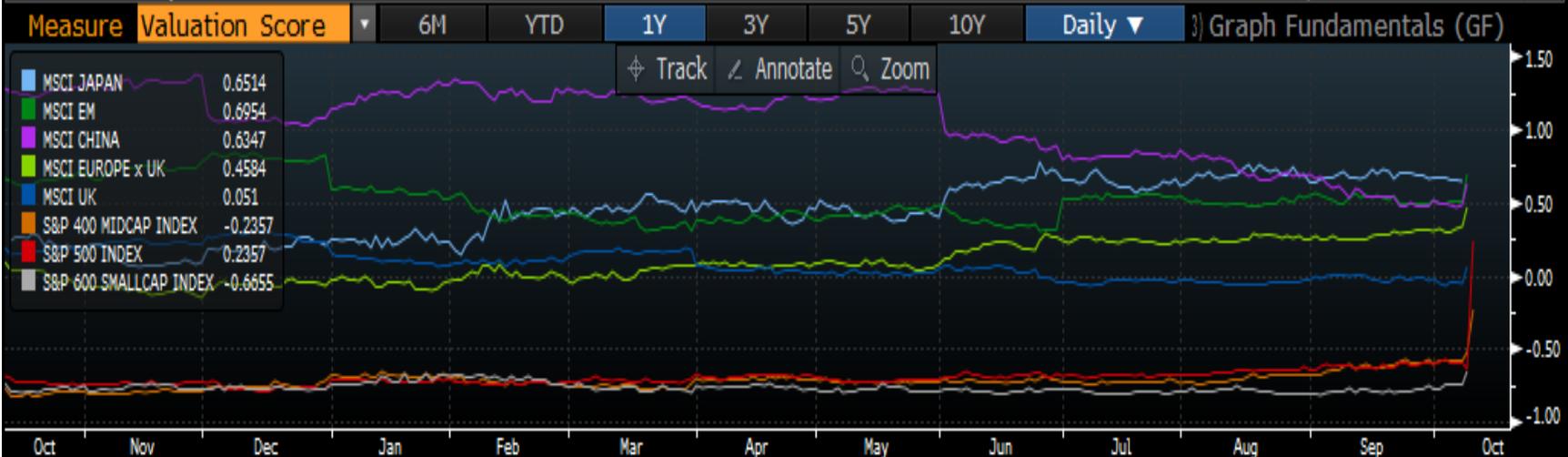


# Relative Valuation of Global Indices (Continued)

Index Basket v5		1) Edit Basket		As of Date		10/11/2016	
1) Valuations		2) Performance		3) Estimates		4) Custom	
<input checked="" type="checkbox"/>	Name	Valuation Score ↑	P/E	P/B	Dvd Yld	P/S	EV/EBITDA
<input checked="" type="checkbox"/>	MSCI JAPAN	0.66	17.31	1.23	2.11%	0.75	8.83
<input checked="" type="checkbox"/>	MSCI EM	0.51	15.70	1.58	2.49%	1.25	9.62
<input checked="" type="checkbox"/>	MSCI CHINA	0.47	14.13	1.65	2.21%	1.51	11.79
<input checked="" type="checkbox"/>	MSCI EUROPE x UK	0.32	24.17	1.72	3.41%	1.14	9.70
<input checked="" type="checkbox"/>	MSCI UK	-0.07	63.39	1.85	3.94%	1.33	14.25
<input checked="" type="checkbox"/>	S&P 400 MIDCAP INDEX	-0.55	22.18	2.27	1.93%	1.23	15.01
<input checked="" type="checkbox"/>	S&P 500 INDEX	-0.58	20.16	2.82	2.15%	1.92	13.17
<input checked="" type="checkbox"/>	S&P 600 SMALLCAP INDEX	-0.76	24.76	2.12	1.45%	1.03	15.20

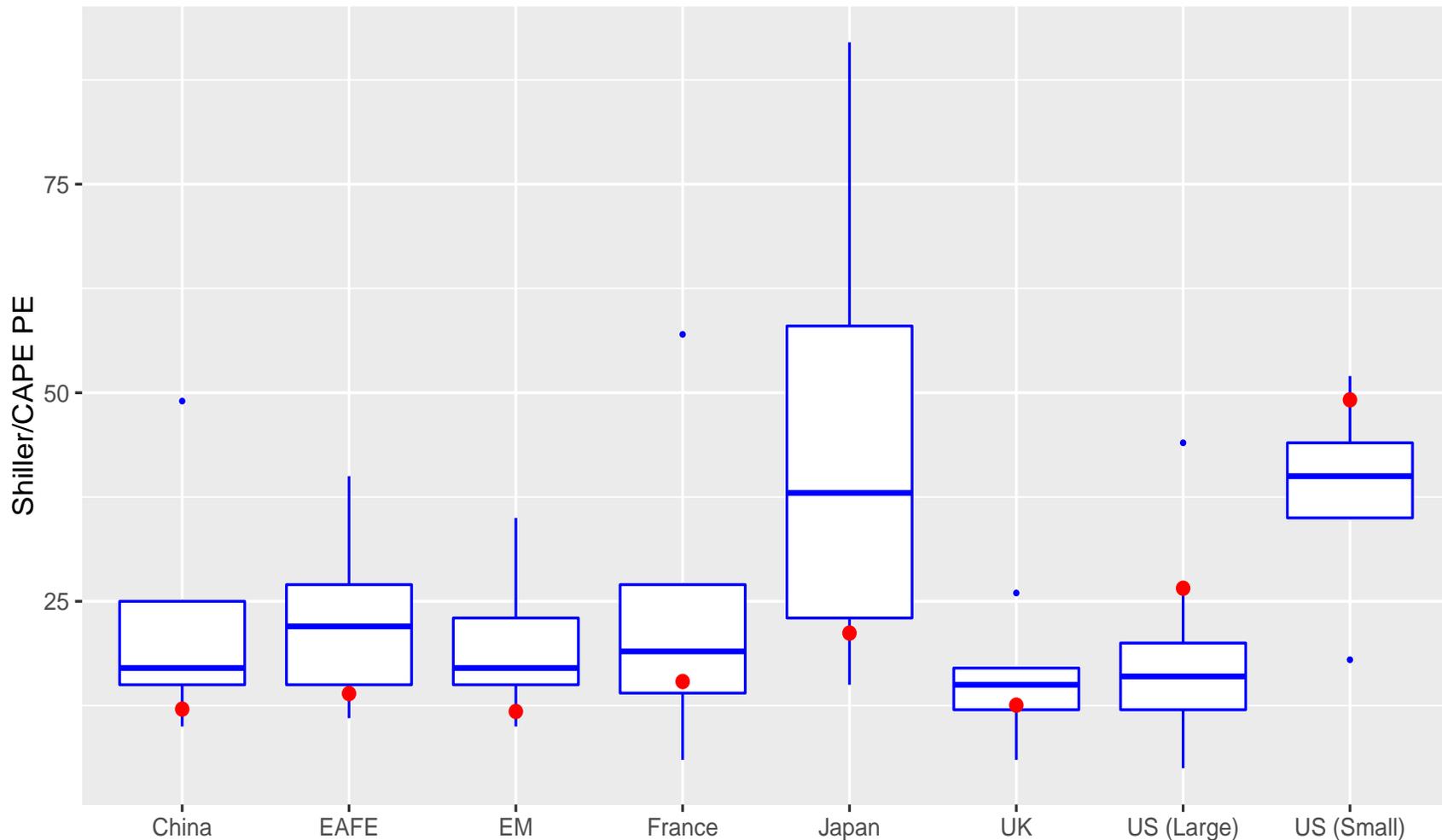
## Historical Graph

2) Hide Chart

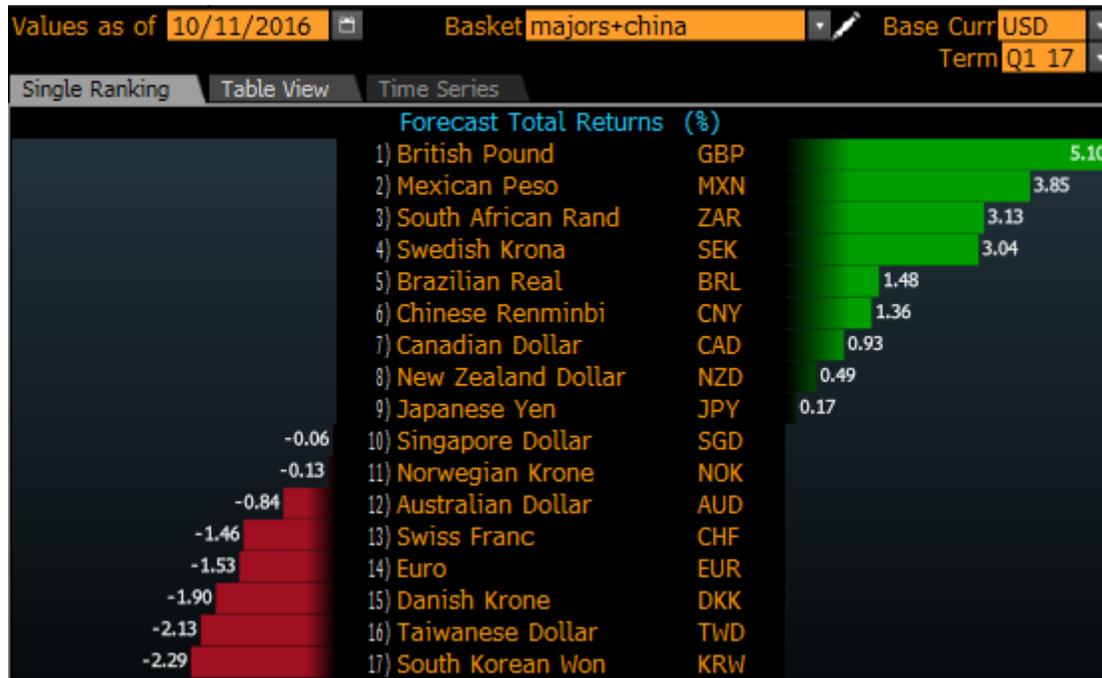


# Cyclically Adjusted PEs

Comparative Shiller/CAPE PEs  
(red dot is value at Sep-16)



# Currency Forecasts



# Fund Flows

99) Settings							ETF Flows			
View	Highest/Lowest	Chart	Netflow	Market	All	Period	3M	History	In Millions of USD	
Country			Netflow	Flow%	Assets	#Funds	Inflow	In/Out	Outflow	
Highest										
10) United States			+64,104	+3.3	1,963,288	1,513	244,886		-180,781	
11) Japan			+11,941	+5.1	232,012	294	29,119		-17,178	
12) Asia Pac ex Japan*			+1,589	+8.8	18,067	47	2,133		-544	
13) Canada			+907	+1.6	55,798	200	5,789		-4,882	
14) Australia			+777	+5.7	13,597	91	1,616		-838	
15) Asia Pacific*			+513	+6.4	7,958	23	735		-221	
16) United Kingdom			+484	+1.6	30,561	106	2,625		-2,141	
17) Latam Region*			+376	+16.7	2,258	15	417		-40	
18) South Korea			+325	+1.3	24,541	193	5,148		-4,824	
19) Sweden			+211	+7.8	2,691	20	329		-118	
Lowest										
20) France			-178	-2.6	6,908	27	354		-532	
21) Mexico			-190	-4.7	4,013	27	1,128		-1,318	
22) Belgium			-205	-115.9	177	3	9		-214	
23) Switzerland			-287	-1.7	16,479	50	704		-991	
24) Spain			-445	-15.4	2,890	16	130		-576	
25) Italy			-767	-16.7	4,603	39	397		-1,164	
26) Germany			-2,405	-5.8	41,645	148	2,354		-4,758	
27) China			-3,359	-3.7	90,567	291	8,620		-11,979	
28) Eurozone*			-3,742	-2.3	163,245	312	10,463		-14,205	
29) European Region*			-5,217	-5.2	100,140	327	8,034		-13,252	

# Outline

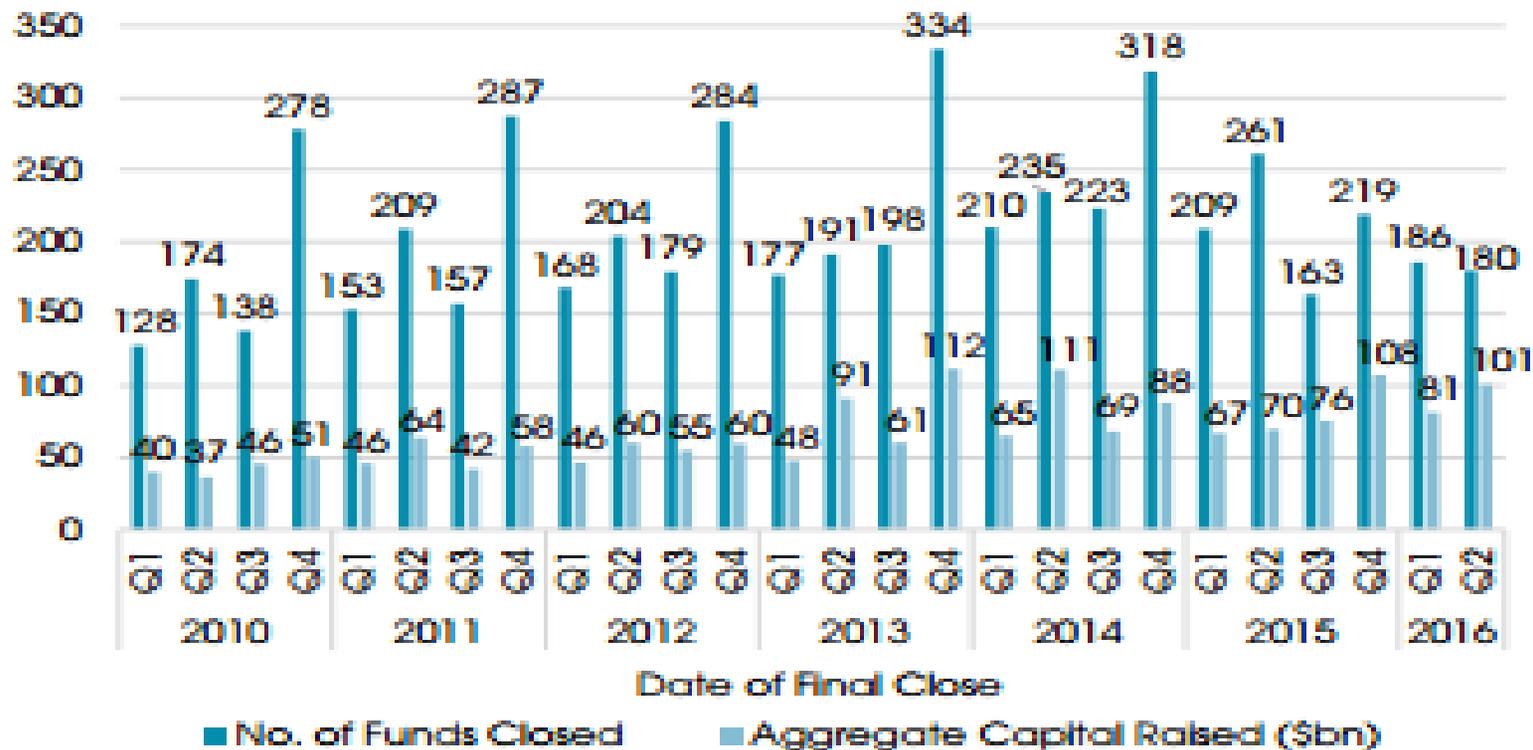
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## Private Equity Fund Raising

- Pace of fundraising remains moderate
- Deal volume & size has ticked back up
- Exit volume and values have turned up
- Dry powder has steadily risen

# Private Equity Fund Raising

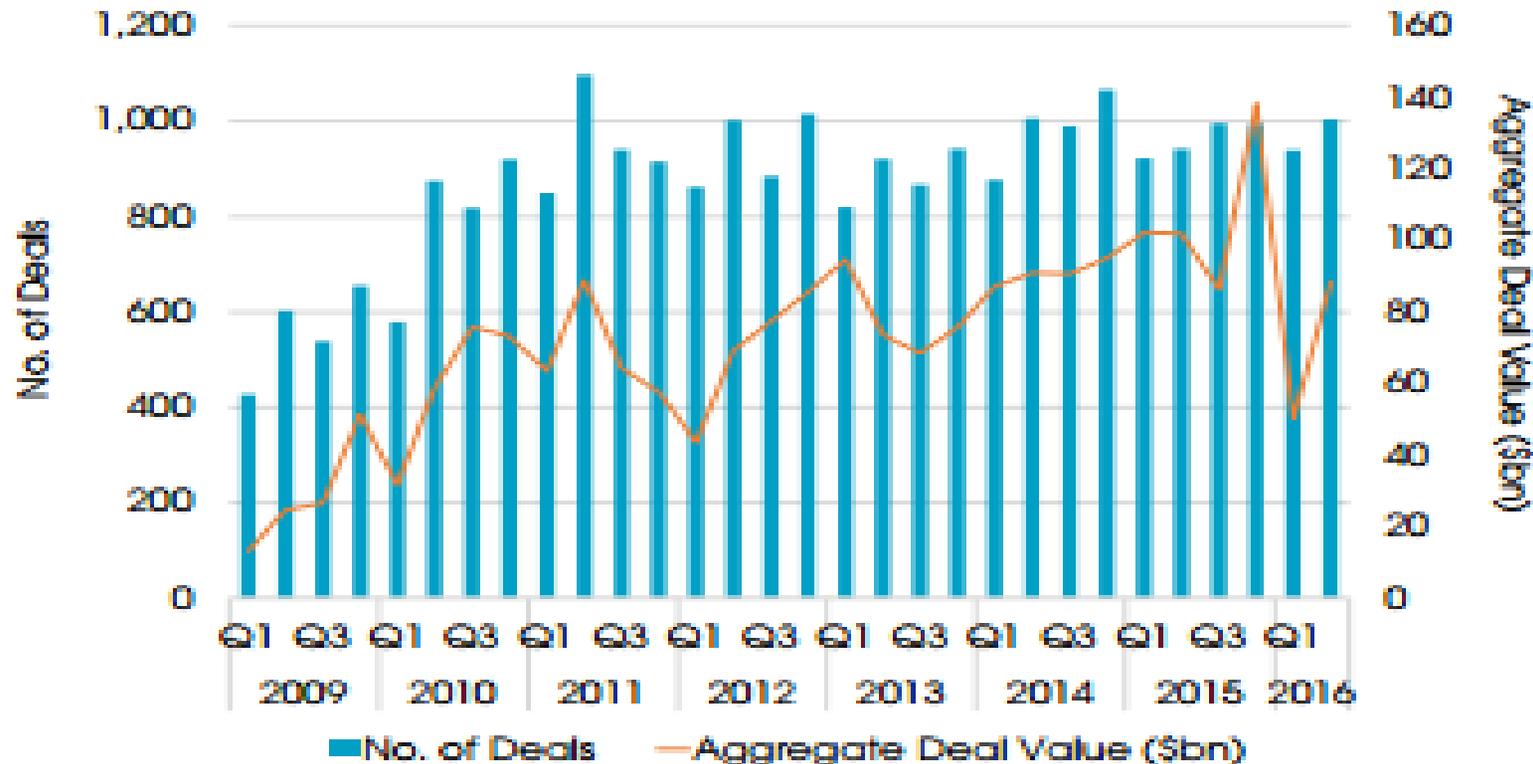
**Fig. 1: Global Quarterly Private Equity Fundraising, Q1 2010 - Q2 2016**



Source: Preqin Private Equity Online

# Private Equity M&A Deal Volume

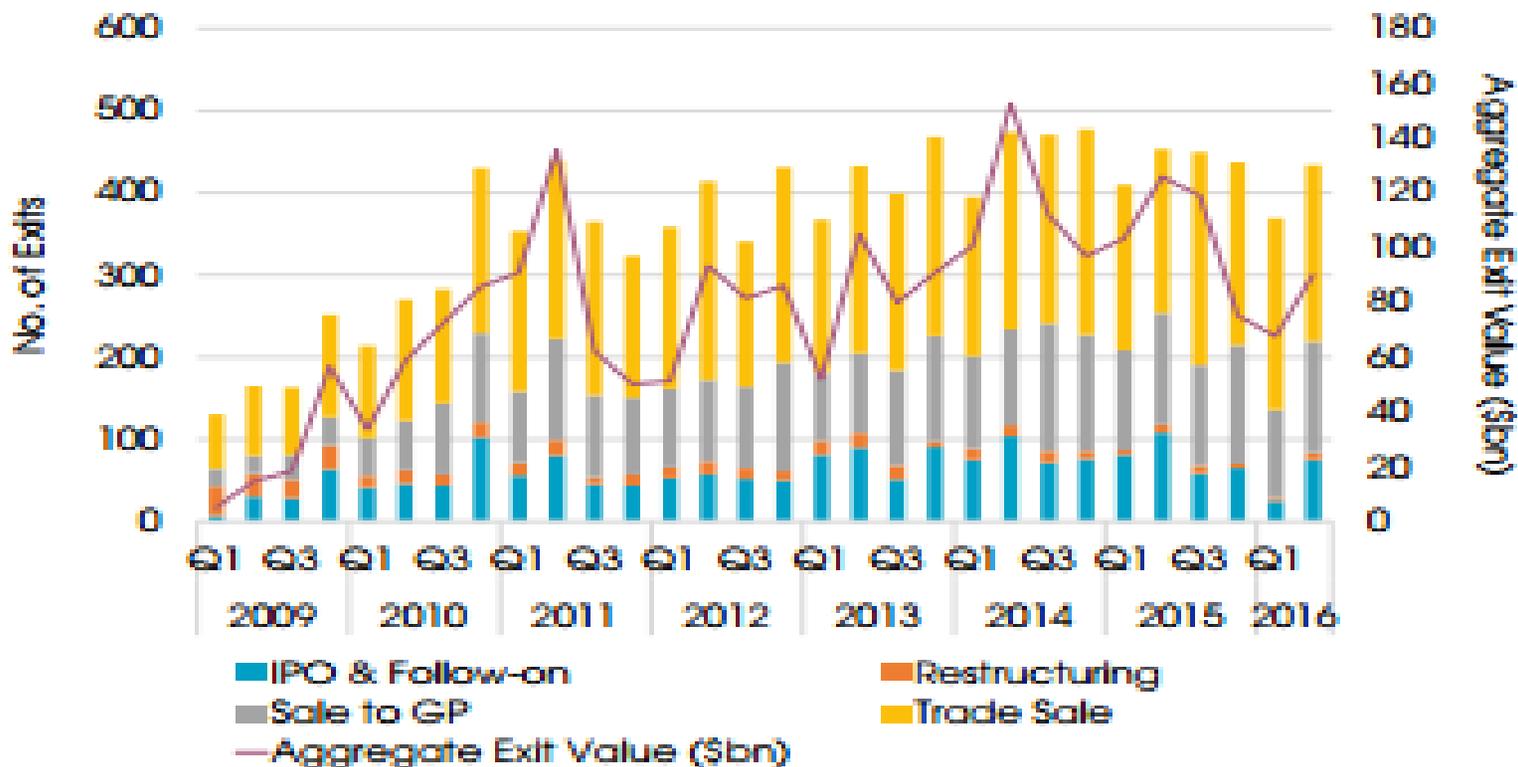
**Fig. 1: Quarterly Number and Aggregate Value of Private Equity-Backed Buyout Deals Globally, Q1 2009 - Q2 2016**



Source: Preqin Private Equity Online

# Private Equity Exits

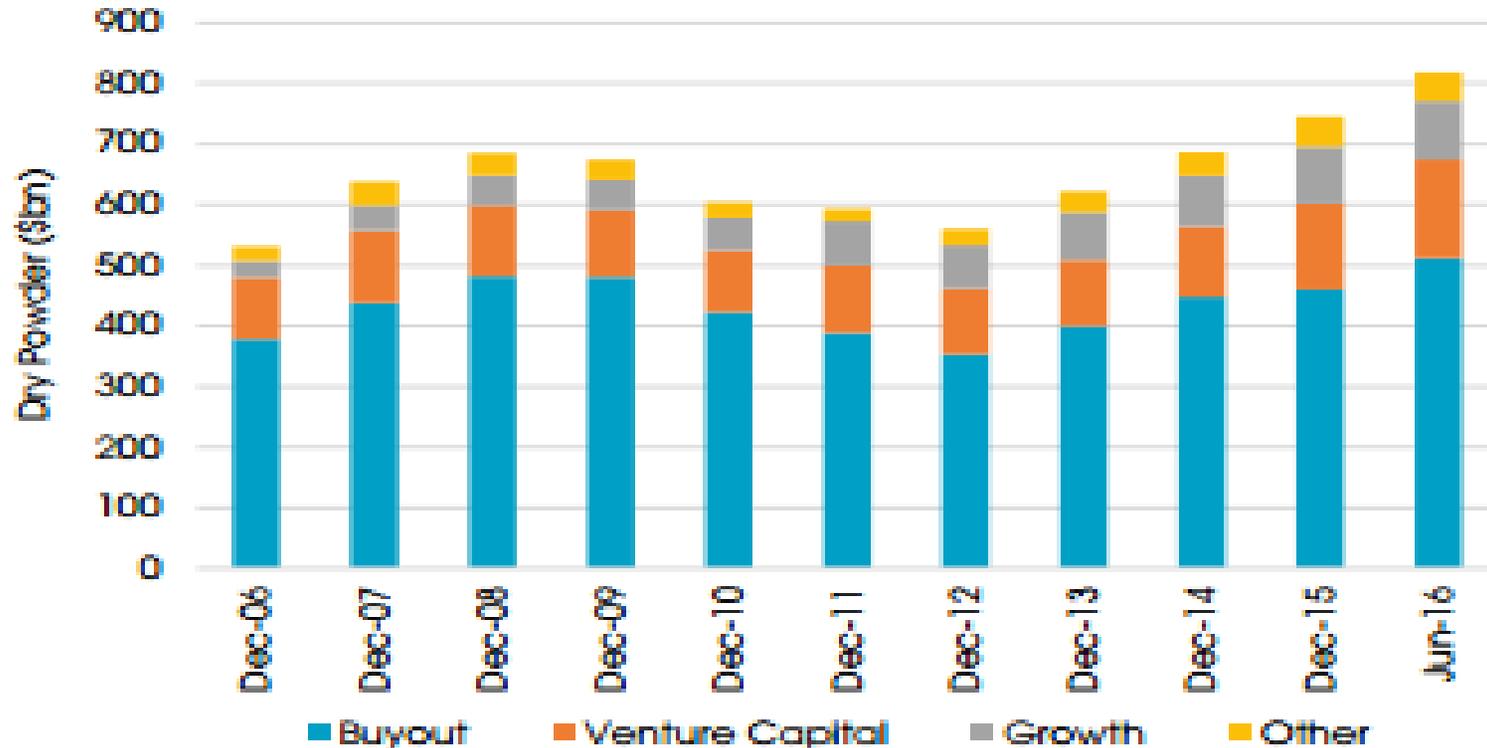
**Fig. 3: Global Number of Private Equity-Backed Exits by Type and Aggregate Exit Value, Q1 2009 - Q2 2016**



Source: Preqin Private Equity Online

# Private Equity Dry Powder

**Fig. 1: Private Equity Dry Powder by Fund Type, December 2006 - June 2016**



Source: Preqin Private Equity Online

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## Commentary

# Fixed Income

- We maintain our overweight allocation to Fixed Income that was established in July with a recent weighting of 29.5% vs. the interim SAA target of 25.3%. The overweight in Fixed Income reflects an overweight in Interest Rate Sensitive Fixed Income (13.7% vs. a 12.1% target), an underweight in High Yield Fixed Income (3.3% vs. a 4.3% target) and an overweight in Opportunistic Debt (3.7% vs. a 0.0% target).
- In early September, following an extended rally in long-term treasury bonds, we tactically reallocated within the Interest Rate Sensitive Fixed Income asset class from Treasuries (Long Duration), which represented 1.6% of the total fund, to Core Fixed Income. While this reallocation did not affect the overall allocation to Interest Rate Sensitive Fixed Income, it reduced the interest rate risk of our investments.
- We continue to believe that the Private Debt asset class offers the most attractive opportunity in fixed income. We have increased our allocation to approximately 8.9% of the total fund vs. a SAA policy target of 10%. We hope to reach the 10% target in the first half of 2017. Our partnership commitments represent approximately 14.6% of the total fund.

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## Interest Rate Sensitive Fixed Income

- Our overweight in Interest Rate Sensitive Fixed Income (13.7% vs. a 12.1% target) reflects a defensive reallocation of the total fund made in July in which we shifted funds from Non-US Equities to Interest Rate Sensitive Fixed Income following the Brexit vote in the United Kingdom.
- In early September, following an extended rally in long-term treasury bonds, ASRS tactically reallocated from Treasuries (Long Duration), which represented 1.6% of the total fund, to Core Fixed Income.
- Overall, long-term U.S. interest rates have fallen in 2016 with the yield on the Barclays U.S. Long Treasury Index declining by approximately 50 bps. The decline reflects a combination of factors including slowing global growth expectations as well as aggressive monetary policies including bond purchases in Europe and Japan that have contributed to negative interest rates in competing “safe haven” sovereign debt markets.
- After bottoming over the summer, long-term rates have recently risen for a number of reasons including concerns that central banks in Europe and Japan could temper their level of bond purchasing going forward.
- While long-term U.S. interest rates may rise further, we believe that rates will likely remain relatively low by historical standards for the foreseeable future as U.S. rates remain attractive in the global sovereign bond market (see charts below of German and Japanese bond yields) and global growth is relatively slow.

# Long Treasury

## Barclays U.S. Long Treasury Index Yield 2015 – 2016



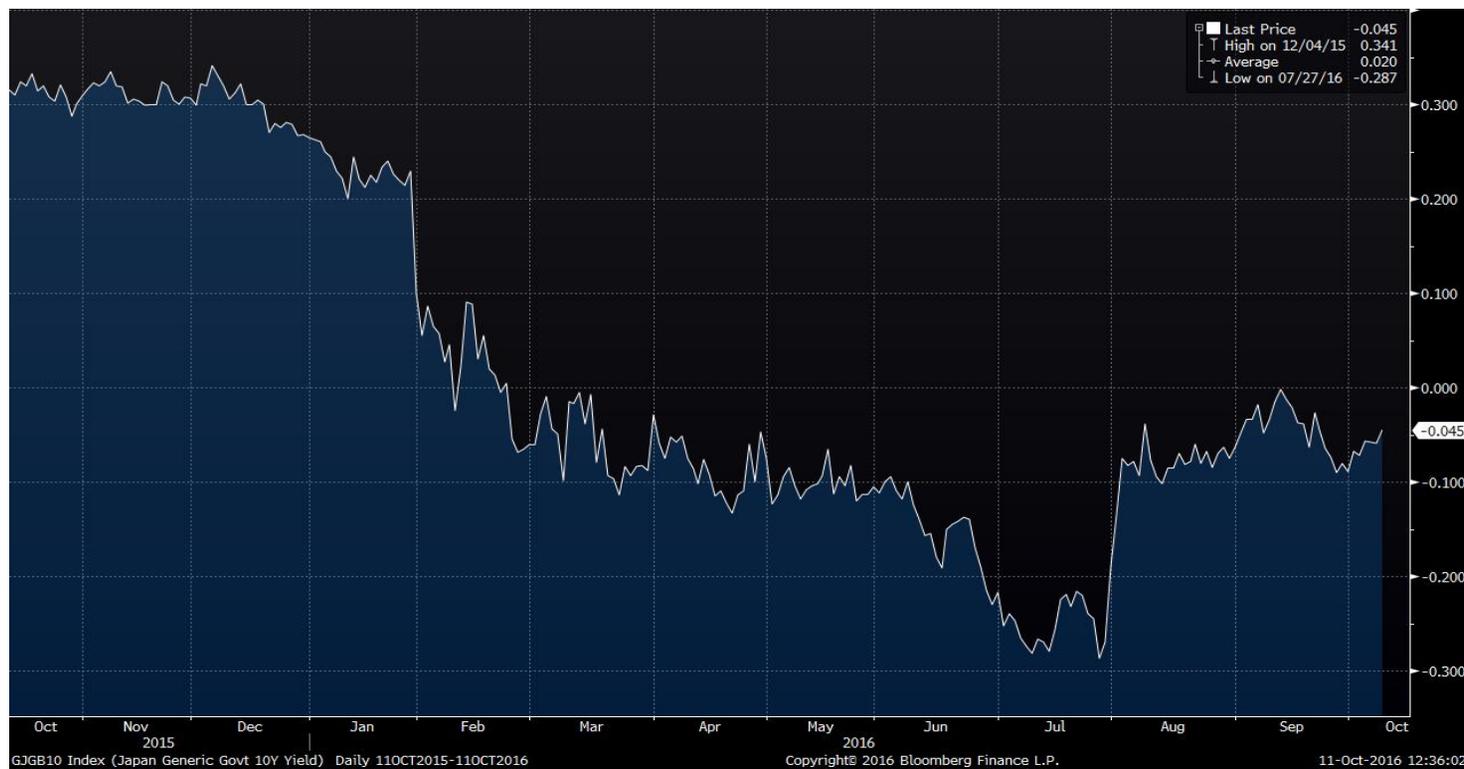
# German Bund

## 10 Year German Bund Yield 2015 - 2016



## Japanese Bonds

# 10 Year Japanese Government Bond Yield 2015 - 2016



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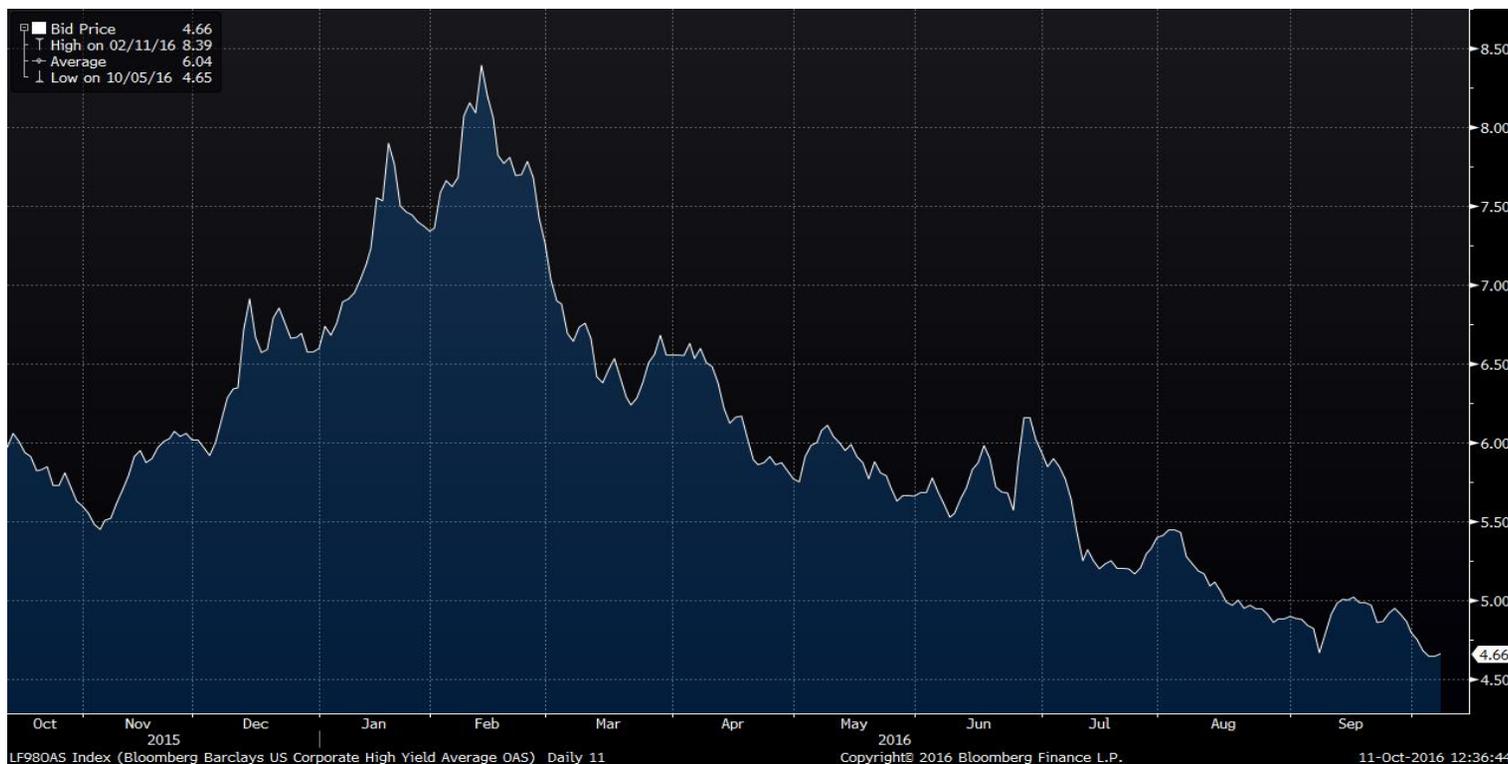
## High Yield

# High Yield

- After a weak 2015, the high yield market has had a strong rally in 2016 with over a 15% return. The rally is due to a number of factors including a recovery in oil prices and other commodities off their lows, strong global demand for higher yielding assets, and continued low default rates outside of the energy sector.
- Yields and credit spreads in the high yield bond market have compressed significantly in 2016. As a result, the market is no longer cheap and, more likely, fairly valued.
- While we continue to believe that we are likely in the later stages of credit cycle (that began with an upturn in 2009), the opening of the credit markets which has accompanied the strong high yield rally this year has most likely elongated the credit cycle and pushed out a substantial uptick in defaults outside of energy. With sovereign rates low, a strong global demand for yield will likely continue to buoy the market.
- We are underweight High Yield with a weighting of 3.3% vs. an interim SAA target of 4.3%. Our underweight reflects our view that the Opportunistic Debt asset class will likely deliver higher returns over the long-term than the high yield bond market, particularly following the recent compression in spreads. ASRS' investments in Opportunistic Debt are primarily in distressed corporate debt that tends to exhibit a meaningful correlation with the broader credit markets including high yield bonds. Overall, we believe we have ample exposure to credit in the total fund.

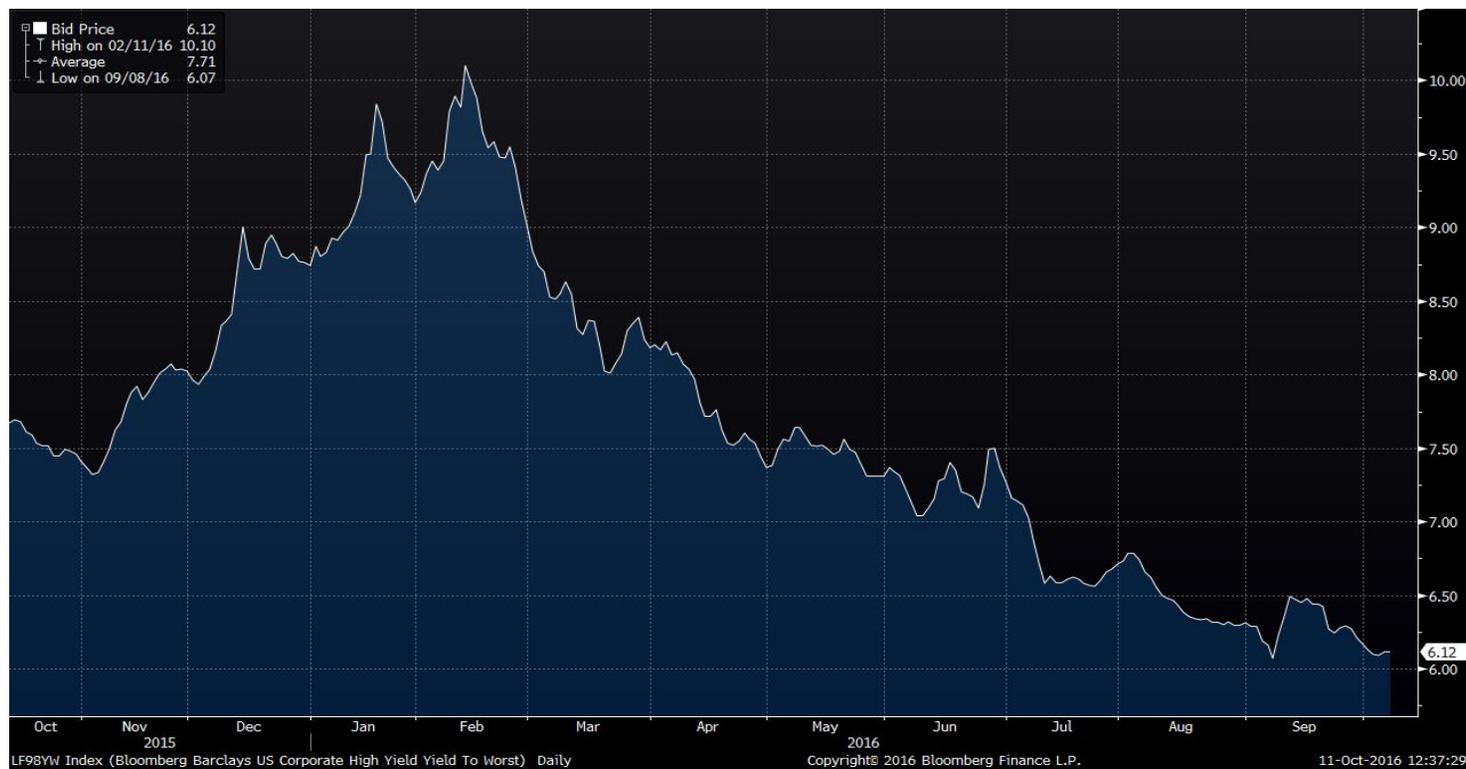
## High Yield Credit Spread

# Barclays US Corporate High Yield Index Option Adjusted Spread (OAS) 2015 – 2016



## High Yield Yield-to-Worst

# Barclays US Corporate High Yield Index Yield-to-Worst 2015 – 2016



## Private Debt

# Private Debt

- We believe the Private Debt asset class offers the most attractive opportunity in the fixed income markets with double-digit yields readily available for investors willing to accept illiquidity. The market opportunity is principally driven by regulatory constraints that make it unattractive for banks to hold illiquid loans or other debt of below investment-grade credit quality.
- The opportunity in Private Debt has become more attractive in the past few years.
- Regulatory constraints limiting banks ability to make below investment-grade, illiquid loans (typically to middle market companies) has become more severe due to a number of policies: the adoption of Basel III, Dodd-Frank financial regulation and new “Leveraged Lending Guidelines” of US bank regulators.
- Business Development Companies (“BDCs”), a competing source of illiquid loans, have pulled back on lending due to their depressed equity valuations. However, a rally this year in the stock prices of BDC’s has enabled some to raise additional equity for new lending.
- Anecdotally, expected returns for middle market loans appear to be 50 - 100 bps higher or more since a year ago in many situations while the credit quality of the underlying loans has either improved or not deteriorated.
- When the public credit markets have “seized up” as they did in the latter part of 2015 and in the first quarter of 2016, our private debt managers quickly capitalized on very attractive investment opportunities that materialized when borrowers were forced to turn to the much more expensive private markets for financing. Going forward, we expect these periods of dislocation in the public credit markets to happen from time-to-time particularly with a weakening global growth outlook and the prospect that we are in the late stages of a credit cycle in the U.S.

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## Commentary

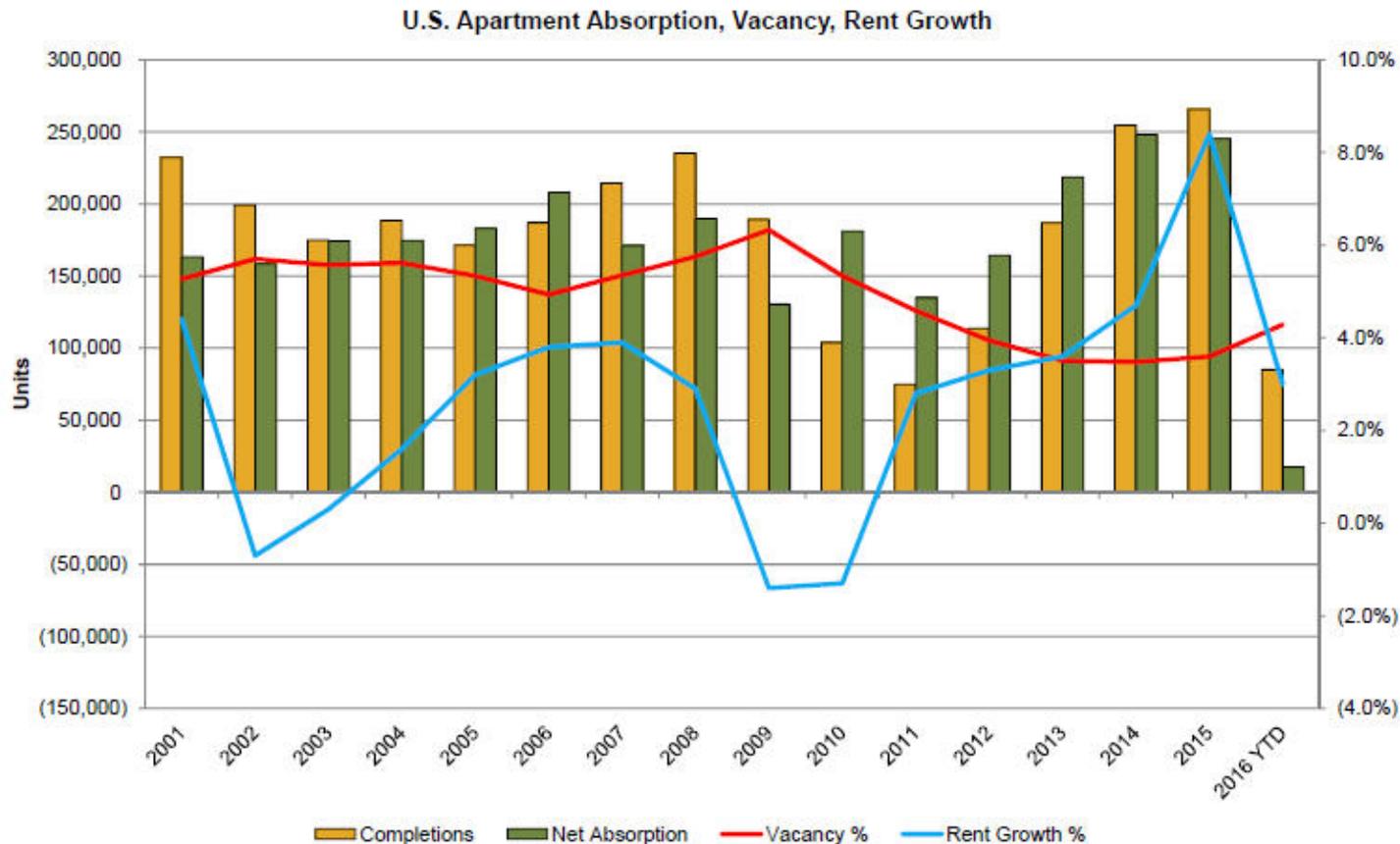
- Property markets are generally moving to the latter stages of the real estate cycle
- Fundamentals leads us to emphasize apartments, industrial properties, medical office buildings, senior housing, self-storage, and student housing for demographic and macro policy reasons
  - Suburban office and certain retail categories require a substantial discount because of weak demand fundamentals
  - For sale housing remains a potential target for opportunistic investing because financing and entitlement constraints have kept the market under-supplied
- CMBS spreads have largely compressed to mid 2015 levels which has resulted in an increase in new issuance
- North America focused dry powder remains robust and at post crisis highs but aggregate deal flow has remains steady according to Preqin

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# Occupancy Trends and New Supply

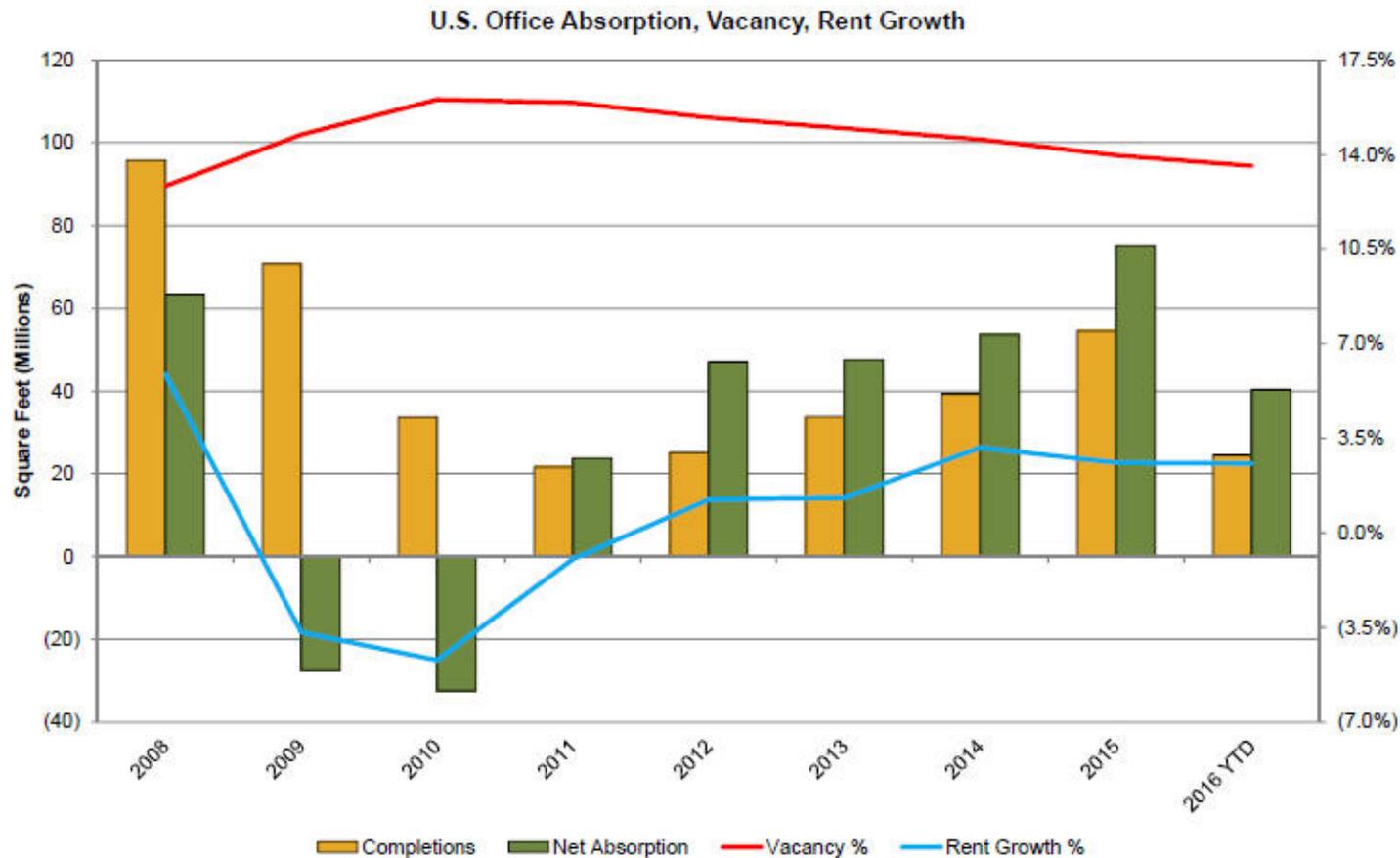
## Multifamily (As of 6/30/16)



Source: CoStar; RCLCO

# Occupancy Trends and New Supply

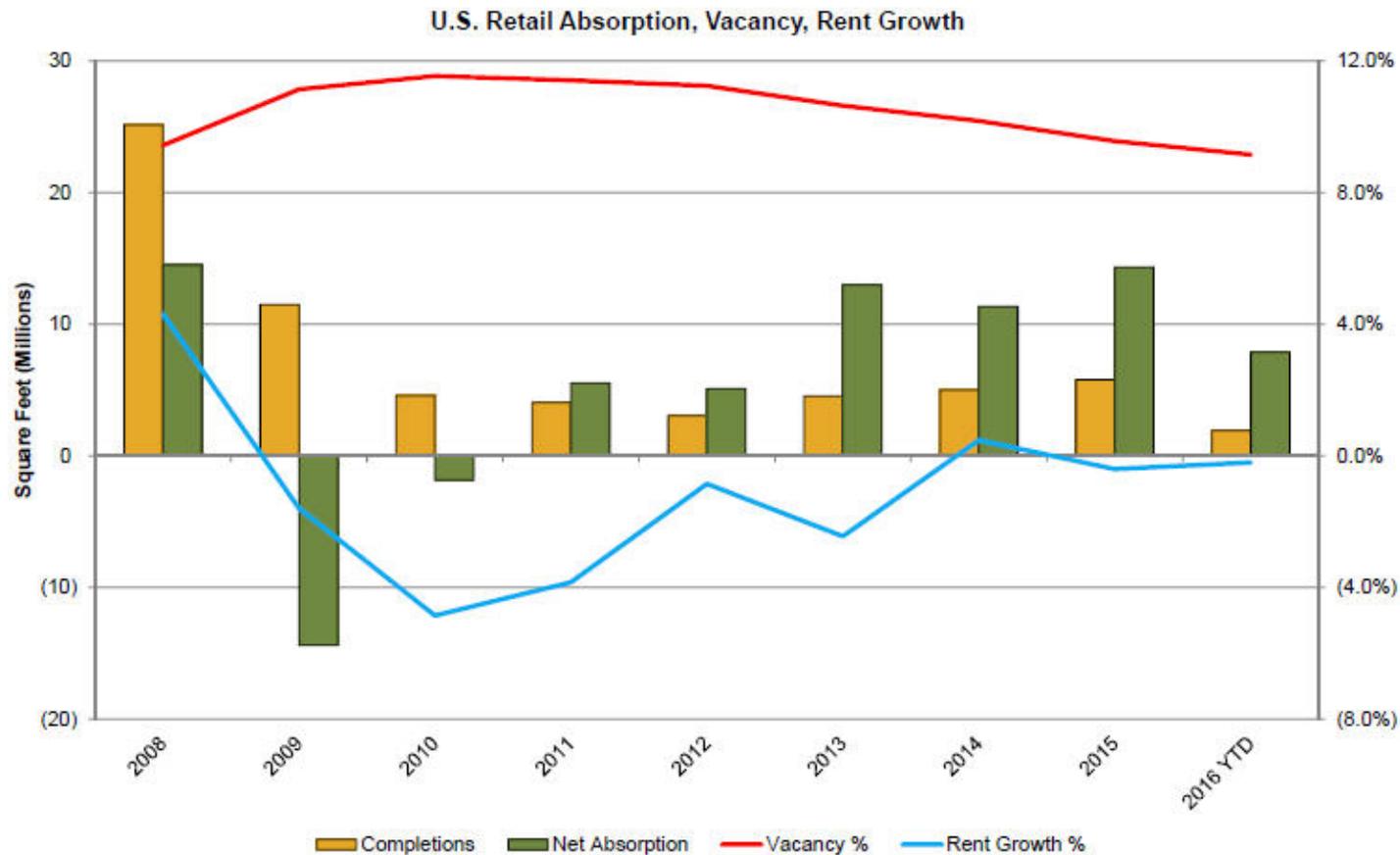
## Office (As of 6/30/16)



Source: CoStar, RCLCO

# Occupancy Trends and New Supply

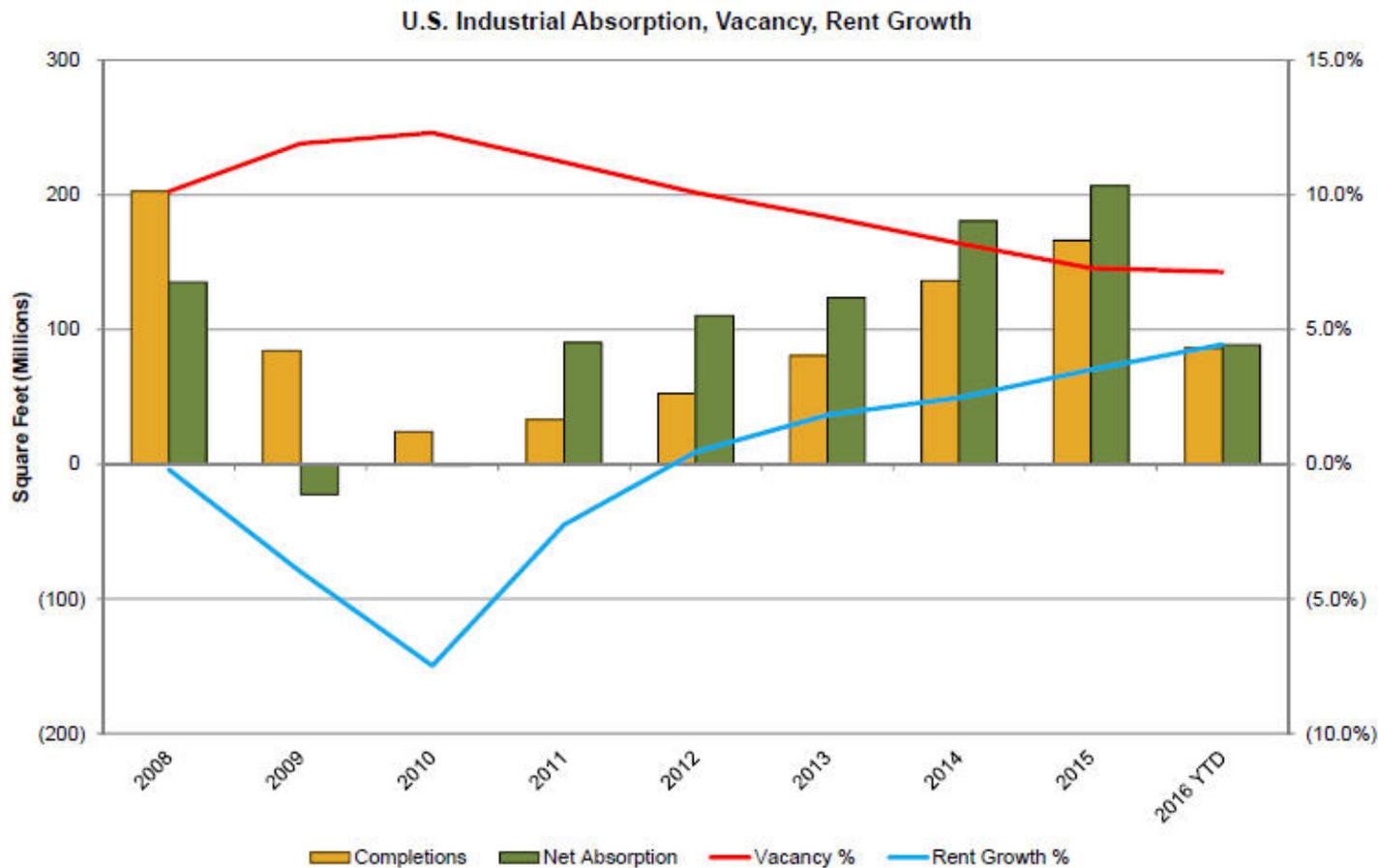
## Retail (As of 6/30/16)



*Note: Above data is for neighborhood and community centers only  
 Source: CoStar; RCLCO*

# Occupancy Trends and New Supply

## Industrial (As of 6/30/16)



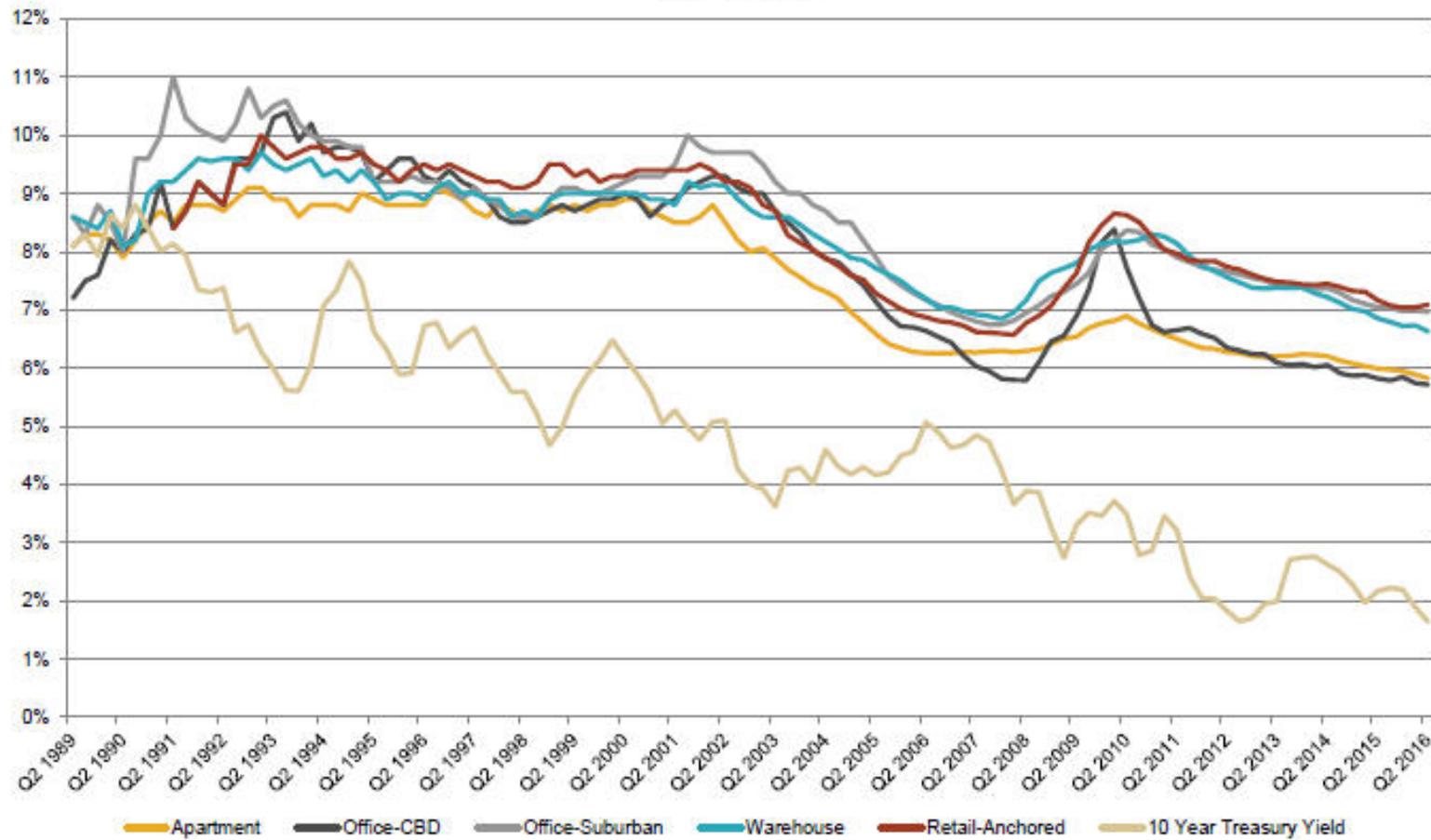
Source: CoStar, RCLCO

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# Cap Rate Trends

Cap Rates by Property Type  
 1989 - Q2 2016

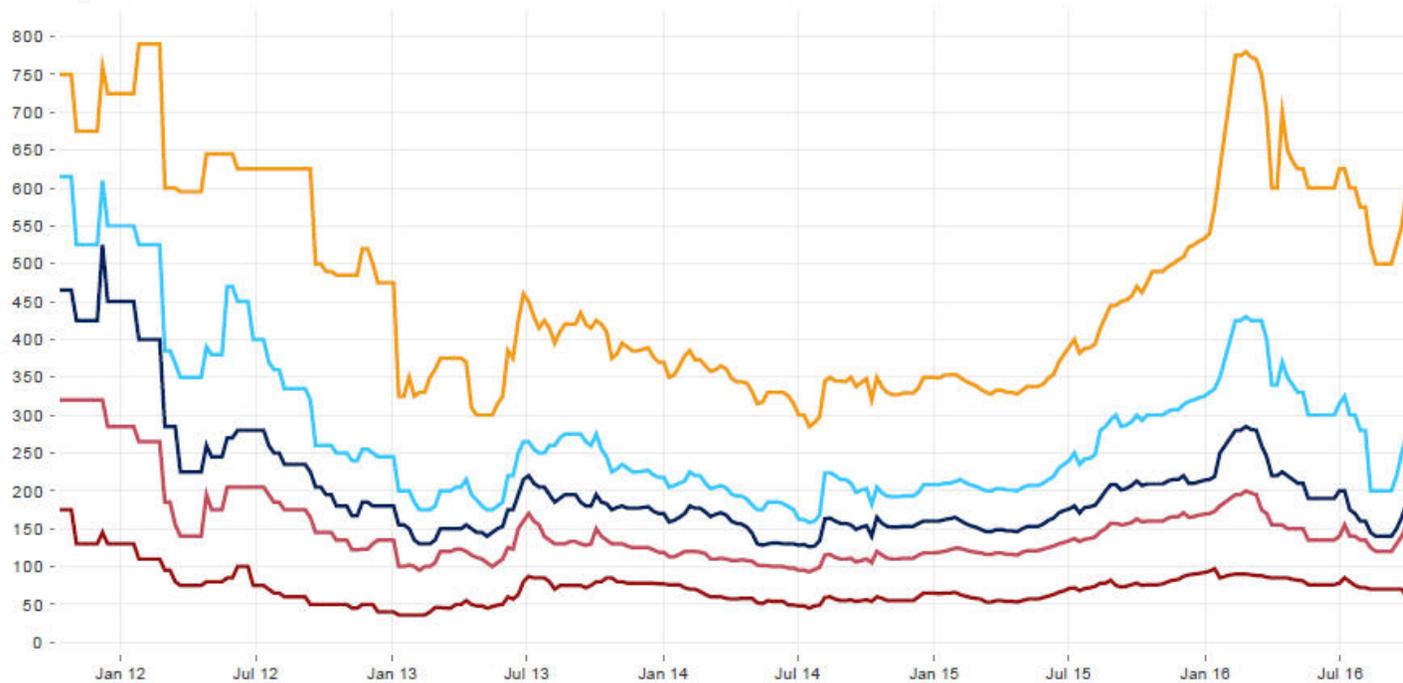


Source: RERC; RCA

# Credit Availability

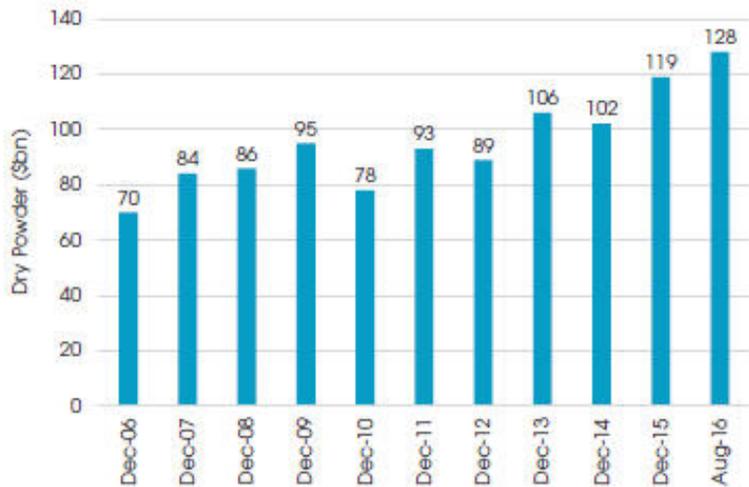


CMBS Spreads



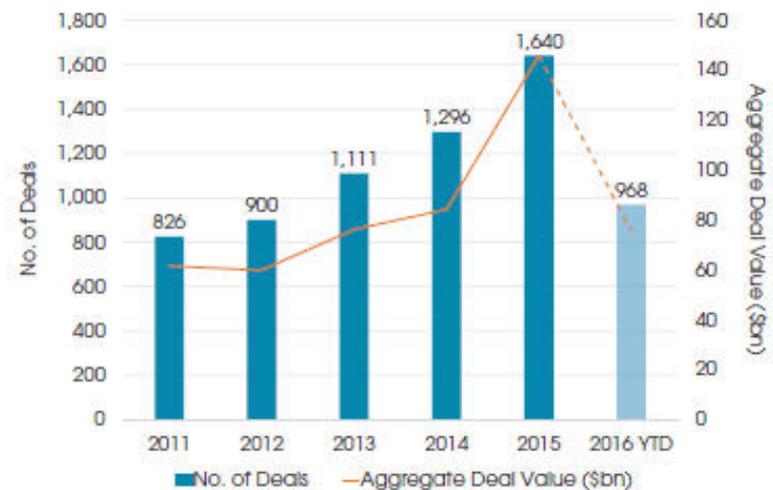
# Investor Demand

North America-Focused Closed-End Private Real Estate Dry Powder, December 2006 - August 2016



Source: Preqin Real Estate Online

Annual Number and Aggregate Value of North American Private Equity Real Estate Deals, 2011 - 2016 YTD (As at 17 August 2016)



Source: Preqin Real Estate Online

# Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Equities
  - Commentary
  - Trends
  - Valuation
  - Private Equity
- 4 Fixed Income
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  - High Yield and Private Debt
- 5 Real Estate
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  - Supply and Demand
  - Capital Markets Dynamics
- 6 **Commodities**
- 7 Historic Data

## Commentary

- Bottoms up model shows a moderate expected decrease
  - flat in energy markets
  - down in ags
  - flat in metals
- Top down model also shows a small expected decline
  - dollar weakness offset by slow projected global growth is negative for commodities

# Bottoms up model

1-3 month horizon											
as of:	Index	Current	60 day								
10/11/2016	DJUBS	price	volatility	-1 st dev	+1 st dev	prob +	prob -	prob price	% ret	wght'd ret	
<b>AGRICULTURE</b>											
Corn	8.0%	348.00	8%	320	376	50%	50%	348	-3%	-0.2%	
Soybeans	5.7%	962.75	9%	879	1,047	50%	50%	963	-1%	0.0%	
Wheat	4.4%	407.25	9%	370	444	50%	50%	407	-5%	-0.2%	
Soybean Meal	2.5%	303.90	9%	277	331	50%	50%	304	0%	0.0%	
Soybean Oil	3.2%	33.64	9%	31	37	50%	50%	34	0%	0.0%	
<b>Group SubTotal</b>	<b>23.7%</b>										
<b>ENERGY</b>											
Crude Oil WTI	7.4%	50.20	15%	42	58	50%	50%	50	-1%	-0.1%	
Crude Oil Brent	6.3%	51.92	15%	44	60	50%	50%	52	-1%	-0.1%	
Heating Oil	3.1%	157.07	14%	136	178	50%	50%	157	-1%	0.0%	
Natural Gas	8.8%	3.25	13%	2.83	3.67	32%	68%	3.10	-11%	-0.9%	
Unleaded Gas (RE	4.2%	146.29	14%	126	167	50%	50%	146	0%	0.0%	
<b>Group SubTotal</b>	<b>29.8%</b>										
<b>INDUSTRIAL METALS</b>											
Aluminum	4.7%	1671.50	6%	1,572	1,771	50%	50%	1,672	0%	0.0%	
Copper (NY)	7.1%	218.60	6%	206	231	68%	32%	223	2%	0.1%	
Nickel	1.5%	10379.50	11%	9,243	11,516	50%	50%	10,380	0%	0.0%	
Zinc	2.2%	2235.25	8%	2,067	2,403	50%	50%	2,235	0%	0.0%	
<b>Group SubTotal</b>	<b>15.5%</b>										
<b>LIVESTOCK</b>											
Live Cattle	3.3%	98.40	9%	90	107	50%	50%	98	0%	0.0%	
Lean Hogs	1.8%	43.73	16%	37	51	50%	50%	44	0%	0.0%	
<b>Group SubTotal</b>	<b>5.1%</b>										
<b>PRECIOUS METALS</b>											
Gold	12.7%	1255.30	5%	1,190	1,321	68%	32%	1,279	2%	0.3%	
Silver	4.3%	17.49	10%	16	19	50%	50%	17	0%	0.0%	
<b>Group SubTotal</b>	<b>17.0%</b>										
<b>FOODS &amp; FIBERS</b>											
Cotton	1.9%	66.81	10%	60	73	50%	50%	67	-1%	0.0%	
Sugar	5.0%	23.21	11%	21	26	32%	68%	22	-1%	0.0%	
Coffee (ICE)	2.0%	152.50	10%	137	168	32%	68%	147	-6%	-0.1%	
<b>Group SubTotal</b>	<b>8.9%</b>										
	<b>100.0%</b>										
									Total	<b>-1.3%</b>	

total weighted expected return: bottoms up

## Top down model

$$\Delta p = -16.8 + 5.3 * \Delta \text{WorldGDP} - 0.9 * \Delta \text{Dollar}$$

1

2.9%	World GDP
-1.1%	USD
-0.4%	expected price change

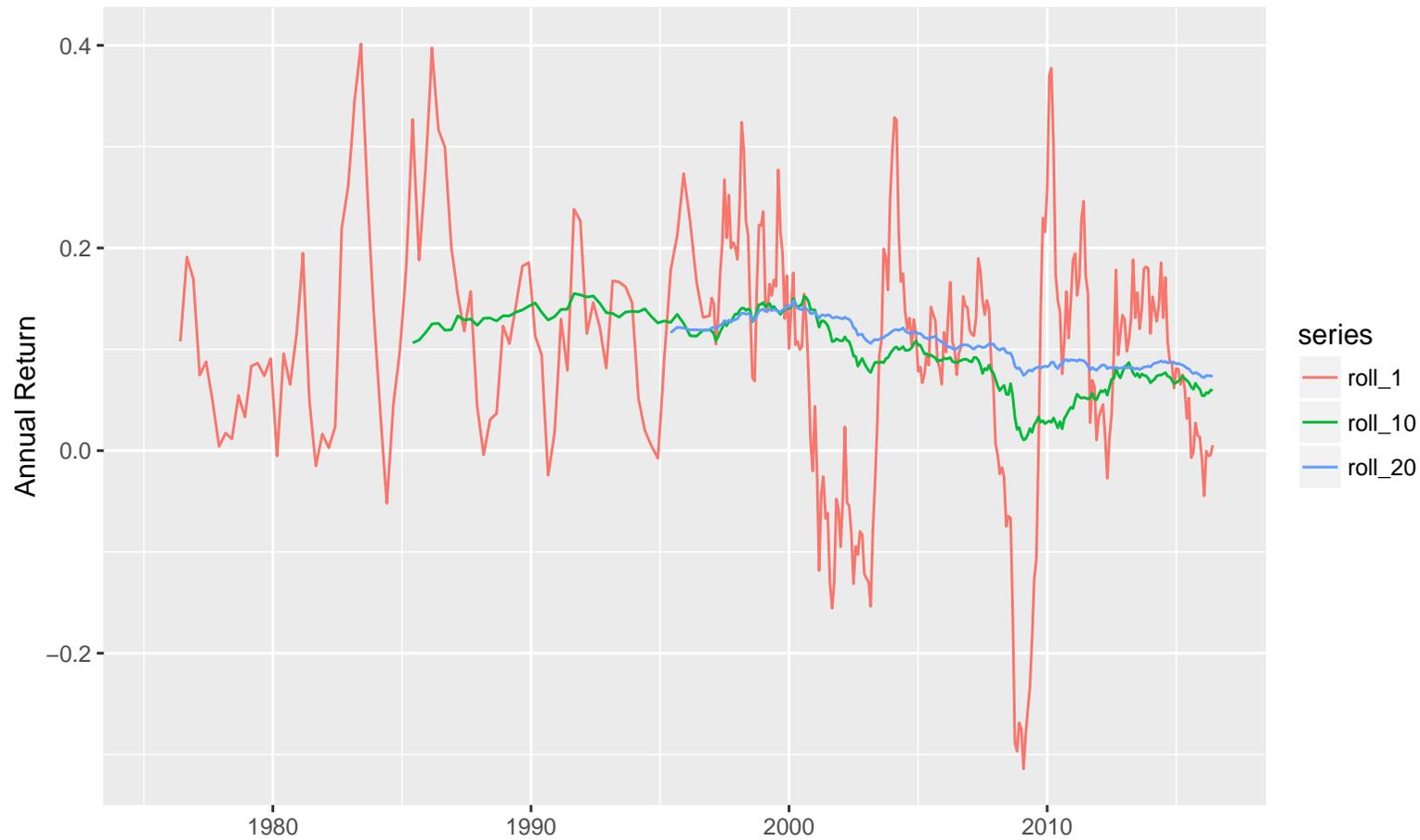
<sup>1</sup> <http://libertystreeteconomics.newyorkfed.org/2016/03/what-tracks-commodity-prices.html>

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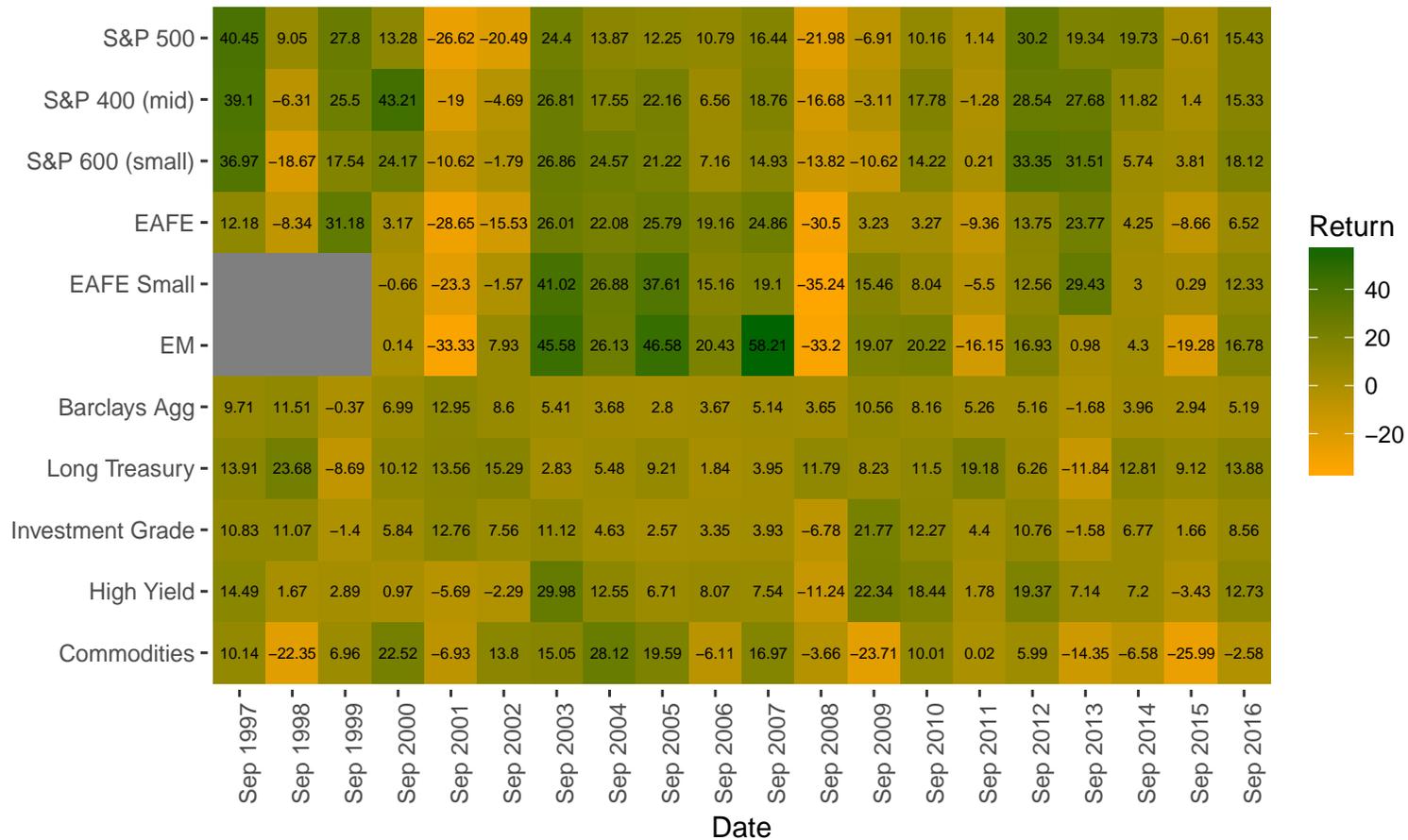
# ASRS Returns

ASRS Total Fund One Ten and Twenty Year Rolling Returns



# Asset Class One Year Returns

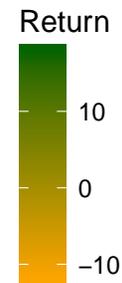
One Year Returns  
 for indicated end dates



# Asset Class Hold Period Returns

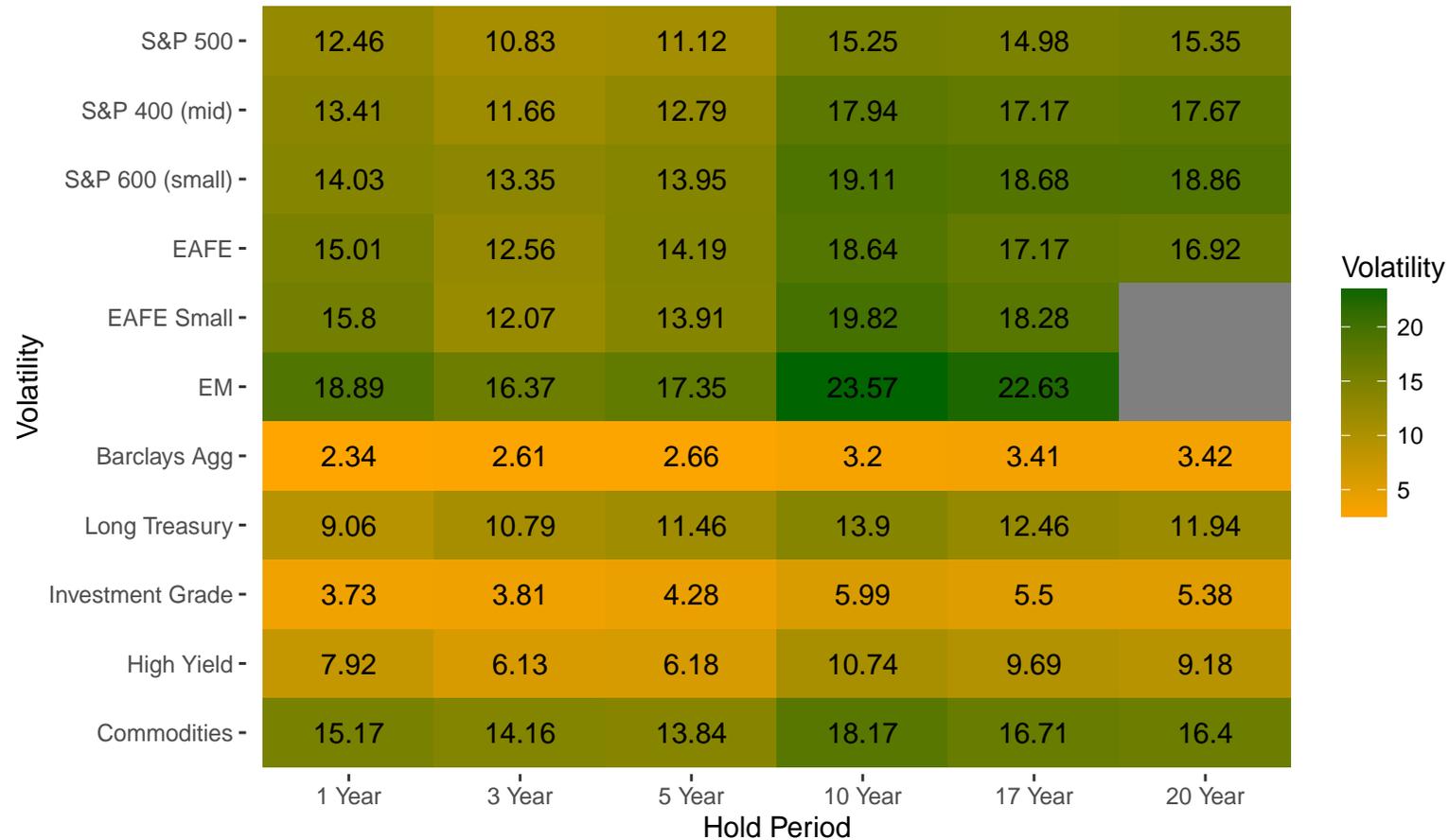
Annualized Returns and Growth of a Dollar  
 for hold periods ending Sep 2016

Asset Class	Annualized Return/Growth of \$					
	1 Year	3 Year	5 Year	10 Year	17 Year	20 Year
S&P 500 -	15.43/1.15	11.16/1.37	16.37/2.13	7.24/2.01	5.13/2.34	7.91/4.58
S&P 400 (mid) -	15.33/1.15	9.35/1.31	16.5/2.15	9.11/2.39	10.1/5.13	11.22/8.39
S&P 600 (small) -	18.12/1.18	9.04/1.3	17.86/2.27	8.71/2.3	10.13/5.16	10.02/6.75
EAFE -	6.52/1.07	0.48/1.01	7.39/1.43	1.82/1.2	3.23/1.72	4.29/2.32
EAFE Small -	12.33/1.12	5.08/1.16	11.07/1.69	4.39/1.54	7.22/3.27	NA/NA
EM -	16.78/1.17	-0.56/0.98	3.03/1.16	3.95/1.47	7.54/3.44	NA/NA
Barclays Agg -	5.19/1.05	4.03/1.13	3.08/1.16	4.79/1.6	5.39/2.44	5.6/2.97
Long Treasury -	13.88/1.14	11.92/1.4	5.6/1.31	8.18/2.19	8.2/3.82	8.28/4.91
Investment Grade -	8.56/1.09	5.63/1.18	5.14/1.28	5.91/1.78	6.27/2.81	6.33/3.41
High Yield -	12.73/1.13	5.28/1.17	8.34/1.49	7.71/2.1	7.27/3.3	7.11/3.95
Commodities -	-2.58/0.97	-12.34/0.67	-9.37/0.61	-5.33/0.58	1.29/1.24	0.64/1.14



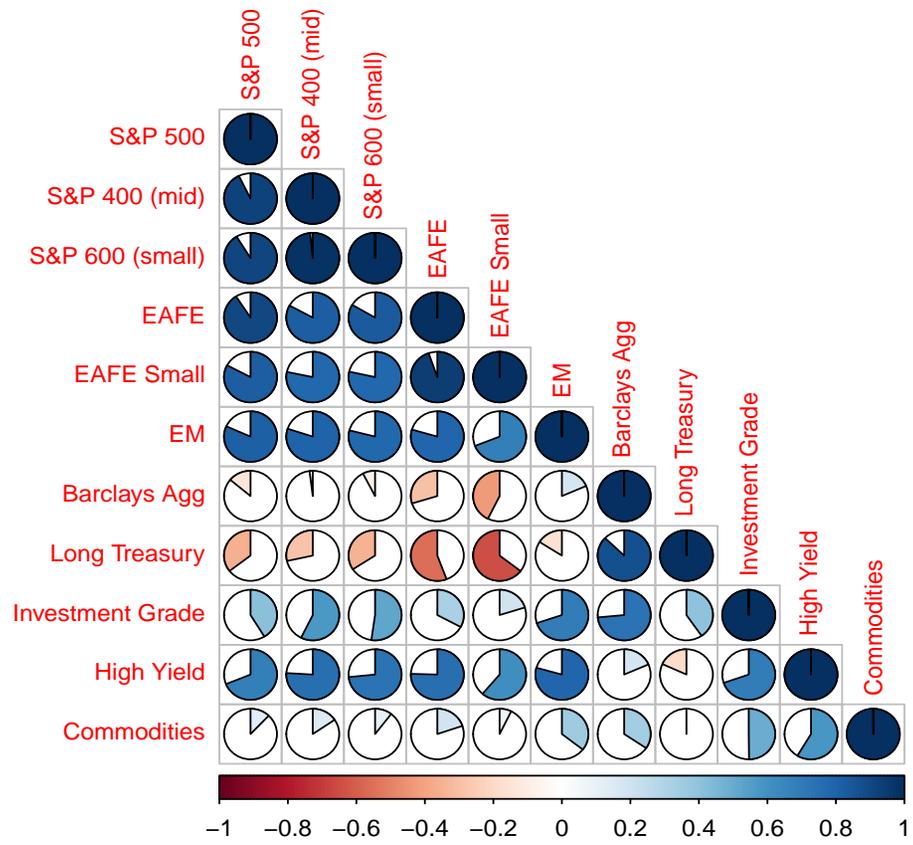
# Asset Class Volatility

Volatility  
 for hold periods ending Sep 2016



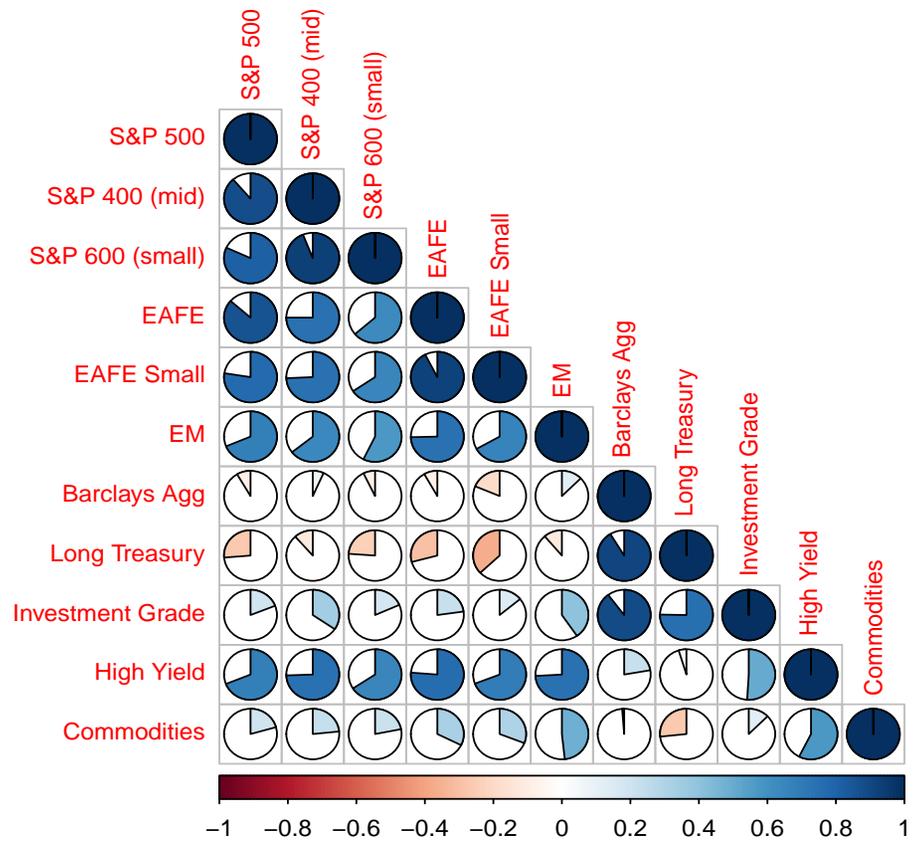
# One Year Correlation

1 Year Correlation Matrix



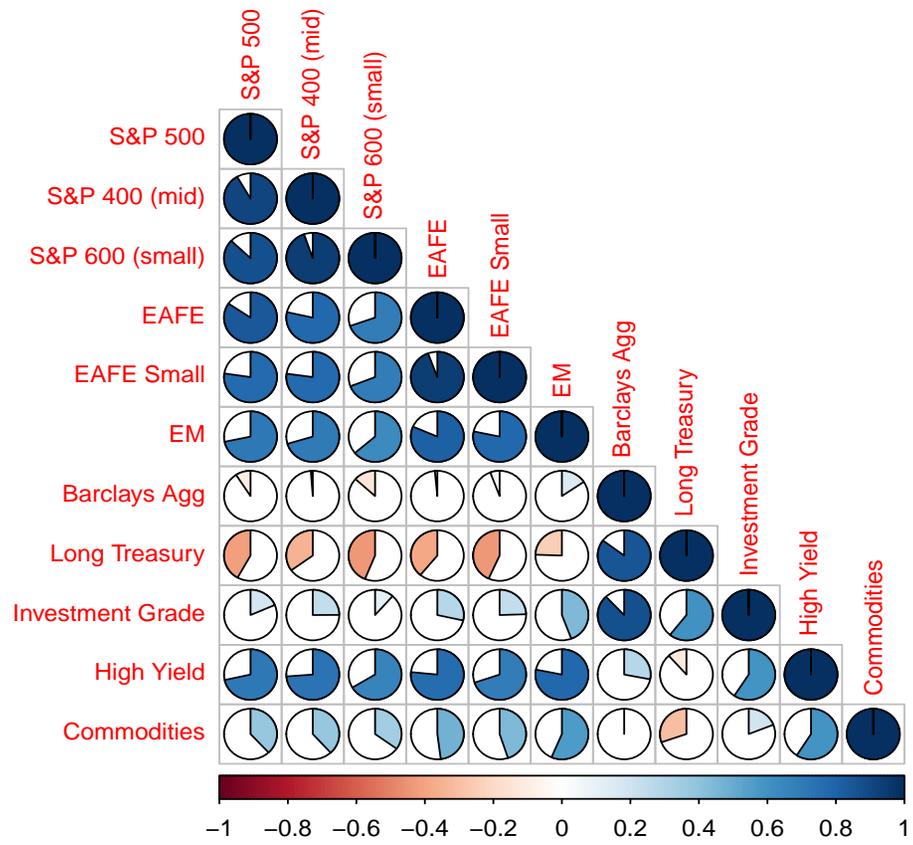
# Three Year Correlation

3 Year Correlation Matrix



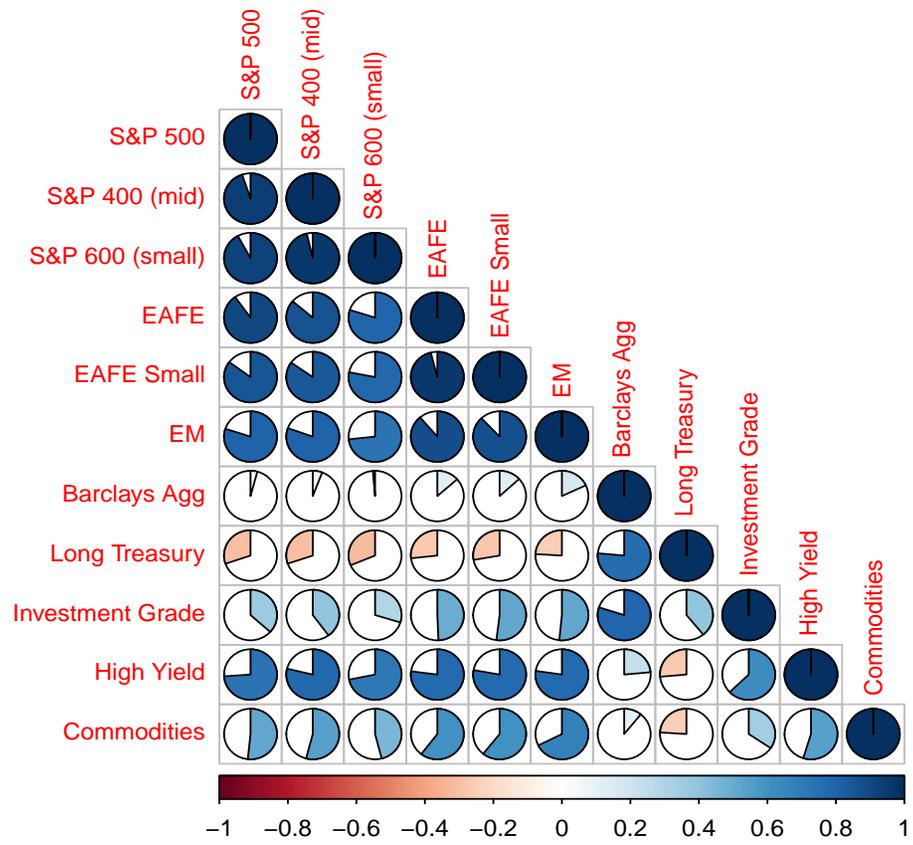
# Five Year Correlation

5 Year Correlation Matrix



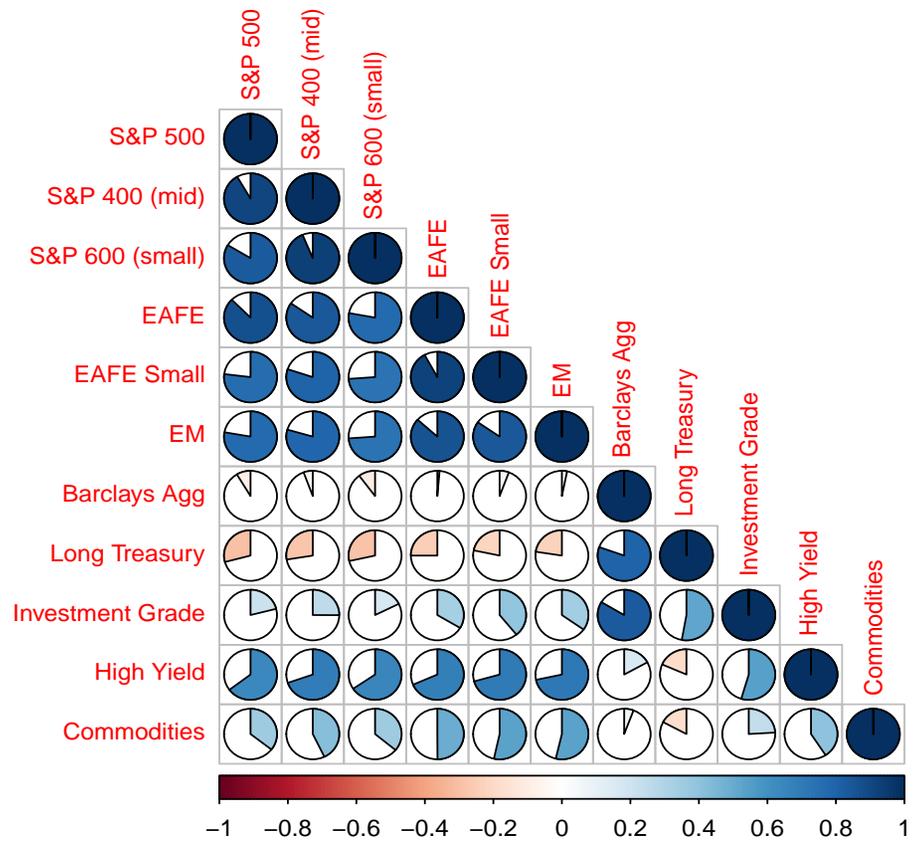
# Ten Year Correlation

10 Year Correlation Matrix



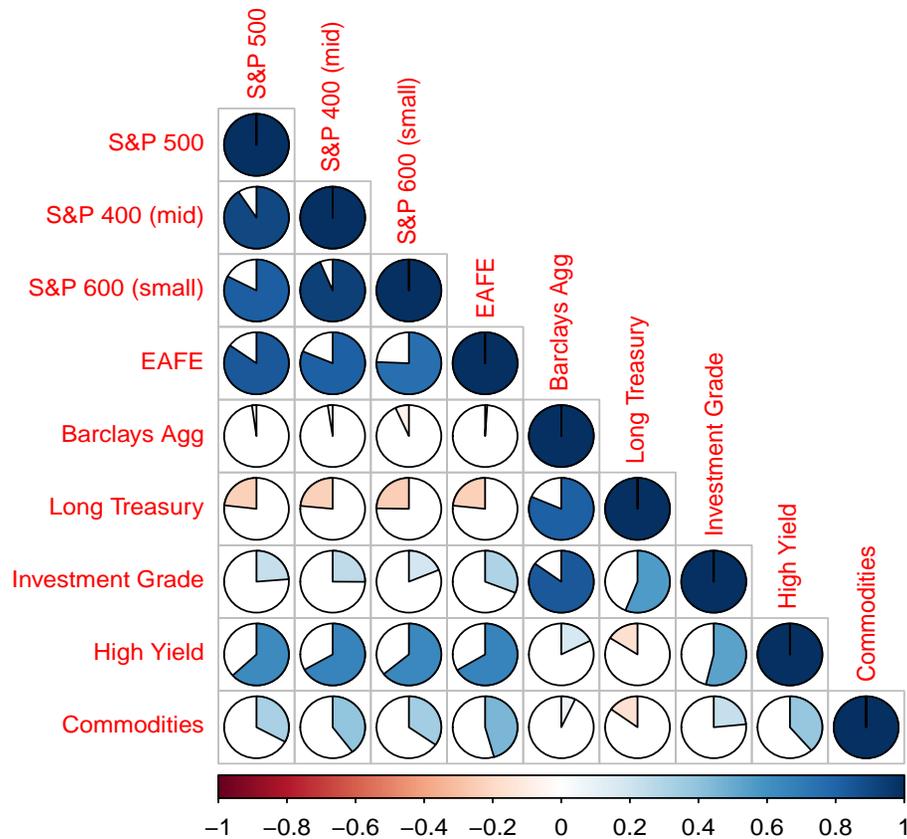
# Seventeen Year Correlation

17 Year Correlation Matrix



# Twenty Year Correlation

20 Year Correlation Matrix



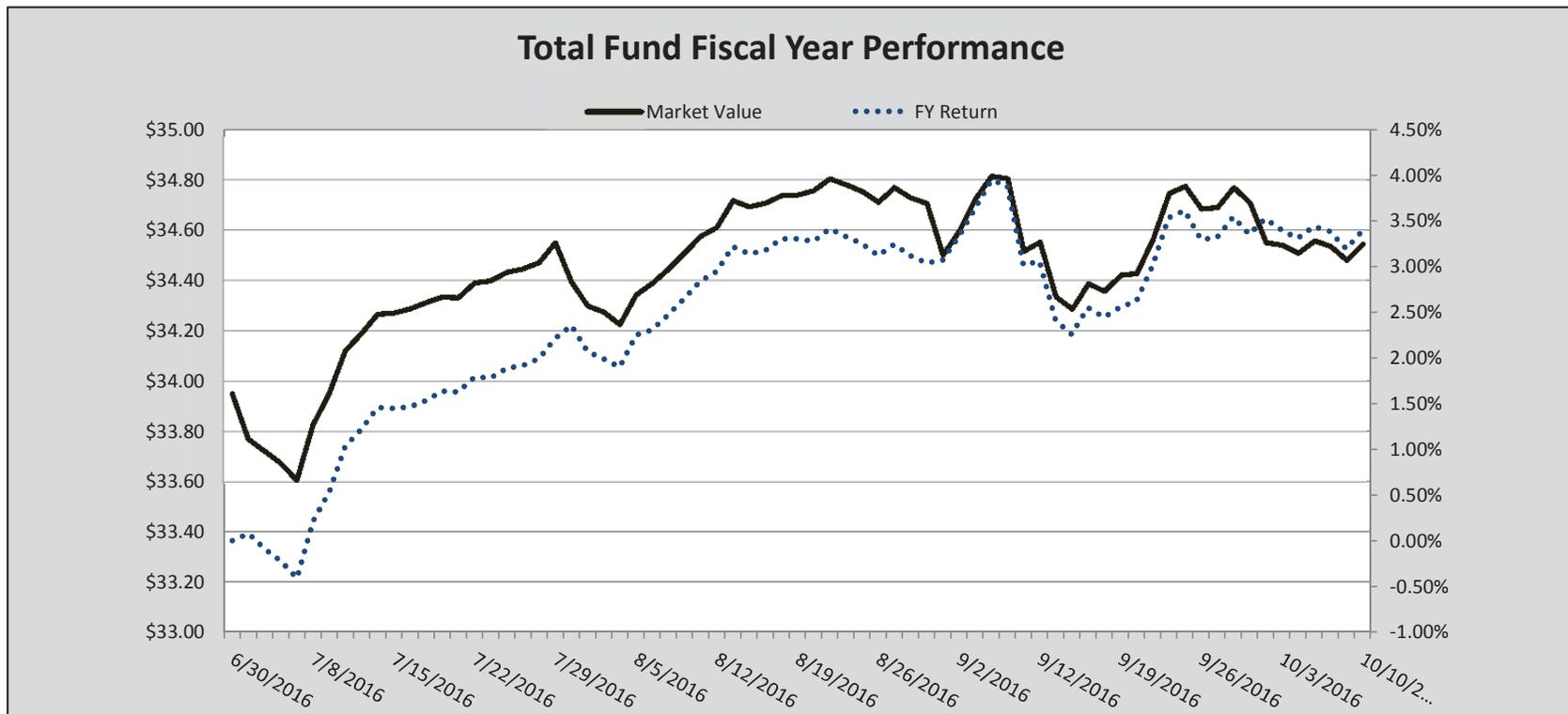
# Agenda Item #4

# Investment Report

Arizona State Retirement System

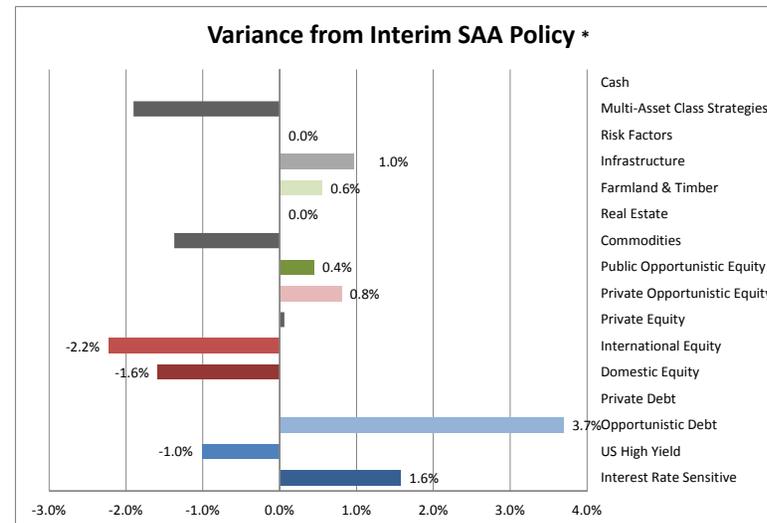
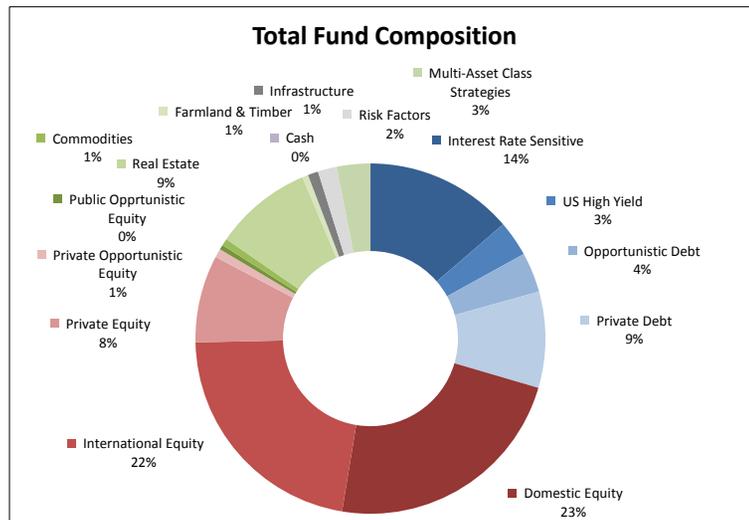
October 24, 2016

# Fiscal Year Performance



# Total Fund Positioning

## Total Fund Positioning October 10, 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.

# Asset Allocation

Total Fund		ASRS Market Value Report					Monday, October 10, 2016		
Account Manager	Account Manager Style	Fixed Income		Equity		Inflation Linked	Multi-Asset	Market Value	%
		Active	Passive	Active	Passive				
Master Cash	Operating Cash (non-assetized)		3,367,304					3,367,304	0.01%
	<b>Cash Total</b>							<b>\$3,367,304</b>	<b>0.01%</b>
	<b>Treasuries (Long Duration) Total</b>							<b>\$0</b>	<b>0.00%</b>
								<b>Long Treasuries (Range: 0% - 10%)</b>	<b>0.00%</b>
ASRS: Phoenix	Enhanced Passive F2		1,911,429,808					1,911,429,808	5.53%
Blackrock: San Francisco	Passive (US Debt Index)		2,487,815,953					2,487,815,953	7.20%
Assetized Cash	US Treasuries		333,363,083					333,363,083	0.96%
	<b>Core Fixed Income Total</b>							<b>\$4,732,608,843</b>	<b>13.69%</b>
	<b>Interest Rate Sensitive</b>							<b>\$4,732,608,843</b>	<b>13.69%</b>
								<b>Interest Rate Sensitive Policy</b>	<b>11.00%</b>
Columbia: Minneapolis	Active	748,817,773						748,817,773	2.17%
JP Morgan: Indianapolis	Active	387,935,623						387,935,623	1.12%
	<b>High Yield Fixed Income Total</b>							<b>\$1,136,753,404</b>	<b>3.29%</b>
								<b>High Yield Policy</b>	<b>4.00%</b>
	<b>Opportunistic Debt</b>	1,274,248,079						<b>\$1,274,248,079</b>	<b>3.69%</b>
								<b>Opportunistic Debt Policy</b>	<b>0.00%</b>
	<b>Private Debt Total</b>	3,065,958,019						<b>\$3,065,958,019</b>	<b>8.87%</b>
								<b>Private Debt (Range: 8% - 12%)</b>	<b>10.00%</b>
	<b>Fixed Income Total</b>							<b>\$10,209,568,345</b>	<b>29.54%</b>
								<b>Total Fixed Income (Range: 18% - 35%)</b>	<b>25.00%</b>
LSV: Chicago	Active (Value)			590,862,730				590,862,730	1.71%
ASRS: Phoenix	Passive E2			4,625,835,042				4,625,835,042	13.38%
ASRS: Phoenix	Enhanced Passive E7			438,497,531				438,497,531	1.27%
ASRS: Phoenix	Enhanced Passive E8			547,336,674				547,336,674	1.58%
	<b>Large Cap Equity Total</b>							<b>\$6,202,618,843</b>	<b>17.95%</b>
								<b>U.S. Equity Large Cap Policy</b>	<b>20.00%</b>
Wellington: Boston	Active (Core)			204,456,495				204,456,495	0.59%
ASRS: Phoenix	Passive E3 (Growth)			319,842,048				319,842,048	0.93%
ASRS: Phoenix	Passive E4 (Value)			314,309,147				314,309,147	0.91%
	<b>Mid Cap Equity Total</b>							<b>\$838,607,690</b>	<b>2.43%</b>
								<b>U.S. Equity Mid Cap Policy</b>	<b>3.00%</b>
TimesSquare: New York	Active (Growth)			335,652,984				335,652,984	0.97%
DFA: Santa Monica	Active (Value)			251,222,977				251,222,977	0.73%
ASRS: Phoenix	Passive E6				342,929,829			342,929,829	0.99%
	<b>Small Cap Equity Total</b>							<b>\$929,805,789</b>	<b>2.69%</b>
								<b>U.S. Equity Small Cap Policy</b>	<b>3.00%</b>
	<b>U.S. Equity Total</b>							<b>\$7,971,032,323</b>	<b>23.06%</b>
								<b>U.S. Equity (Range: 16% - 36%)</b>	<b>26.00%</b>
Brandes: San Diego	Active (EAFE)			570,742,986				570,742,986	1.65%
American Century	Active (EAFE)			547,665,873				547,665,873	1.58%
Trinity Street	Active (EAFE)			320,534,736				320,534,736	0.93%
Thompson Siegel Walmsley	Active (EAFE)			304,025,337				304,025,337	0.88%
Blackrock: San Francisco	Passive (EAFE)				4,089,805,020			4,089,805,020	11.83%
	<b>Large Cap Developed Non-US Equity Total</b>							<b>\$5,833,303,571</b>	<b>16.88%</b>
								<b>Large Cap Developed Policy</b>	<b>17.00%</b>
AQR: Greenwich	Active (EAFE SC)			100,891,897				100,891,897	0.29%
DFA: Santa Monica	Active (EAFE SC)			109,006,911				109,006,911	0.32%
Franklin Templeton: San Mateo	Active (EAFE SC)			101,690,056				101,690,056	0.29%
Blackrock: San Francisco	Passive (EAFE SC)				131,208,366			131,208,366	0.38%
	<b>Small Cap Developed Non-US Equity Total</b>							<b>\$442,799,691</b>	<b>1.28%</b>
								<b>Small Cap Developed Policy</b>	<b>2.00%</b>
William Blair: Chicago	Active (EM)			393,877,865				393,877,865	1.14%

# Asset Allocation (Continued)

LSV: Chicago	Active (EM)				129,843,610				129,843,610	0.38%
Blackrock: San Francisco	Passive (EM)					352,643,101			352,643,101	1.02%
Total Equity Transition	ASRS Transition					177,901,210			177,901,210	0.51%
	<b>Emerging Markets Equity Total</b>								<b>\$1,348,495,380</b>	<b>3.90%</b>
									<b>Emerging Markets Policy</b>	<b>5.00%</b>
	<b>Non-US Equity Total</b>								<b>\$7,624,598,642</b>	<b>22.06%</b>
									<b>Non-US Equity (Range: 14% - 34%)</b>	<b>24.00%</b>
ASRS: Phoenix	Risk Factor Portfolio					599,841,824			599,841,824	1.74%
	<b>Public Equity Total</b>								<b>\$16,195,472,789</b>	<b>46.86%</b>
	<b>Private Equity Total</b>				2,786,395,889				<b>\$2,786,395,889</b>	<b>8.06%</b>
									<b>Private Equity (Range: 6% - 10%)</b>	<b>8.00%</b>
	<b>Private Opportunistic Equity</b>				276,798,605				<b>\$276,798,605</b>	<b>0.80%</b>
									<b>Private Opportunistic Equity Policy:</b>	<b>0.00%</b>
	<b>Public Opportunistic Equity</b>				151,094,713				<b>\$151,094,713</b>	<b>0.44%</b>
									<b>Public Opportunistic Equity Policy:</b>	<b>0.00%</b>
	<b>Equity Total</b>								<b>\$19,409,761,996</b>	<b>56.16%</b>
									<b>Total Equity (Range: 48% - 65%)</b>	<b>58.00%</b>
Gresham: New York								226,059,882	226,059,882	0.65%
	<b>Commodities Total</b>								<b>\$226,059,882</b>	<b>0.65%</b>
									<b>Commodities (Range: 0% - 4%)</b>	<b>2.00%</b>
	<b>Real Estate Total</b>						3,119,562,244		<b>\$3,119,562,244</b>	<b>9.03%</b>
									<b>Real Estate (Range: 8% - 12%)</b>	<b>10.00%</b>
	<b>Infrastructure Total</b>						331,287,085		<b>\$331,287,085</b>	<b>0.96%</b>
									<b>Infrastructure (Range: 0% - 3%)</b>	<b>0.00%</b>
	<b>Farmland &amp; Timber Total</b>						188,959,819		<b>\$188,959,819</b>	<b>0.55%</b>
									<b>Farmland &amp; Timber (Range: 0% - 3%)</b>	<b>0.00%</b>
	<b>Inflation Linked Total</b>								<b>\$3,865,869,029</b>	<b>11.19%</b>
									<b>Inflation Linked (Range: 10% - 16%)</b>	<b>12.00%</b>
Bridgewater								1,071,831,158	1,071,831,158	3.10%
	<b>Multi-Asset Class Strategies</b>								<b>\$1,071,831,158</b>	<b>3.10%</b>
									<b>Multi-Asset Class (Range: 0% - 12%)</b>	<b>5.00%</b>
	<b>TOTAL Amounts</b>	<b>\$5,476,959,501</b>	<b>\$4,735,976,147</b>	<b>\$7,469,186,976</b>	<b>\$11,940,575,020</b>	<b>\$3,865,869,029</b>	<b>\$1,071,831,158</b>		<b>\$34,560,397,832</b>	<b>100.00%</b>
	<b>TOTAL Percent</b>	<b>15.85%</b>	<b>13.70%</b>	<b>21.61%</b>	<b>34.55%</b>	<b>11.19%</b>	<b>3.10%</b>			

# Asset Allocation (Continued)

Asset Class	Actual Portfolio	SAAP		Interim SAA		Actual - Interim SAA		Policy Band check Actual - Adj Policy
		Target	Range	Adj Policy	Range	% diff	\$ diff	
Tactical Cash	0.00%	0%	(0-3%)	0.00%	(0-3%)	0.00%	0	
Cash	0.01%	0%		0.00%		0.01%	3,367,304	
<b>Total Cash</b>	<b>0.01%</b>	<b>0%</b>	<b>(0-3%)</b>	<b>0.00%</b>	<b>(0-3%)</b>	<b>0.01%</b>	<b>\$3,367,303.87</b>	
Interest Rate Sensitive	13.69%	11%		12.12%		1.57%	543,961,859	
High Yield	3.29%	4%		4.30%		-1.01%	-\$349,684,313	
Opportunistic Debt	3.69%	0%		0.00%		3.69%	\$1,274,248,079	
Private Debt	8.87%	10%	(8-12%)	8.87%	(7-11%)	0.00%	\$0	
<b>Total Fixed Income</b>	<b>29.54%</b>	<b>25%</b>	<b>(18-35%)</b>	<b>25.29%</b>	<b>(18-35%)</b>	<b>4.25%</b>	<b>\$1,468,525,625</b>	<b>OK</b>
Large Cap	17.95%	20%		18.87%		-0.92%	-\$318,824,577	
Mid Cap	2.43%	3%		2.77%		-0.35%	-\$120,224,808	
Small Cap	2.69%	3%		3.00%		-0.31%	-\$107,006,145	
<b>US Equity</b>	<b>23.06%</b>	<b>26%</b>	<b>(16-36%)</b>	<b>24.64%</b>	<b>(15-35%)</b>	<b>-1.58%</b>	<b>-\$546,055,530</b>	<b>OK</b>
Developed Large Cap	16.88%	17%		17.28%		-0.40%	-\$139,542,547	
Developed Small Cap	1.28%	2%		2.00%		-0.72%	-\$248,408,265	
Emerging Markets	3.90%	5%		5.00%		-1.10%	-\$379,524,511	
<b>Non-US Equity</b>	<b>22.06%</b>	<b>24%</b>	<b>(14-34%)</b>	<b>24.28%</b>	<b>(14-34%)</b>	<b>-2.22%</b>	<b>-\$767,475,324</b>	<b>OK</b>
Total Equity Transition	0.00%	0%		0.00%		0.00%	\$0	
Risk Factors	1.74%	0%		1.74%		0.00%	\$0	
<b>Total Public Equity</b>	<b>46.86%</b>			<b>1.74%</b>		<b>0.00%</b>	<b>\$0</b>	
Private Equity	8.06%	8%		8.00%	(6-10%)	0.06%	\$21,564,062	<b>OK</b>
Private Opportunistic Equity	0.80%	0%		0.00%		0.80%	\$276,798,605	
Public Opportunistic Equity	0.44%	0%		0.00%		0.44%	\$151,094,713	
<b>Total Equity</b>	<b>56.16%</b>	<b>58%</b>	<b>(48-65%)</b>	<b>58.66%</b>	<b>(48-65%)</b>	<b>-2.50%</b>	<b>-\$864,073,473</b>	<b>OK</b>
Commodities	0.65%	2%	(0-4%)	2.02%	(0-4%)	-1.37%	-\$471,877,626	<b>OK</b>
Real Estate	9.03%	10%	(8-12%)	9.03%	(7-11%)	0.00%	\$0	<b>OK</b>
Infrastructure	0.96%	0%	(0-3%)	0.00%	(0-3%)	0.96%	\$331,287,085	<b>OK</b>
Farmland & Timber	0.55%	0%	(0-3%)	0.00%	(0-3%)	0.55%	\$188,959,819	<b>OK</b>
Opportunistic I/L	0.00%	0%		0.00%		0.00%	\$0	
<b>Total Inflation Linked</b>	<b>11.19%</b>	<b>12%</b>	<b>(10-14%)</b>	<b>11.05%</b>		<b>0.14%</b>	<b>\$48,369,278</b>	<b>OK</b>
Multi-Asset Strategies	3.10%	5%	(0-12%)	5.00%	(0-12%)	-1.90%	-\$656,188,733	<b>OK</b>
<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>		<b>100.00%</b>		<b>0.00%</b>	<b>\$0</b>	

Internally Managed Portfolios:	
\$8,500,180,079	25%

\*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.

<b>Total Opportunistic</b>		
Opportunistic Debt	\$1,274,248,079	3.7%
Private Opportunistic Equity	\$276,798,605	0.8%
Public Opportunistic Equity	\$151,094,713	0.4%
Opportunistic IL	\$0	0.0%
	<b>\$1,702,141,397</b>	<b>4.9%</b>

# Public Equity Performance

## Public Equity Performance

*Investment Management Division*

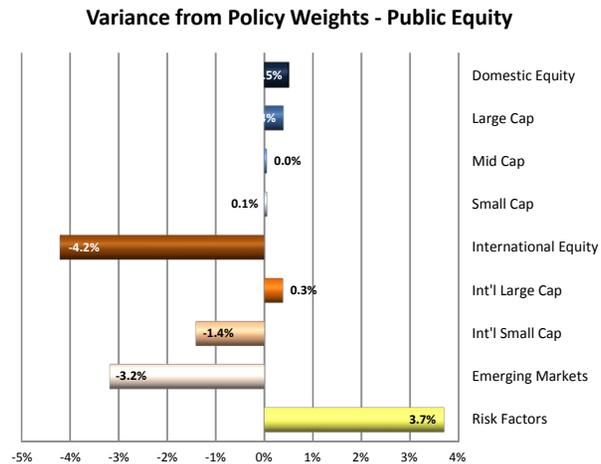
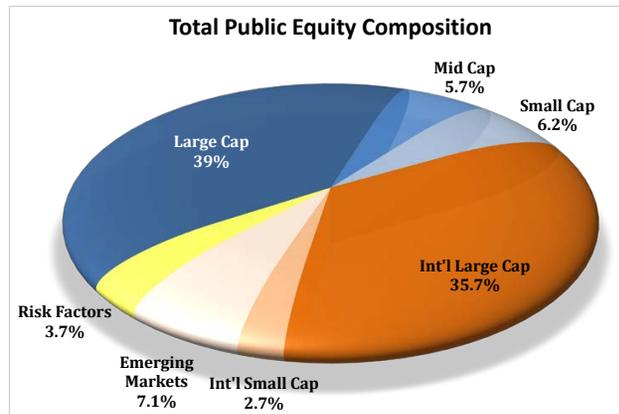
*Performance through August 31, 2016*

### Contents

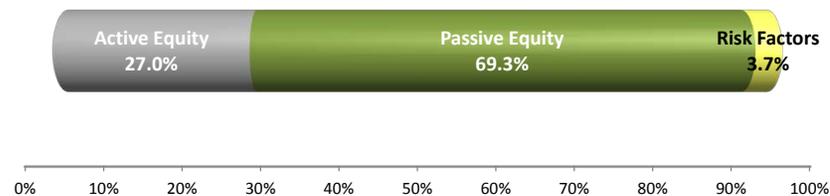
Total Public Equity Snapshot . . . . .	2
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# Public Equity Performance (Continued)

## Total Public Equity Snapshot



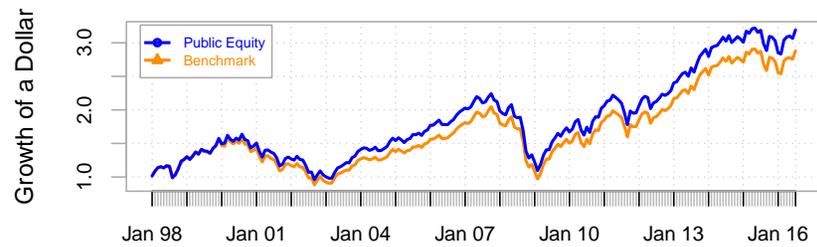
## Active/Passive Composition



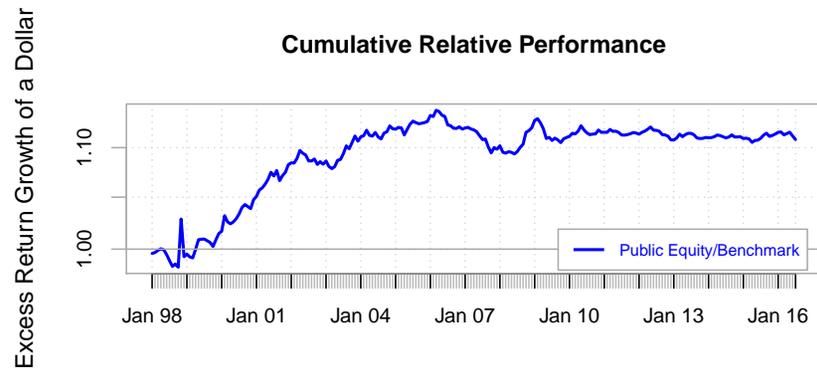
# Public Equity Performance (Continued)

## Total Public Equity Performance

Cumulative Performance

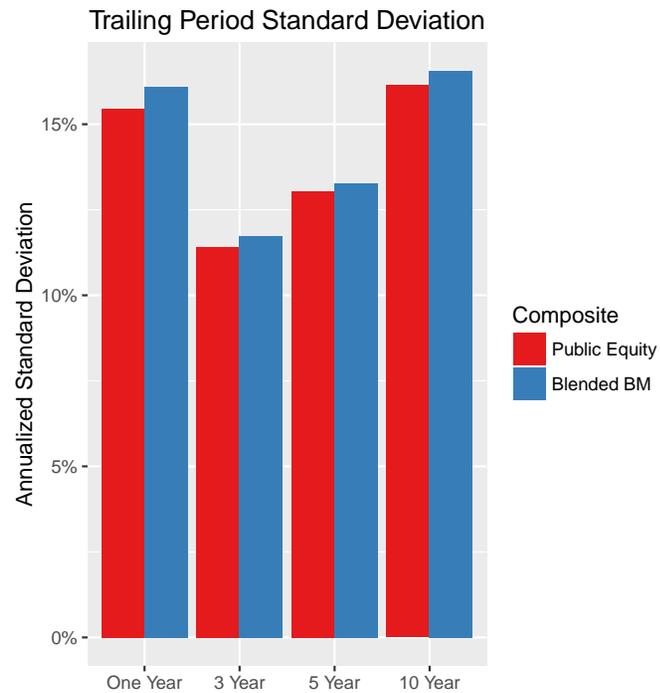
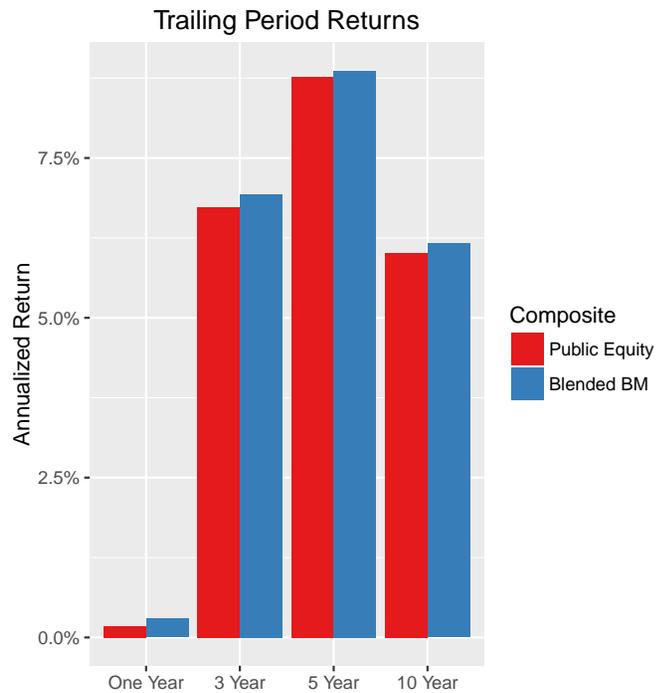


Cumulative Relative Performance



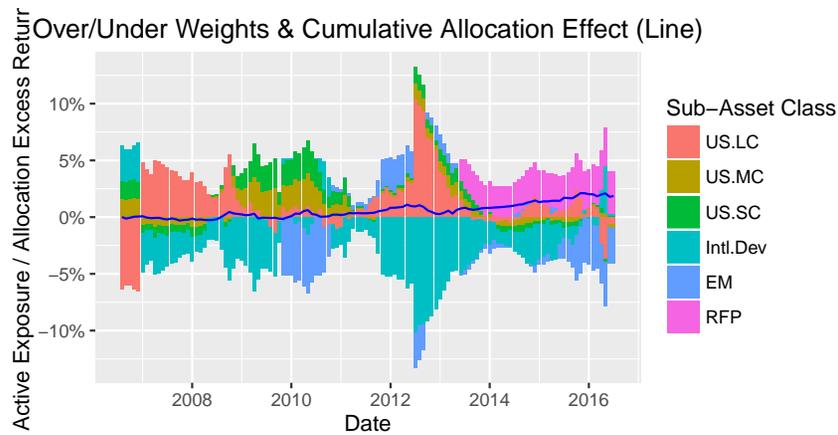
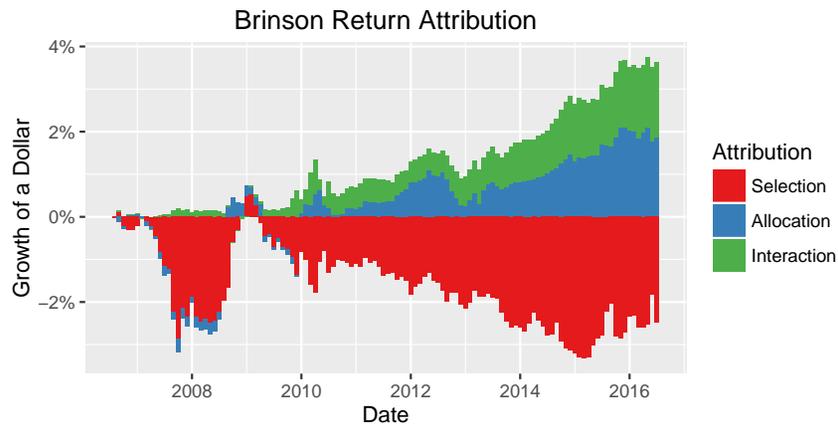
# Public Equity Performance (Continued)

Public Equity Trailing Return Performance

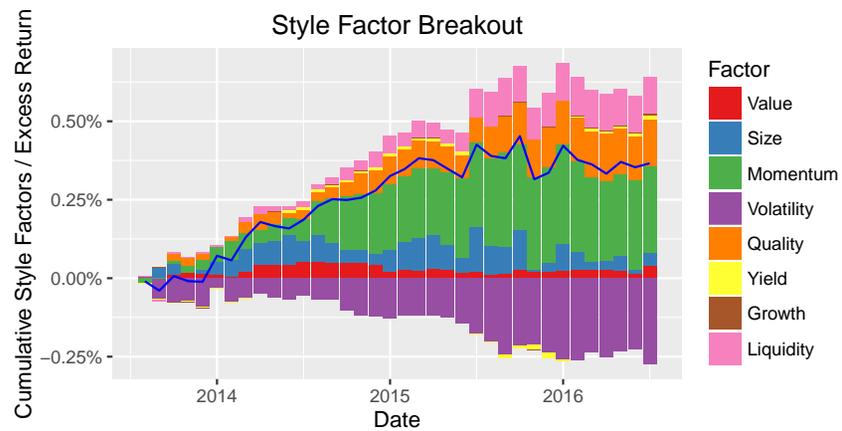
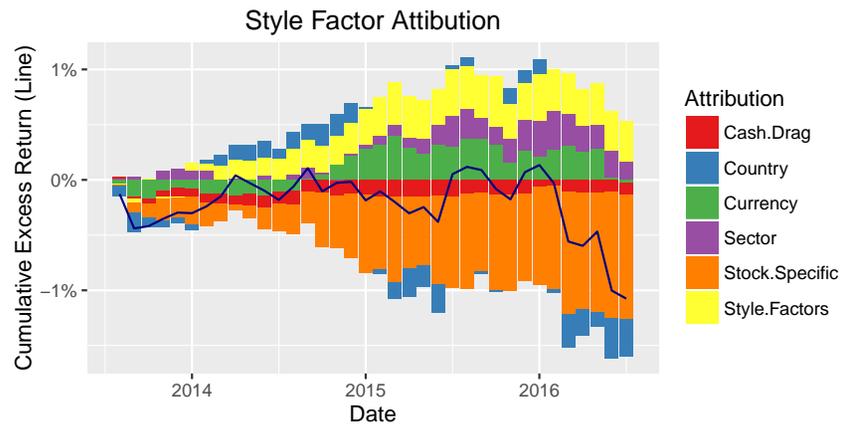


# Public Equity Performance (Continued)

Public Equity Decomposition of Excess Return



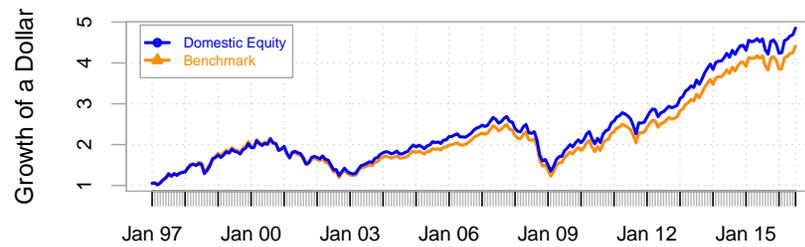
# Public Equity Performance (Continued)



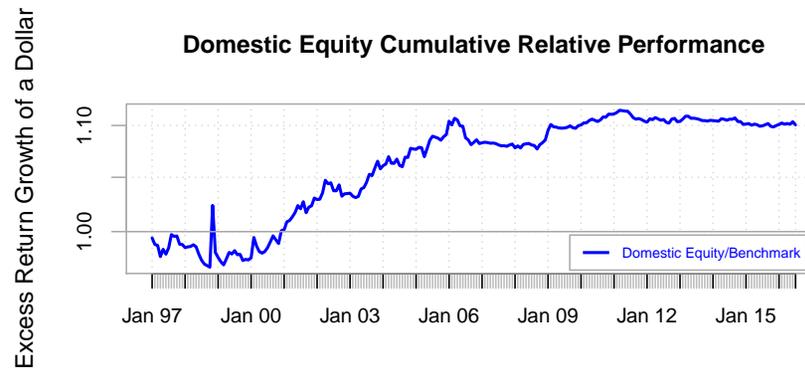
# Public Equity Performance (Continued)

## Domestic Equity Performance

Domestic Equity Cumulative Performance

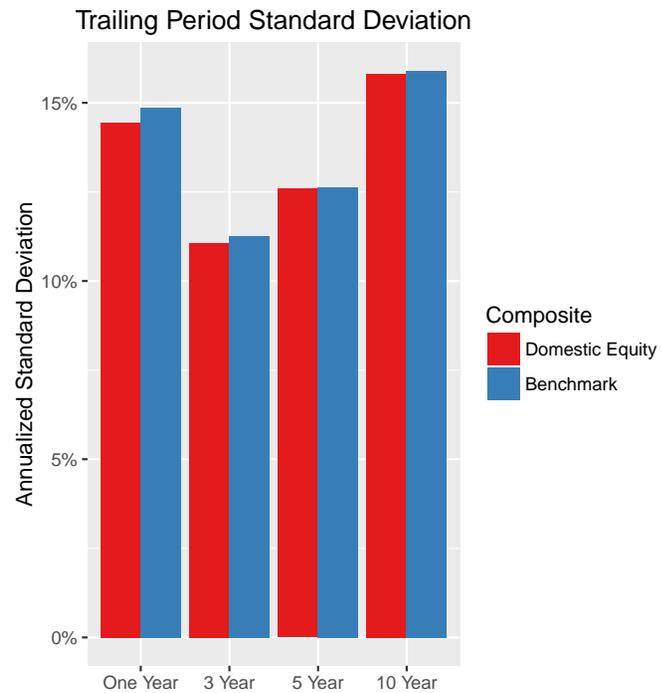
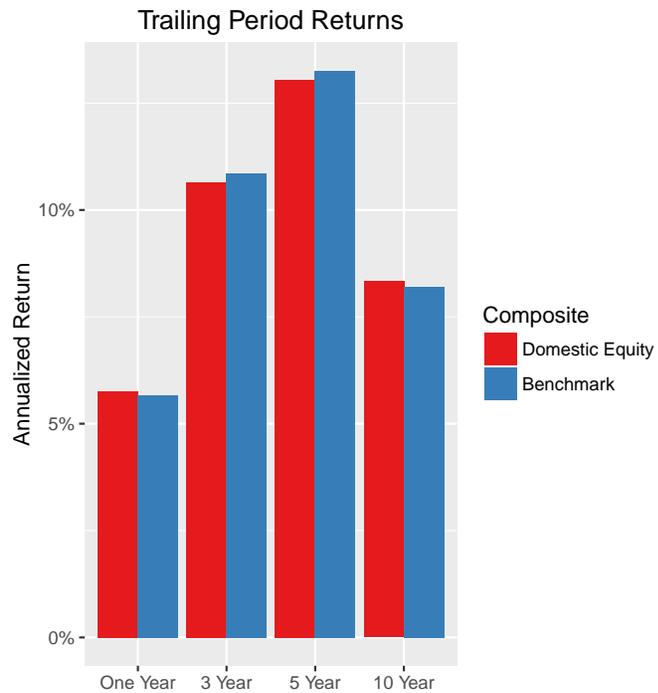


Domestic Equity Cumulative Relative Performance



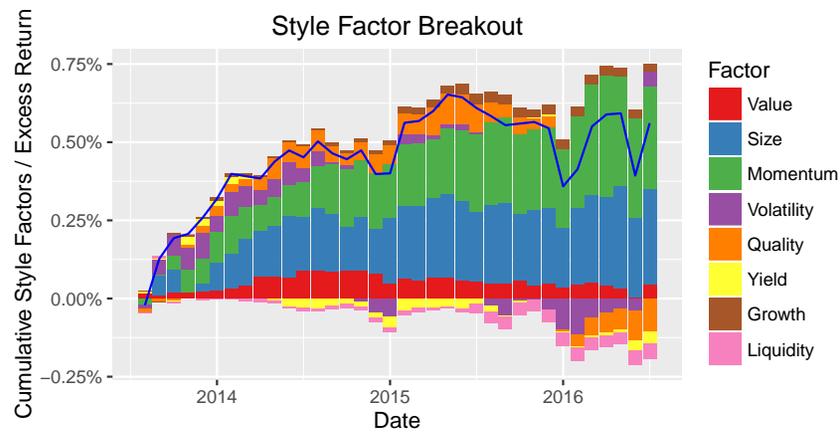
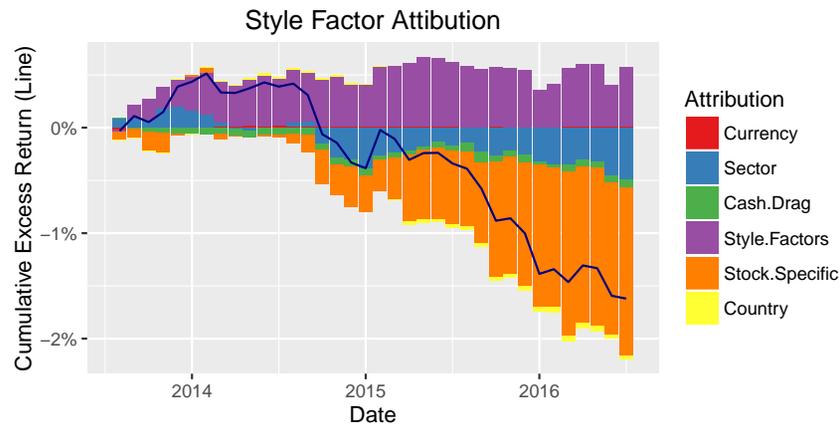
# Public Equity Performance (Continued)

## Domestic Equity Trailing Returns



# Public Equity Performance (Continued)

Domestic Equity Decomposition of Excess Return



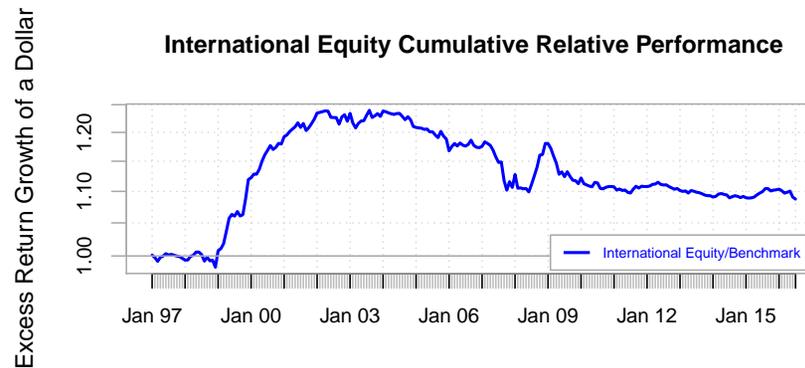
# Public Equity Performance (Continued)

## International Equity Performance

International Equity Cumulative Performance

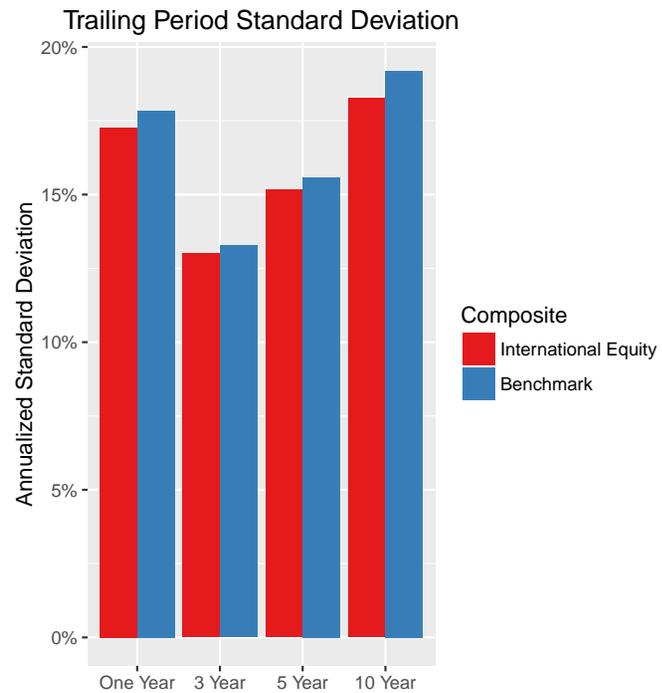
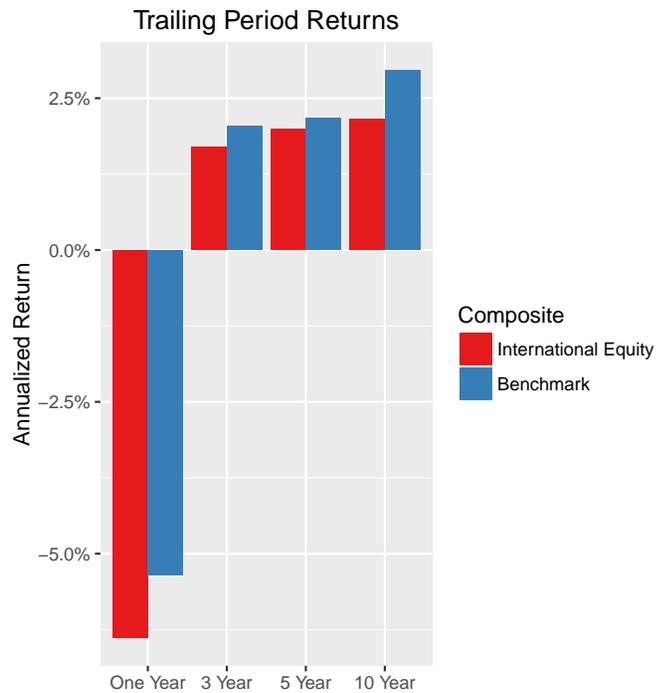


International Equity Cumulative Relative Performance



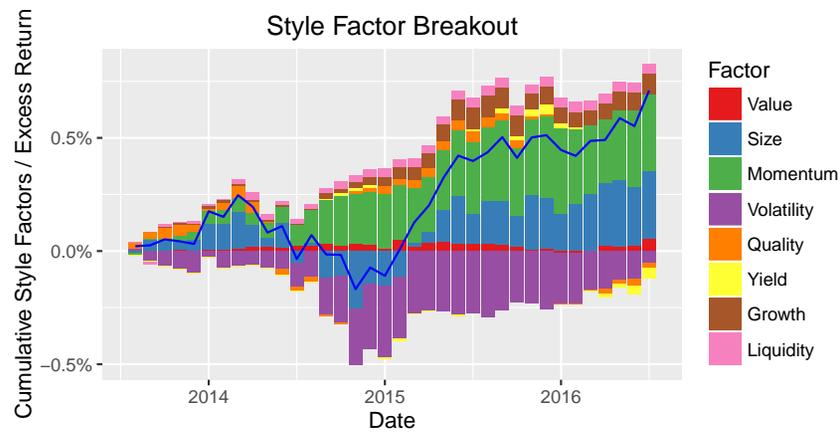
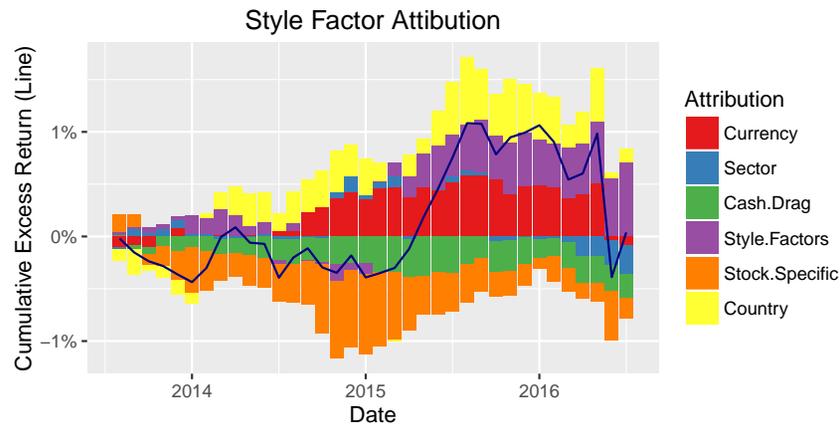
# Public Equity Performance (Continued)

International Equity Trailing Returns



# Public Equity Performance (Continued)

## International Equity Decomposition of Excess Return



# Total Public Equity Returns as of August 31, 2016

## Arizona State Retirement System

### Total Domestic and International Equity Performance Summary

	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Total Domestic and International Equity</b>	<b>16,289,691,875</b>	<b>47.41</b>	<b>0.26</b>	<b>3.24</b>	<b>5.67</b>	<b>4.42</b>	<b>7.25</b>	<b>7.69</b>	<b>10.41</b>	<b>5.79</b>	<b>6.43</b>	<b>Jan-98</b>
ASRS Custom Total Equity Benchmark			<u>0.42</u>	<u>4.12</u>	<u>6.38</u>	<u>4.94</u>	<u>7.87</u>	<u>7.90</u>	<u>10.53</u>	<u>5.94</u>	<u>5.85</u>	Jan-98
Over/Under			-0.16	-0.88	-0.71	-0.52	-0.62	-0.21	-0.12	-0.15	0.58	
Equity Risk Factor Portfolio	600,627,637	1.75	-0.26	3.78	6.87	3.12	11.39	12.59	--	--	11.77	Jun-13
ASRS Custom Total Equity Benchmark			<u>0.42</u>	<u>4.12</u>	<u>6.38</u>	<u>4.94</u>	<u>7.87</u>	<u>7.90</u>	<u>10.53</u>	<u>5.94</u>	<u>7.30</u>	Jun-13
Over/Under			-0.68	-0.34	0.49	-1.82	3.52	4.69			4.47	
<b>Total Domestic and Int'l Equity ex-Equity Risk Factor Portfolio</b>	<b>15,689,064,238</b>	<b>45.66</b>	<b>0.28</b>	<b>3.22</b>	<b>5.63</b>	<b>4.48</b>	<b>7.12</b>	<b>7.58</b>	<b>10.36</b>	<b>5.78</b>	<b>6.42</b>	<b>Jan-98</b>
ASRS Custom Total Equity Benchmark			<u>0.42</u>	<u>4.12</u>	<u>6.38</u>	<u>4.94</u>	<u>7.87</u>	<u>7.90</u>	<u>10.53</u>	<u>5.94</u>	<u>5.85</u>	Jan-98
Over/Under			-0.14	-0.90	-0.75	-0.46	-0.75	-0.32	-0.17	-0.16	0.57	

1. Total Domestic and International Equity market value includes \$2,009,050 remaining in terminated manager and transition accounts.

2. Performance of ASRS Total Domestic and International Equity includes the performance of the ASRS Domestic Equity and ASRS International Equity asset classes and the Equity Risk Factor Portfolio with an inception date of 6/1/2013. NEPC began calculating Total Domestic and International Equity performance in January 2009.

Monthly performance data from January 1998 - December 2008 was provided by State Street.

Note: Performance is based on net of fee performance data.

Composition of ASRS Custom Total Equity Benchmark can be found in the appendix.

# Domestic Equity Returns as of August 31, 2016

## Arizona State Retirement System

### Domestic and Large Cap Equity Performance Summary

	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Total Domestic Equity</b>	<b>8,321,475,105</b>	<b>24.22</b>	<b>0.13</b>	<b>4.33</b>	<b>8.88</b>	<b>3.75</b>	<b>12.41</b>	<b>11.84</b>	<b>14.56</b>	<b>8.11</b>	<b>11.15</b>	<b>Jul-75</b>
ASRS Custom Domestic Equity Benchmark			0.32	4.58	9.02	4.25	12.63	12.09	14.75	7.99	11.24	Jul-75
Over/Under			-0.19	-0.25	-0.14	-0.50	-0.22	-0.25	-0.19	0.12	-0.09	
<b>Total Large Cap Equity</b>	<b>6,308,299,530</b>	<b>18.36</b>	<b>-0.03</b>	<b>4.19</b>	<b>8.41</b>	<b>3.39</b>	<b>13.28</b>	<b>12.33</b>	<b>14.51</b>	<b>7.54</b>	<b>7.96</b>	<b>Jul-02</b>
S&P 500			0.14	4.10	7.82	3.83	12.55	12.30	14.69	7.51	7.89	Jul-02
Over/Under			-0.17	0.09	0.59	-0.44	0.73	0.03	-0.18	0.03	0.07	
<b>Active Large Cap Equity</b>												
LSV	586,569,641	1.71	0.86	3.83	6.45	4.98	7.33	9.54	14.91	7.04	10.35	Jan-03
S&P/Citigroup 500 Value			0.59	4.24	9.77	3.32	13.17	10.37	14.17	5.85	8.67	Jan-03
Over/Under			0.27	-0.41	-3.32	1.66	-5.84	-0.83	0.74	1.19	1.68	
<b>Enhanced/Passive Large Cap Equity</b>												
Internally Managed E2	4,641,650,312	13.51	0.15	4.11	7.80	3.84	12.57	12.30	14.67	7.53	7.63	Apr-97
S&P 500			0.14	4.10	7.82	3.83	12.55	12.30	14.69	7.51	7.56	Apr-97
Over/Under			0.01	0.01	-0.02	0.01	0.02	0.00	-0.02	0.02	0.07	
Internally Managed E7	518,351,270	1.51	-0.49	5.27	13.07	2.12	21.71	13.15	--	--	13.85	Aug-12
MSCI USA High Dividend Yield Index			-0.49	5.26	13.16	2.11	21.83	13.28	15.11	8.69	13.88	Aug-12
Over/Under			0.00	0.01	-0.09	0.01	-0.12	-0.13	--	--	-0.03	
Internally Managed E8	561,728,306	1.63	-1.94	4.04	11.04	-0.49	17.39	14.73	--	--	14.37	Aug-12
MSCI USA Minimum Volatility Index			-1.95	4.05	11.23	-0.50	17.57	14.71	15.49	9.00	14.11	Aug-12
Over/Under			0.01	-0.01	-0.19	0.01	-0.18	0.02	--	--	0.26	

1. Total Domestic Equity includes \$30,978 in terminated manager and transition accounts

2. In mid-December, 2005 the S&P/Citigroup style indices replaced the S&P/Barra style indices. Returns are a blend of S&P/Barra indices prior to mid-December 2005 and S&P/Citigroup indices going forward.

Note: Performance is reported net of fees.

Composition of ASRS Custom Domestic Equity Benchmark can be found in the appendix.

# Domestic Equity Returns as of August 31, 2016

## Arizona State Retirement System

### Mid Cap Equity Performance Summary

	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Total Mid Cap Equity</b>	<b>931,095,677</b>	<b>2.71</b>	<b>0.32</b>	<b>4.30</b>	<b>11.15</b>	<b>4.37</b>	<b>10.30</b>	<b>11.12</b>	<b>14.06</b>	<b>9.23</b>	<b>10.02</b>	<b>Jul-02</b>
S&P 400 MidCap			0.50	5.25	13.12	4.81	12.33	11.45	14.07	9.26	10.08	Jul-02
Over/Under			-0.18	-0.95	-1.97	-0.44	-2.03	-0.33	-0.01	-0.03	-0.06	
<b>Active Mid Cap Equity</b>												
Wellington	289,509,847	0.84	-0.13	1.77	6.14	3.25	5.35	11.06	14.67	9.73	10.80	Jul-02
S&P 400 MidCap			0.50	5.25	13.12	4.81	12.33	11.45	14.07	9.26	10.08	Jul-02
Over/Under			-0.63	-3.48	-6.98	-1.56	-6.98	-0.39	0.60	0.47	0.72	
<b>Passive Mid Cap Equity</b>												
Internally Managed E3	326,338,700	0.95	0.63	5.67	11.34	5.18	11.34	11.86	13.63	10.73	8.66	Dec-00
S&P/Citigroup 400 Growth			0.62	5.53	11.10	5.16	11.25	11.81	13.47	10.16	8.16	Dec-00
Over/Under			0.01	0.14	0.24	0.02	0.09	0.05	0.16	0.57	0.50	
Internally Managed E4	315,247,130	0.92	0.42	5.11	15.30	4.58	13.37	10.89	14.50	8.58	10.06	Jul-02
S&P/Citigroup 400 Value			0.39	5.00	15.22	4.49	13.31	10.95	14.61	8.31	9.89	Jul-02
Over/Under			0.03	0.11	0.08	0.09	0.06	-0.06	-0.11	0.27	0.17	

1. In mid-December, 2005 the S&P/Citigroup style indices replaced the S&P/Barra style indices. Returns are a blend of S&P/Barra indices prior to mid-December 2005 and S&P/Citigroup indices going forward.

Note: Performance is reported net of fees.

# Domestic Equity Returns as of August 31, 2016

## Arizona State Retirement System

### Small Cap Equity Performance Summary

	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Total Small Cap Equity</b>	<b>1,007,233,007</b>	<b>2.93</b>	<b>0.99</b>	<b>5.32</b>	<b>9.21</b>	<b>5.53</b>	<b>7.60</b>	<b>8.93</b>	<b>14.27</b>	<b>8.66</b>	<b>10.06</b>	<b>Jul-02</b>
ASRS Custom Small Cap Equity Blended Benchmark			1.36	7.16	13.15	6.52	13.26	11.02	15.18	8.83	9.92	Jul-02
Over/Under			-0.37	-1.84	-3.94	-0.99	-5.66	-2.09	-0.91	-0.17	0.14	
<b>Active Small Cap Equity</b>												
TimesSquare	376,049,617	1.09	0.77	4.71	5.51	4.86	3.83	8.48	14.79	10.68	11.10	Apr-05
Times Square Blended Benchmark			1.06	7.18	5.96	7.67	3.55	9.17	13.24	8.83	9.07	Apr-05
Over/Under			-0.29	-2.47	-0.45	-2.81	0.28	-0.69	1.55	1.85	2.03	
<b>Active Small Cap Equity</b>												
DFA - US Small Cap	288,315,630	0.84	0.81	3.89	9.94	5.20	6.44	7.53	13.45	7.25	11.21	Sep-98
DFA Blended Benchmark			1.13	7.18	15.66	6.35	15.36	10.64	15.25	7.84	10.75	Sep-98
Over/Under			-0.32	-3.29	-5.72	-1.15	-8.92	-3.11	-1.80	-0.59	0.46	
<b>Passive Small Cap Equity</b>												
Internally Managed E6	342,867,760	1.00	1.38	7.22	12.81	6.56	12.93	10.99	15.13	--	8.23	Feb-07
S&P 600 SmallCap			1.36	7.16	13.15	6.52	13.26	11.02	15.18	8.73	7.94	Feb-07
Over/Under			0.02	0.06	-0.34	0.04	-0.33	-0.03	-0.05		0.29	

Note: Performance is reported net of fees.

Composition of ASRS Custom Small Cap Equity Blended Benchmark, Times Square Blended Benchmark and DFA Blended Benchmark can be found in the appendix.

# Domestic Equity Returns as of August 31, 2016

## Arizona State Retirement System

### Public Opportunistic Equity Performance Summary

	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Total Public Opportunistic Equity</b>	<b>74,815,915</b>	<b>0.22</b>	--	--	--	--	--	--	--	--	--	<b>Sep-16</b>
ASRS Custom Domestic Equity Benchmark Over/Under			--	--	--	--	--	--	--	--	--	Sep-16
Tortoise Capital Advisors	74,815,915	0.22	--	--	--	--	--	--	--	--	--	Sep-16
Alerian MLP Index Over/Under			--	--	--	--	--	--	--	--	--	Sep-16

1. Tortoise Capital Advisors was funded in late August 2016. Inception date for performance reporting purposes is September 1, 2016.

Note: Performance is reported net of fees.

Composition of ASRS Custom Domestic Equity Benchmark can be found in the appendix.

# International Equity Returns as of August 31, 2016

## Arizona State Retirement System

### International Developed Markets Equity Performance Summary

	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Total International Equity</b>	<b>7,366,140,757</b>	<b>21.44</b>	<b>0.45</b>	<b>2.32</b>	<b>2.04</b>	<b>5.31</b>	<b>1.18</b>	<b>2.30</b>	<b>3.89</b>	<b>1.89</b>	<b>5.74</b>	<b>Apr-87</b>
ASRS Custom Int'l Equity Benchmark			0.52	3.62	3.53	5.70	2.84	2.65	4.21	2.72	5.48	Apr-87
Over/Under			-0.07	-1.30	-1.49	-0.39	-1.66	-0.35	-0.32	-0.83	0.26	
<b>Total International Developed Markets Equity</b>	<b>6,221,819,303</b>	<b>18.11</b>	<b>0.21</b>	<b>1.12</b>	<b>0.58</b>	<b>5.10</b>	<b>0.03</b>	<b>2.91</b>	<b>5.46</b>	<b>2.85</b>	<b>6.08</b>	<b>Apr-87</b>
ASRS Custom Int'l Developed Markets Equity Benchmark			0.00	1.43	0.68	5.18	0.49	3.06	5.63	3.46	5.74	Apr-87
Over/Under			0.21	-0.31	-0.10	-0.08	-0.46	-0.15	-0.17	-0.61	0.34	
<b>Active Large Cap International Equity</b>												
Brandes	563,286,631	1.64	1.62	0.39	0.23	4.77	-2.40	3.79	6.05	2.03	8.16	Oct-98
Brandes Custom Benchmark			0.07	1.61	0.49	5.14	-0.12	2.49	5.21	3.05	5.48	Oct-98
Over/Under			1.55	-1.22	-0.26	-0.37	-2.28	1.30	0.84	-1.02	2.68	
American Century	538,969,462	1.57	-1.54	-2.14	-4.33	2.81	-3.81	--	--	--	-3.83	Jul-14
MSCI EAFE			0.07	1.61	0.49	5.14	-0.12	2.49	5.21	2.05	-4.52	Jul-14
Over/Under			-1.61	-3.75	-4.82	-2.33	-3.69	--	--	--	0.69	
Trinity Street	323,773,748	0.94	2.15	-0.60	0.08	7.66	-0.83	--	--	--	-3.87	Jul-14
MSCI EAFE			0.07	1.61	0.49	5.14	-0.12	2.49	5.21	2.05	-4.52	Jul-14
Over/Under			2.08	-2.21	-0.41	2.52	-0.71	--	--	--	0.65	
TS&W International	301,254,242	0.88	1.22	1.85	0.97	7.12	0.91	--	--	--	-2.73	Jul-14
MSCI EAFE			0.07	1.61	0.49	5.14	-0.12	2.49	5.21	2.05	-4.52	Jul-14
Over/Under			1.15	0.24	0.48	1.98	1.03	--	--	--	1.79	

1. Total International Equity market value includes \$529,697 in terminated manager and transition accounts.

2. Total International Developed Markets Equity market value includes \$191,502 in terminated manager accounts.

3. American Century, Trinity Street and TS&W were funded in mid-June 2014. Inception date for performance reporting purposes is July 1, 2014.

Note: Performance is reported net of fees.

Composition of ASRS Custom Int'l Equity Benchmark, ASRS Custom Int'l Developed Markets Equity Benchmark, and Brandes Custom Benchmark can be found in the appendix.

# International Equity Returns as of August 31, 2016

## Arizona State Retirement System

### International Developed Markets Equity Performance Summary

	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Passive Large Cap International Equity</b>												
BlackRock EAFE Equity Index	4,058,033,026	11.81	0.06	1.65	0.81	5.14	0.24	2.76	5.30	--	6.89	Jul-09
MSCI EAFE			0.07	1.61	0.49	5.14	-0.12	2.49	5.21	2.05	6.85	Jul-09
Over/Under			-0.01	0.04	0.32	0.00	0.36	0.27	0.09		0.04	
<b>Active Small Cap International Equity</b>												
DFA - International Small Cap	106,239,925	0.31	0.17	1.30	3.61	7.96	2.46	4.48	6.46	3.25	4.85	Sep-05
MSCI EAFE Small Cap			-0.59	-0.07	2.15	5.50	5.41	7.10	8.19	4.39	5.70	Sep-05
Over/Under			0.76	1.37	1.46	2.46	-2.95	-2.62	-1.73	-1.14	-0.85	
Franklin Templeton	102,305,920	0.30	1.72	-6.76	-5.11	4.18	-8.06	0.06	6.92	--	4.83	Apr-11
MSCI EAFE Small Cap			-0.59	-0.07	2.15	5.50	5.41	7.10	8.19	4.39	5.85	Apr-11
Over/Under			2.31	-6.69	-7.26	-1.32	-13.47	-7.04	-1.27		-1.02	
AQR Capital	98,932,221	0.29	-1.57	-0.59	-0.32	4.61	3.22	8.05	--	--	8.21	Jun-13
MSCI EAFE Small Cap			-0.59	-0.07	2.15	5.50	5.41	7.10	8.19	4.39	7.25	Jun-13
Over/Under			-0.98	-0.52	-2.47	-0.89	-2.19	0.95			0.96	
<b>Passive Small Cap International Equity</b>												
BlackRock EAFE Small Cap Equity Index	128,830,172	0.37	-0.65	0.04	2.47	5.53	5.72	7.26	8.15	--	10.16	Jun-10
MSCI EAFE Small Cap			-0.59	-0.07	2.15	5.50	5.41	7.10	8.19	4.39	10.20	Jun-10
Over/Under			-0.06	0.11	0.32	0.03	0.31	0.16	-0.04		-0.04	

Note: Performance is reported net of fees.

# International Equity Returns as of August 31, 2016

## Arizona State Retirement System

### International Emerging Markets Equity Performance Summary

	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Total International Emerging Markets Equity</b>	<b>1,143,985,716</b>	<b>3.33</b>	<b>1.77</b>	<b>10.53</b>	<b>13.60</b>	<b>6.47</b>	<b>9.97</b>	<b>1.21</b>	<b>0.08</b>	<b>--</b>	<b>-0.53</b>	<b>Oct-10</b>
<i>MSCI Emerging Markets</i>			<u>2.49</u>	<u>11.94</u>	<u>14.55</u>	<u>7.64</u>	<u>11.83</u>	<u>1.14</u>	<u>-0.27</u>	<u>4.13</u>	<u>-0.50</u>	<u>Oct-10</u>
Over/Under			-0.72	-1.41	-0.95	-1.17	-1.86	0.07	0.35		-0.03	
<b>Active Emerging Markets Equity</b>												
Eaton Vance	290,027,453	0.84	0.06	8.15	14.46	4.55	8.21	-0.05	-0.60	--	-0.82	Dec-10
<i>MSCI Emerging Markets</i>			<u>2.49</u>	<u>11.94</u>	<u>14.55</u>	<u>7.64</u>	<u>11.83</u>	<u>1.14</u>	<u>-0.27</u>	<u>4.13</u>	<u>-0.54</u>	<u>Dec-10</u>
Over/Under			-2.43	-3.79	-0.09	-3.09	-3.62	-1.19	-0.33		-0.28	
LSV Emerging Market	126,783,452	0.37	3.01	15.43	17.24	10.04	12.06	0.88	-0.23	--	-0.39	Dec-10
<i>MSCI Emerging Markets</i>			<u>2.49</u>	<u>11.94</u>	<u>14.55</u>	<u>7.64</u>	<u>11.83</u>	<u>1.14</u>	<u>-0.27</u>	<u>4.13</u>	<u>-0.54</u>	<u>Dec-10</u>
Over/Under			0.52	3.49	2.69	2.40	0.23	-0.26	0.04		0.15	
William Blair	384,857,037	1.12	2.11	9.67	11.25	5.85	9.29	3.54	2.53	--	0.96	Nov-10
<i>MSCI Emerging Markets</i>			<u>2.49</u>	<u>11.94</u>	<u>14.55</u>	<u>7.64</u>	<u>11.83</u>	<u>1.14</u>	<u>-0.27</u>	<u>4.13</u>	<u>-0.99</u>	<u>Nov-10</u>
Over/Under			-0.38	-2.27	-3.30	-1.79	-2.54	2.40	2.80		1.95	
<b>Passive Emerging Markets Equity</b>												
BlackRock Emerging Markets Equity Index	342,317,773	1.00	2.40	11.86	14.26	7.55	11.49	0.91	-0.63	--	-0.87	Oct-10
<i>MSCI Emerging Markets</i>			<u>2.49</u>	<u>11.94</u>	<u>14.55</u>	<u>7.64</u>	<u>11.83</u>	<u>1.14</u>	<u>-0.27</u>	<u>4.13</u>	<u>-0.50</u>	<u>Oct-10</u>
Over/Under			-0.09	-0.08	-0.29	-0.09	-0.34	-0.23	-0.36		-0.37	

Note: Performance is reported net of fees.

# Fixed Income Returns as of August 31, 2016

## Arizona State Retirement System

### Fixed Income and Interest Rate Sensitive Fixed Income Performance Summary

	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Total Public Markets Fixed Income</b>	<b>5,549,208,394</b>	<b>16.15</b>	<b>0.24</b>	<b>3.21</b>	<b>7.77</b>	<b>1.37</b>	<b>7.22</b>	<b>4.56</b>	<b>3.51</b>	<b>5.19</b>	<b>8.26</b>	<b>Jul-75</b>
ASRS Custom Public Markets Fixed Income Benchmark			<u>0.48</u>	<u>3.27</u>	<u>8.13</u>	<u>1.68</u>	<u>6.87</u>	<u>3.74</u>	<u>2.97</u>	<u>4.72</u>	--	Jul-75
Over/Under			-0.24	-0.06	-0.36	-0.31	0.35	0.82	0.54	0.47		
<b>Total Interest Rate Sensitive Fixed Income</b>	<b>4,424,042,436</b>	<b>12.88</b>	<b>-0.22</b>	<b>2.83</b>	<b>6.88</b>	<b>0.61</b>	<b>7.06</b>	<b>4.80</b>	<b>3.60</b>	<b>5.17</b>	<b>8.26</b>	<b>Jul-75</b>
Barclays Aggregate			<u>-0.11</u>	<u>2.32</u>	<u>5.86</u>	<u>0.52</u>	<u>5.97</u>	<u>4.37</u>	<u>3.24</u>	<u>4.89</u>	--	Jul-75
Over/Under			-0.11	0.51	1.02	0.09	1.09	0.43	0.36	0.28		
<b>Treasuries (Long Duration)</b>												
BlackRock Long Gov't Bond Index	563,632,380	1.64	-0.86	7.57	16.67	1.35	16.91	--	--	--	16.91	Sep-15
Barclays U.S. Treasury Long TR USD			<u>-0.95</u>	<u>7.49</u>	<u>16.59</u>	<u>1.27</u>	<u>16.75</u>	<u>11.90</u>	<u>7.83</u>	<u>8.41</u>	<u>16.75</u>	Sep-15
Over/Under			0.09	0.08	0.08	0.08	0.16				0.16	
<b>Core Fixed Income</b>												
BlackRock US Debt Index	1,938,599,170	5.64	-0.12	2.31	5.95	0.52	6.08	--	--	--	4.24	May-14
Barclays Aggregate			<u>-0.11</u>	<u>2.32</u>	<u>5.86</u>	<u>0.52</u>	<u>5.97</u>	<u>4.37</u>	<u>3.24</u>	<u>4.89</u>	<u>4.10</u>	May-14
Over/Under			-0.01	-0.01	0.09	0.00	0.11				0.14	
Internally Managed F2	1,921,810,885	5.59	-0.14	2.30	5.80	0.49	6.01	4.55	3.50	5.15	5.48	Oct-00
Barclays Aggregate			<u>-0.11</u>	<u>2.32</u>	<u>5.86</u>	<u>0.52</u>	<u>5.97</u>	<u>4.37</u>	<u>3.24</u>	<u>4.89</u>	<u>5.32</u>	Oct-00
Over/Under			-0.03	-0.02	-0.06	-0.03	0.04	0.18	0.26	0.26	0.16	

- Total Public Markets Fixed Income market value includes \$8 remaining in terminated manager accounts.
  - BlackRock Long Gov't Bond Index was funded in mid-August 2015. Inception date for performance reporting purposes is September 1, 2015.
  - BlackRock US Debt Index was funded in mid-April 2014. Inception date for performance reporting purposes is May 1, 2014.
- Note: Performance is reported net of fees.  
Composition of ASRS Custom Public Markets Fixed Income Benchmark can be found in the appendix.

# Fixed Income Returns as of August 31, 2016

## Arizona State Retirement System

### Total High Yield Fixed Income Performance Summary

	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Total High Yield Fixed Income</b>	<b>1,125,165,958</b>	<b>3.27</b>	<b>2.08</b>	<b>4.95</b>	<b>11.44</b>	<b>4.45</b>	<b>7.88</b>	<b>6.00</b>	<b>7.59</b>	<b>--</b>	<b>8.37</b>	<b>Oct-09</b>
<i>Barclays High Yield</i>			<i>2.09</i>	<i>5.82</i>	<i>14.35</i>	<i>4.85</i>	<i>9.07</i>	<i>5.40</i>	<i>7.48</i>	<i>7.79</i>	<i>8.76</i>	<i>Oct-09</i>
Over/Under			<i>-0.01</i>	<i>-0.87</i>	<i>-2.91</i>	<i>-0.40</i>	<i>-1.19</i>	0.60	0.11		<i>-0.39</i>	
<b>Active High Yield Fixed Income</b>												
Columbia Management	742,130,738	2.16	2.00	4.60	10.49	4.21	8.12	6.32	7.94	--	8.74	Oct-09
<i>Barclays High Yield</i>			<i>2.09</i>	<i>5.82</i>	<i>14.35</i>	<i>4.85</i>	<i>9.07</i>	<i>5.40</i>	<i>7.48</i>	<i>7.79</i>	<i>8.76</i>	<i>Oct-09</i>
Over/Under			<i>-0.09</i>	<i>-1.22</i>	<i>-3.86</i>	<i>-0.64</i>	<i>-0.95</i>	0.92	0.46		<i>-0.02</i>	
JP Morgan High Yield	383,035,212	1.11	2.24	5.63	13.34	4.91	7.45	5.47	--	--	5.51	Jul-13
<i>Barclays High Yield</i>			<i>2.09</i>	<i>5.82</i>	<i>14.35</i>	<i>4.85</i>	<i>9.07</i>	<i>5.40</i>	<i>7.48</i>	<i>7.79</i>	<i>5.53</i>	<i>Jul-13</i>
Over/Under			0.15	<i>-0.19</i>	<i>-1.01</i>	0.06	<i>-1.62</i>	0.07			<i>-0.02</i>	

1. Total High Yield Fixed Income includes \$7 in terminated manager and transition accounts.  
 Note: Performance is reported net of fees.

# Fixed Income and Commodity Returns as of August 31, 2016

## Arizona State Retirement System

### Inflation-Linked Assets Performance Summary

	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Total Inflation-Linked Assets</b>	<b>216,612,606</b>	<b>0.63</b>	<b>-1.23</b>	<b>-3.50</b>	<b>4.22</b>	<b>-6.49</b>	<b>-11.09</b>	<b>-14.79</b>	<b>-12.20</b>	<b>--</b>	<b>-6.34</b>	<b>Feb-10</b>
ASRS Custom Inflation-Linked Benchmark			-1.76	-2.93	5.57	-6.78	-8.76	-13.98	-12.75	-2.81	-7.09	Feb-10
Over/Under			0.53	-0.57	-1.35	0.29	-2.33	-0.81	0.55		0.75	
<b>Total Commodities</b>	<b>216,612,606</b>	<b>0.63</b>	<b>-1.23</b>	<b>-3.50</b>	<b>4.22</b>	<b>-6.49</b>	<b>-11.09</b>	<b>-14.79</b>	<b>-12.17</b>	<b>--</b>	<b>-6.63</b>	<b>Sep-10</b>
Bloomberg Commodity Index			-1.76	-2.93	5.57	-6.78	-8.76	-13.98	-12.75	-6.20	-7.26	Sep-10
Over/Under			0.53	-0.57	-1.35	0.29	-2.33	-0.81	0.58		0.63	
Gresham	216,612,606	0.63	-1.23	-3.50	4.22	-6.49	-11.09	-14.79	-12.04	--	-6.06	Sep-10
Bloomberg Commodity Index			-1.76	-2.93	5.57	-6.78	-8.76	-13.98	-12.75	-6.20	-7.26	Sep-10
Over/Under			0.53	-0.57	-1.35	0.29	-2.33	-0.81	0.71		1.20	

Note: Performance is reported net of fees.  
 Composition of ASRS Custom Inflation-Linked Benchmark can be found in the appendix.

# Multi-Asset Class Returns as of August 31, 2016

## Arizona State Retirement System

### Multi-Asset Class Strategies Performance Summary

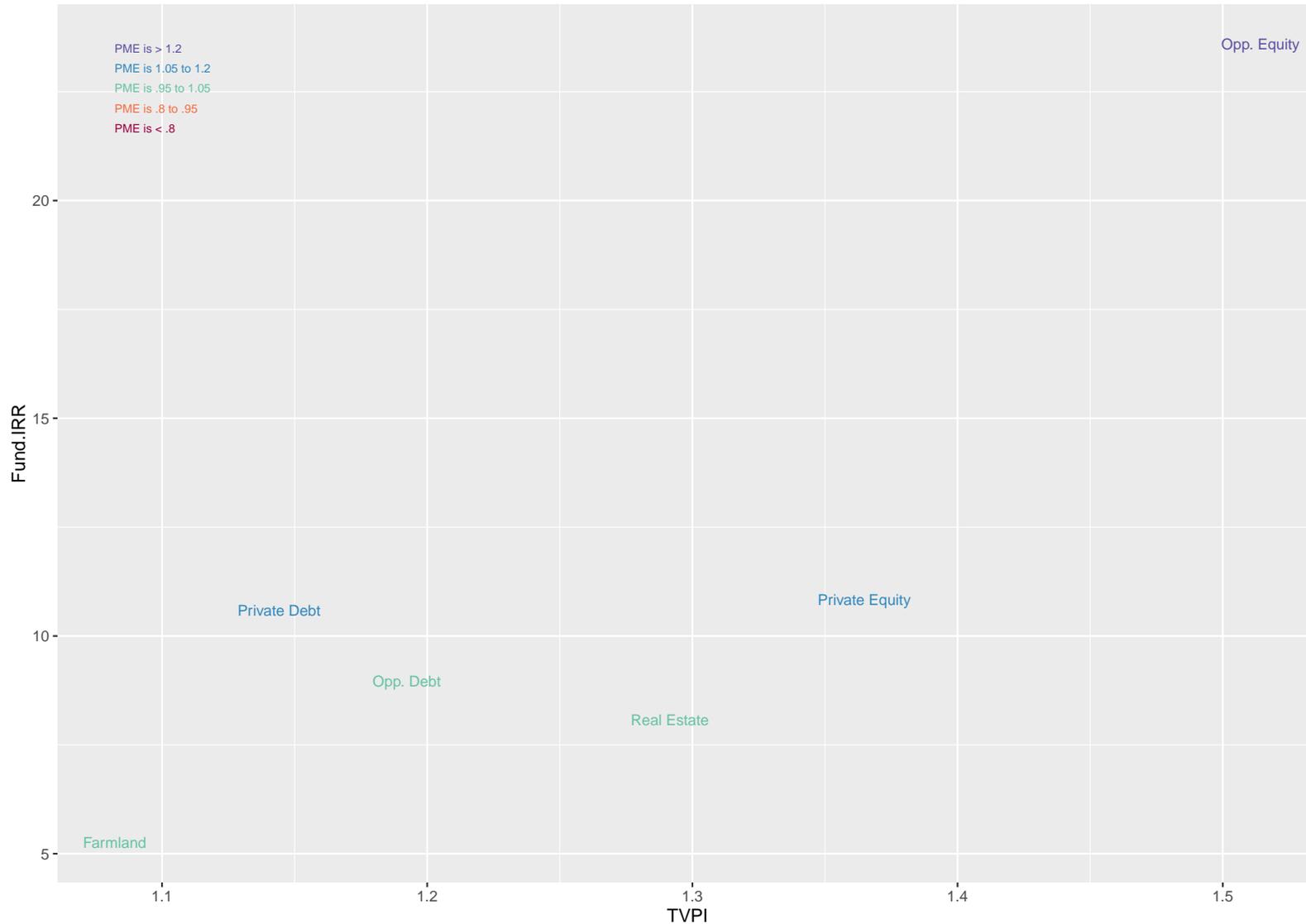
	Market Value (\$)	% of Portfolio	1 Mo (%)	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Return (%)	Since
<b>Total Multi-Asset Class Strategies</b>	<b>1,028,497,144</b>	<b>2.99</b>	<b>0.35</b>	<b>-1.83</b>	<b>-7.21</b>	<b>-11.66</b>	<b>1.48</b>	<b>4.81</b>	<b>5.67</b>	<b>6.16</b>	<b>Jan-04</b>
<i>Multi-Asset Class Strategies Custom Benchmark</i>			<i>0.02</i>	<i>0.06</i>	<i>0.14</i>	<i>-0.95</i>	<i>4.45</i>	<i>6.54</i>	<i>5.16</i>	<i>5.70</i>	<i>Jan-04</i>
Over/Under			0.33	-1.89	-7.35	-10.71	-2.97	-1.73	0.51	0.46	
<b>Bridgewater</b>	<b>1,028,497,144</b>	<b>2.99</b>	<b>0.35</b>	<b>-1.83</b>	<b>-7.21</b>	<b>-10.63</b>	<b>2.62</b>	<b>6.01</b>	<b>6.91</b>	<b>7.27</b>	<b>Jan-04</b>
<i>ASRS Bridgewater Custom Benchmark</i>			<i>0.02</i>	<i>0.06</i>	<i>0.14</i>	<i>0.16</i>	<i>5.01</i>	<i>6.88</i>	<i>5.33</i>	<i>5.83</i>	<i>Jan-04</i>
Over/Under			0.33	-1.89	-7.35	-10.79	-2.39	-0.87	1.58	1.44	

Note: Performance is reported net of fees.

Composition of Multi-Asset Class Strategies Custom Benchmark and ASRS Bridgewater Custom Benchmark can be found in the appendix.

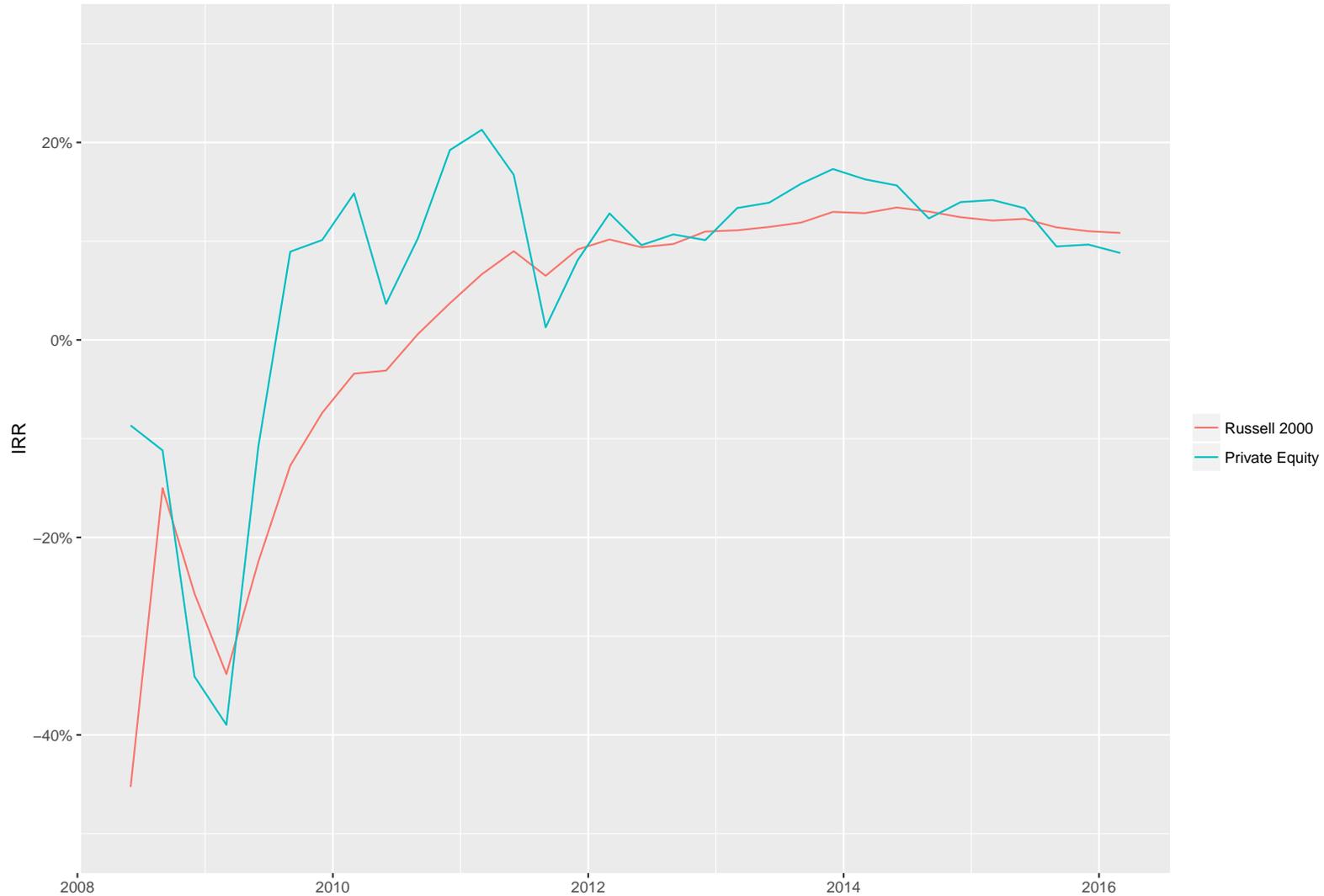
# Private Markets Summary

Private Markets Summary



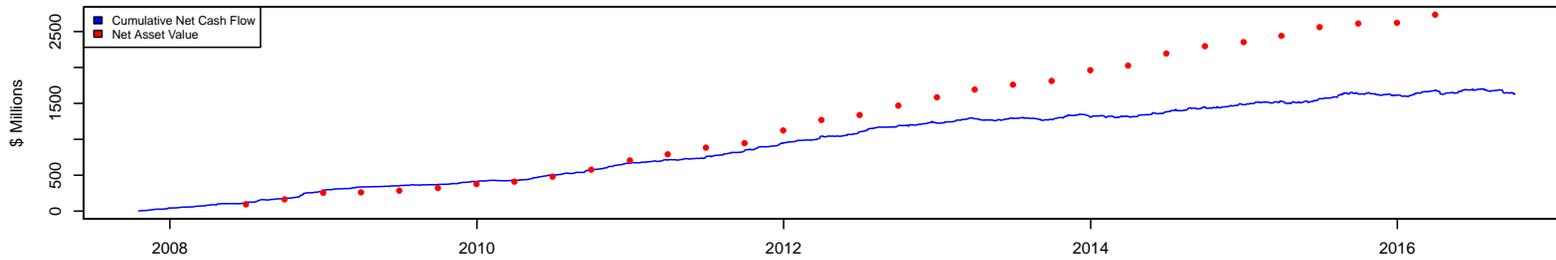
# Private Equity Performance

Private Equity IRRs compared to Russell 2000  
Inception through indicated date

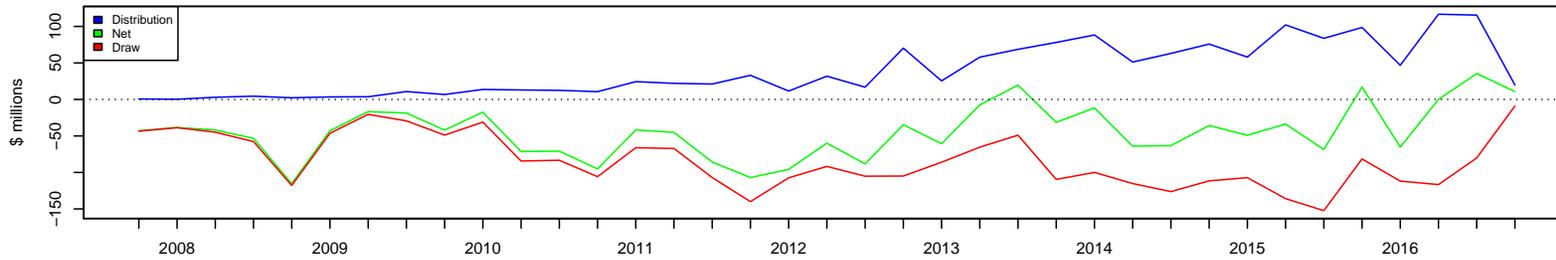


# Private Equity Performance (Continued)

Private Equity Cumulative Net Capital Contributed  
 Compared to Value

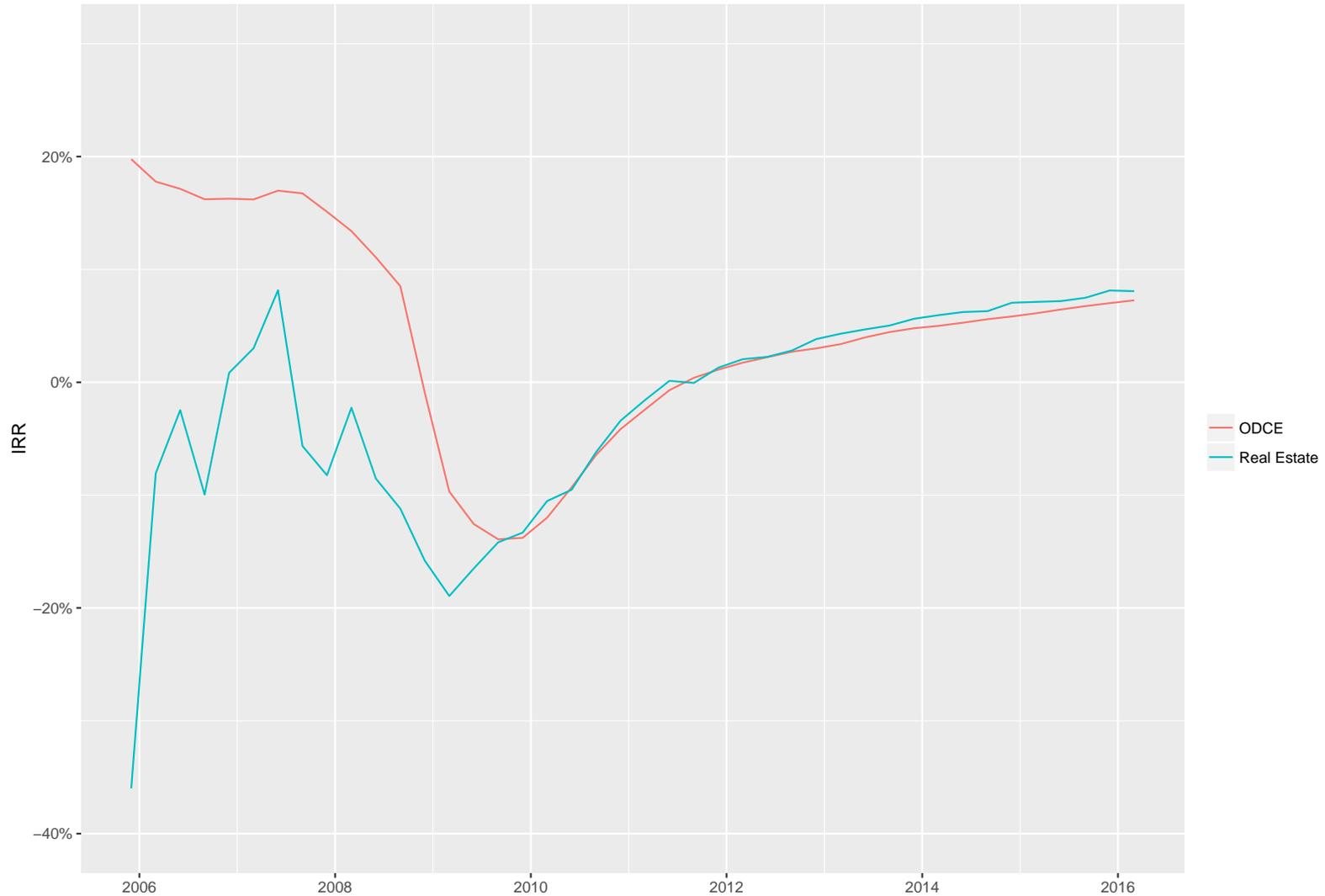


Private Equity  
 Quarterly Draws and Distributions



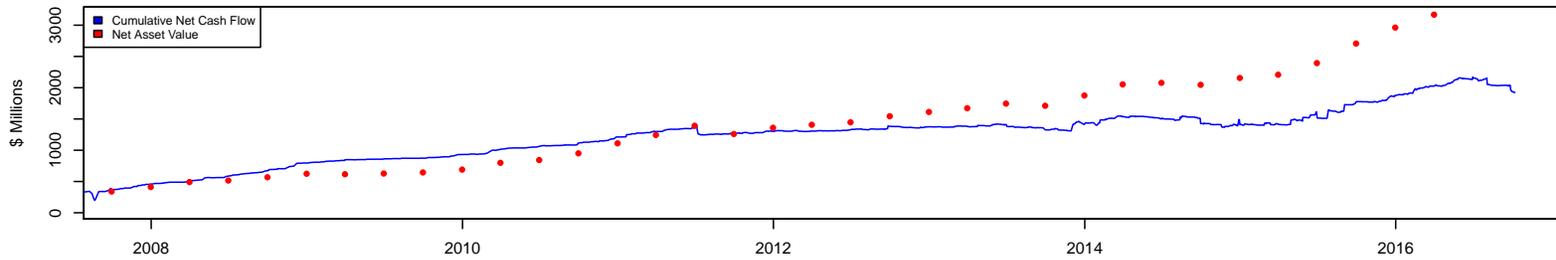
# Real Estate Performance

Real Estate IRRs compared to ODCE  
Inception through indicated date

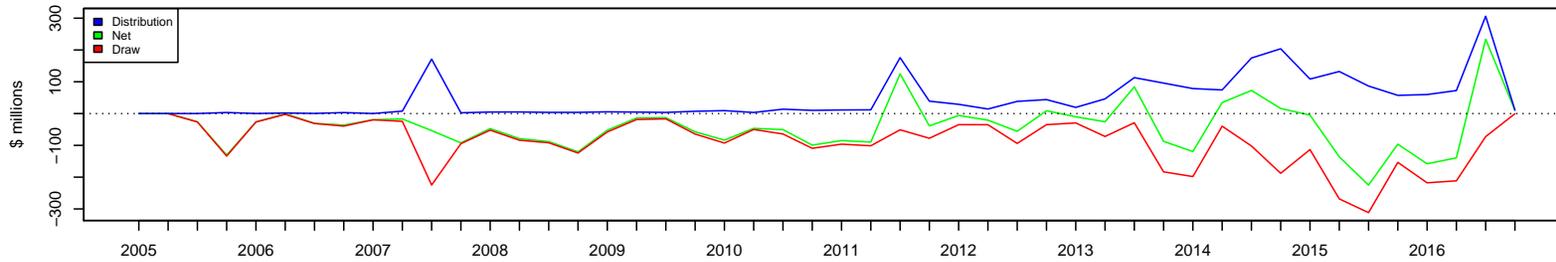


# Real Estate Performance (Continued)

Real Estate Cumulative Net Capital Contributed  
Compared to Value

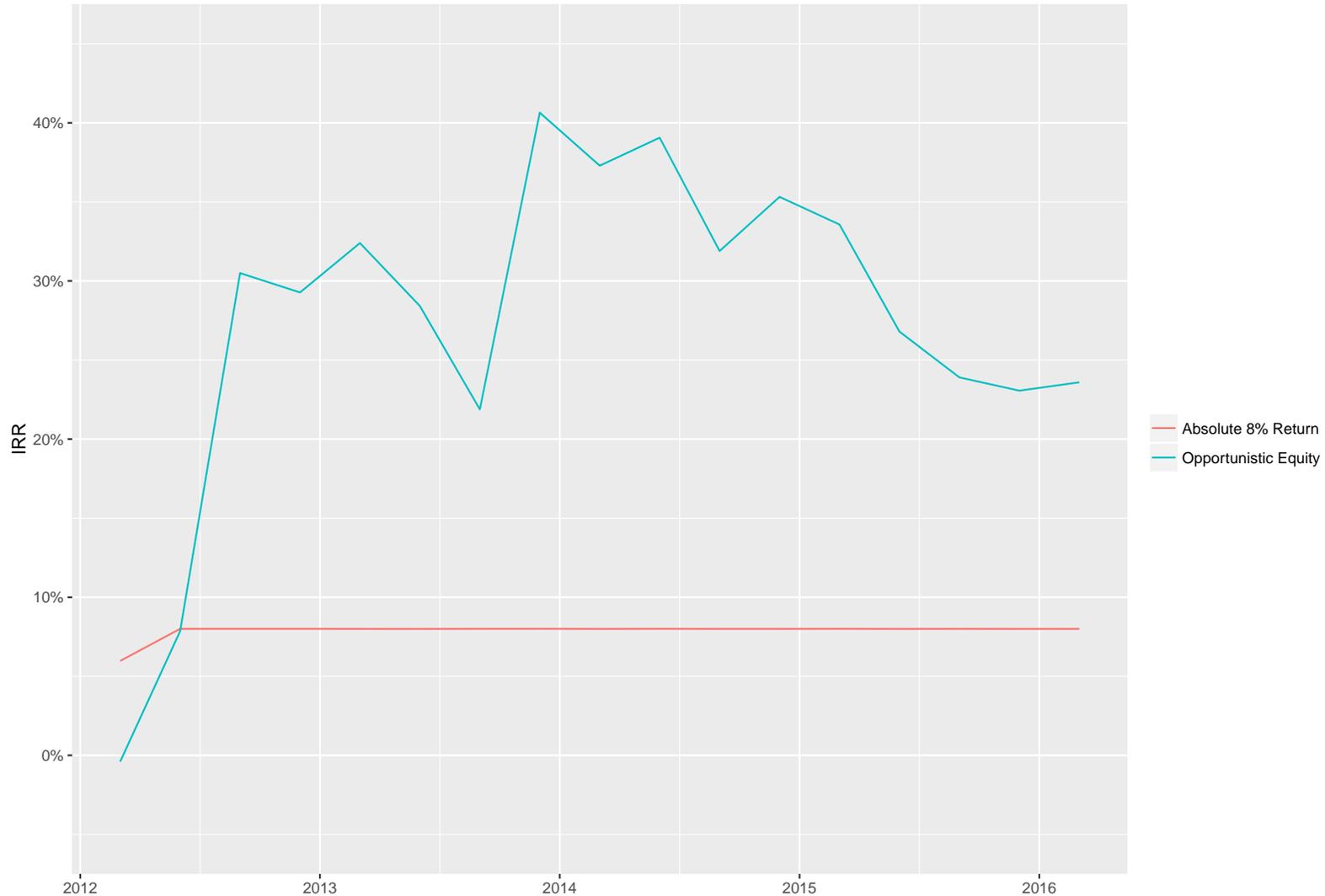


Real Estate  
Quarterly Draws and Distributions



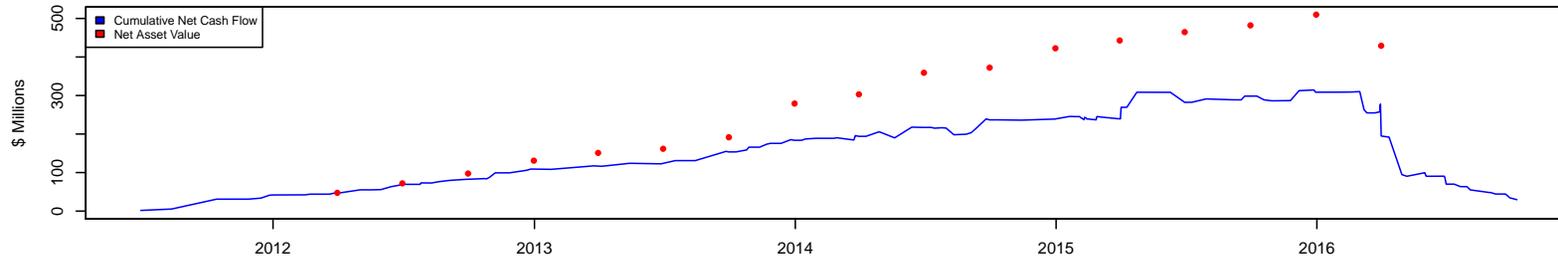
# Opportunistic Equity Performance

Opportunistic Equity IRRs compared to Absolute 8%  
Inception through indicated date

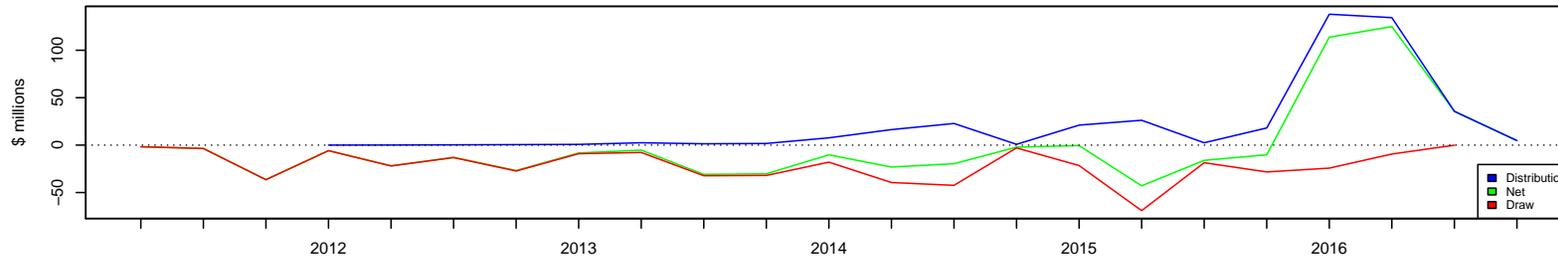


# Opportunistic Equity Performance (Continued)

Opportunistic Equity Cum. Net Capital Contributed  
 Compared to Value

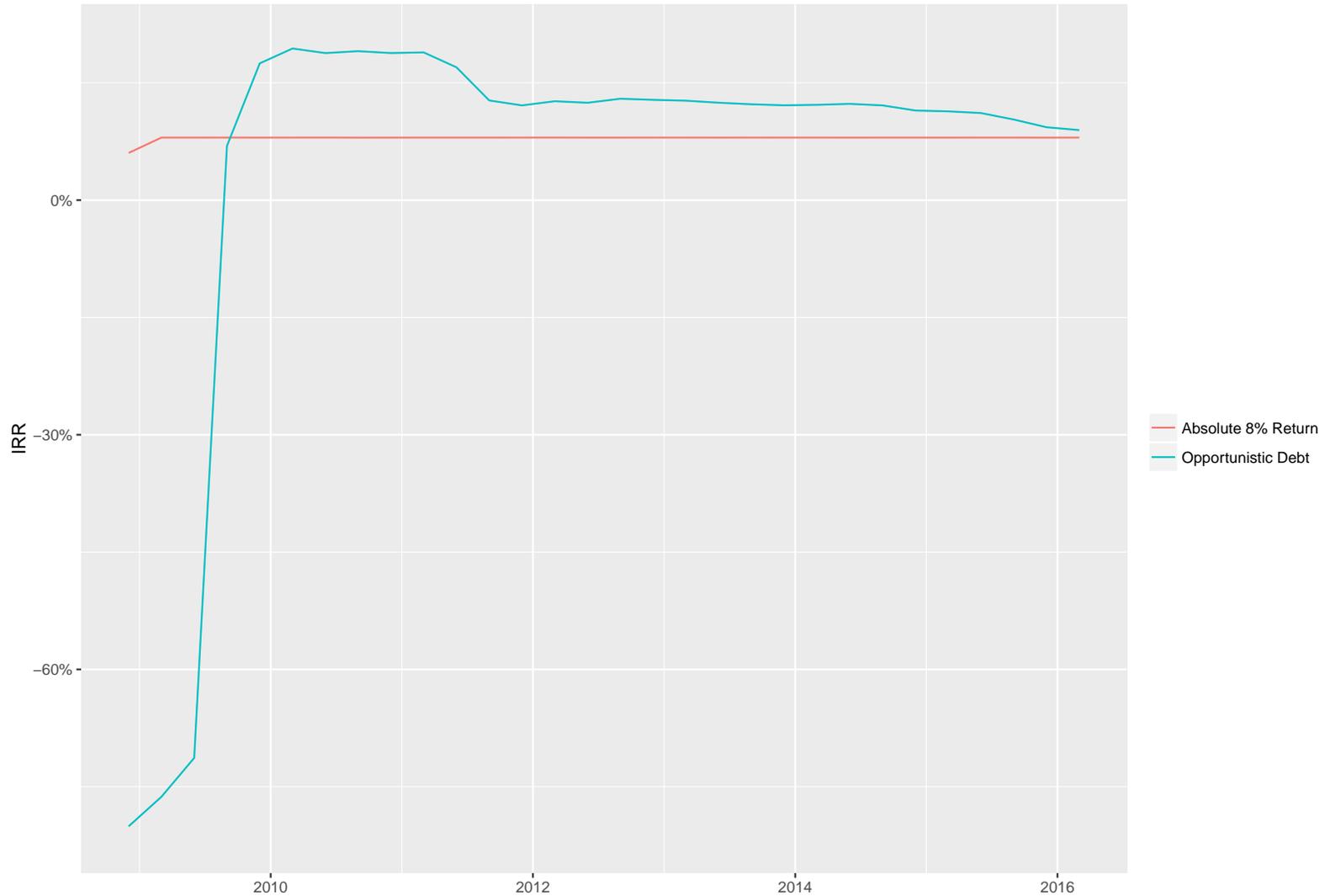


Opportunistic Equity  
 Quarterly Draws and Distributions



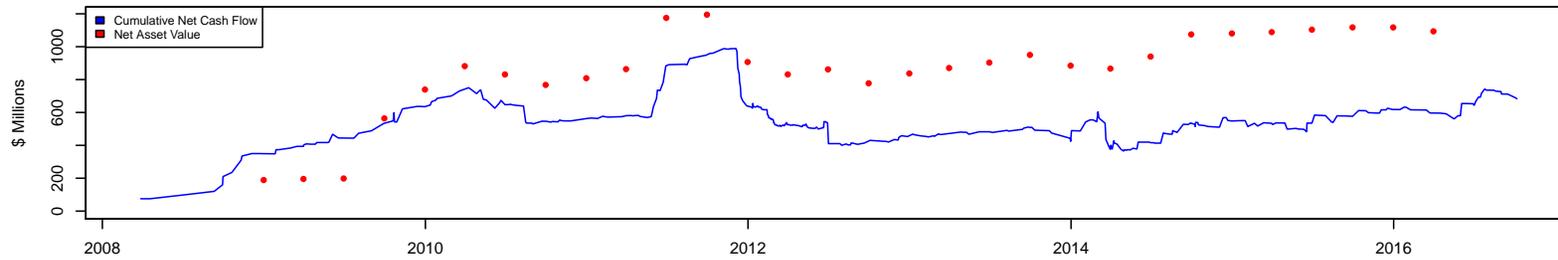
# Opportunistic Debt Performance

Opportunistic Debt IRRs  
compared to Absolute 8%

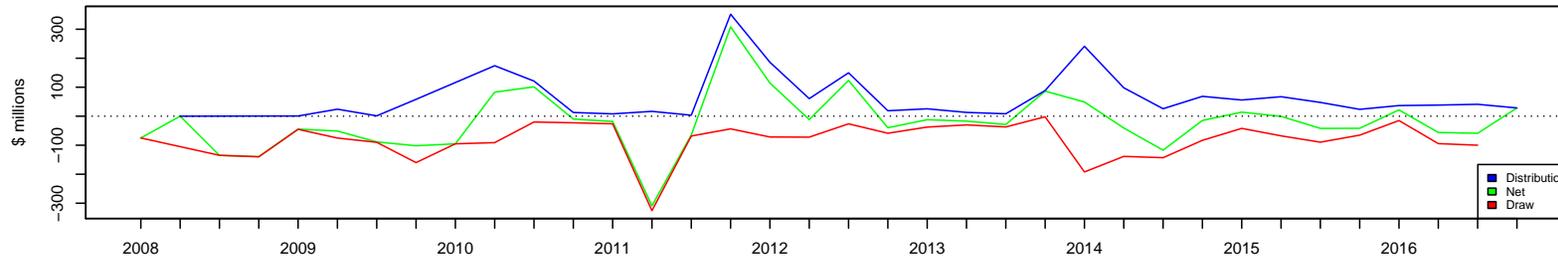


# Opportunistic Debt Performance (Continued)

Opp. Debt Cum. Net Capital Contributed  
 Compared to Value

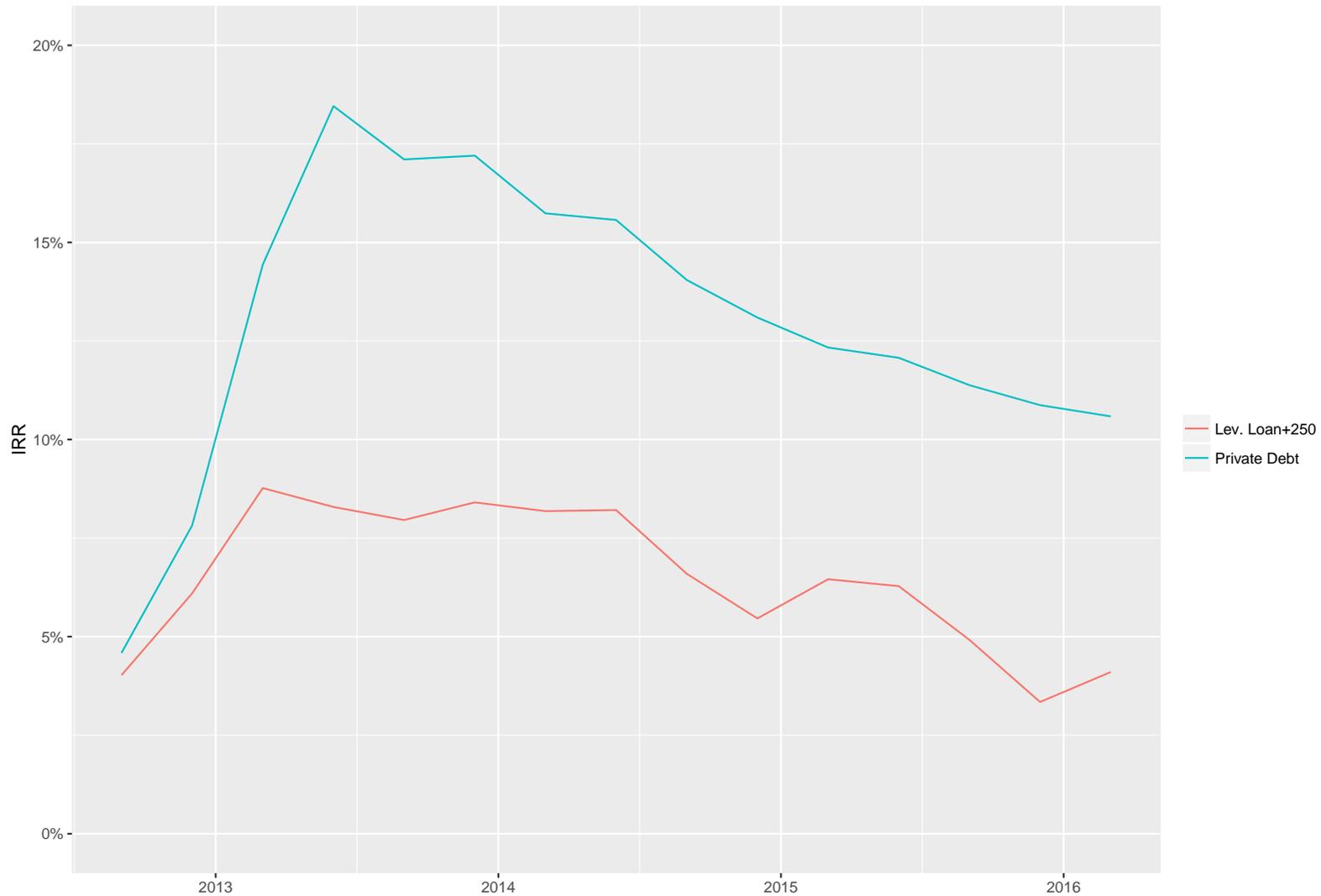


Opportunistic Debt  
 Quarterly Draws and Distributions



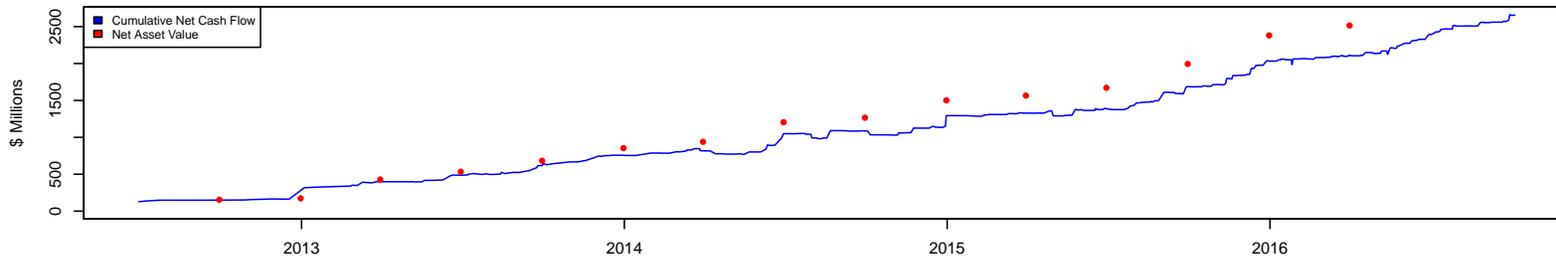
# Private Debt Performance

Private Debt IRRs  
compared to Lev Loan+250

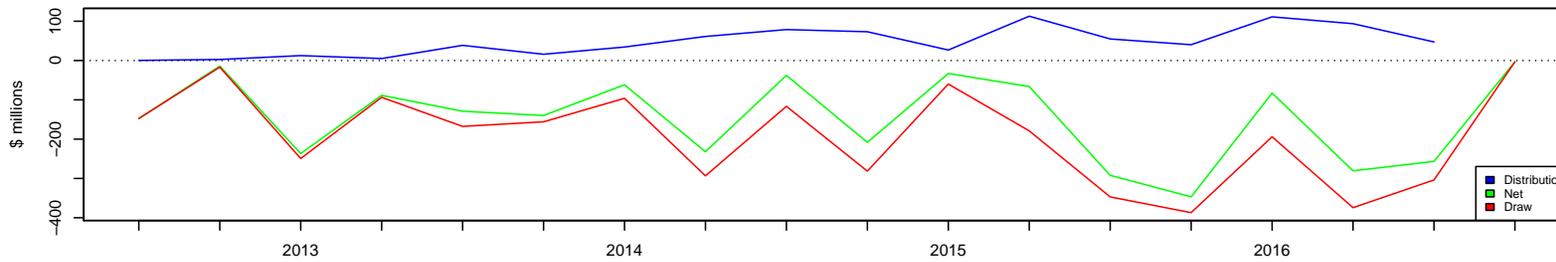


# Private Debt Performance (Continued)

Private Debt Cumulative Net Capital Contributed  
 Compared to Value

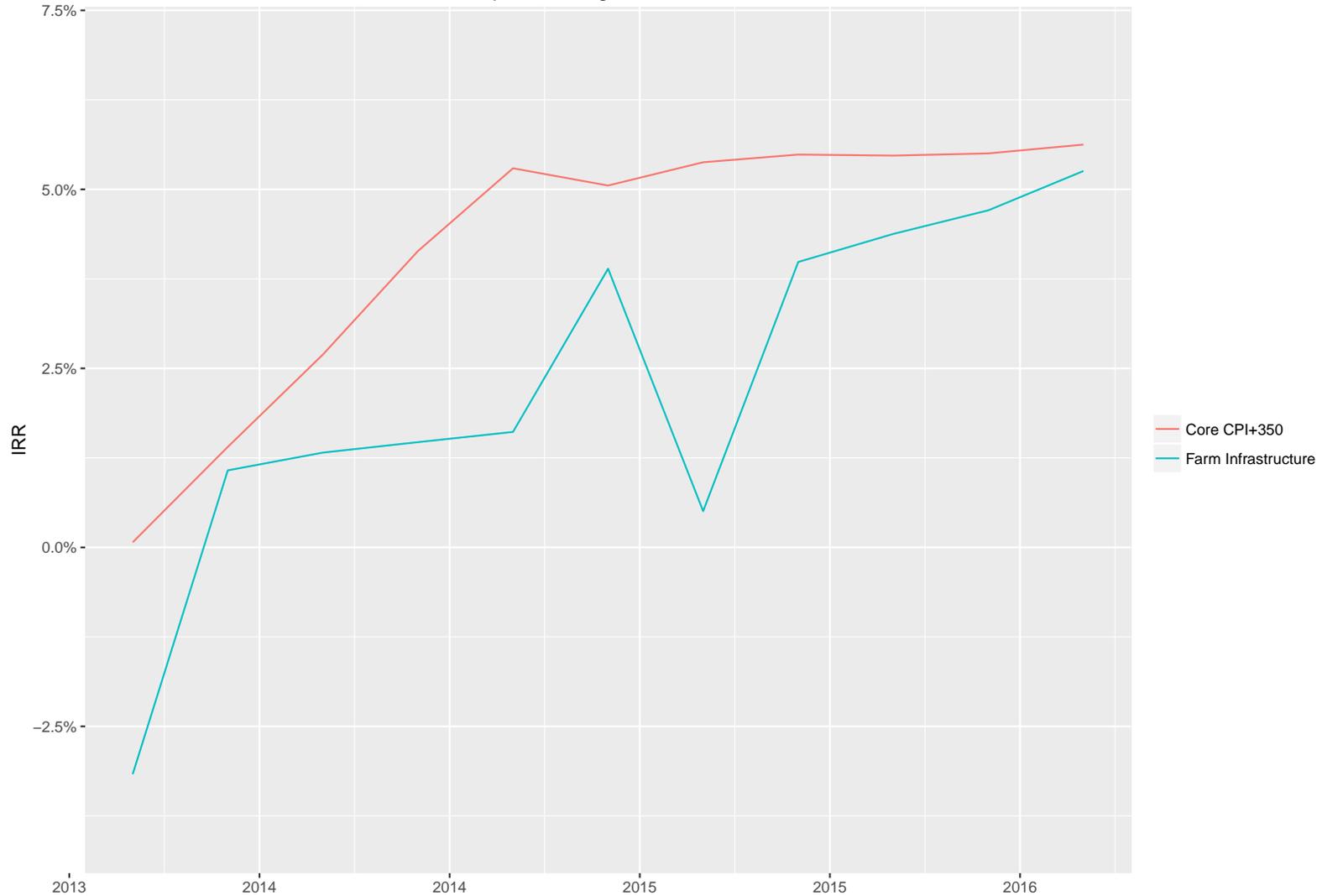


Private Debt  
 Quarterly Draws and Distributions



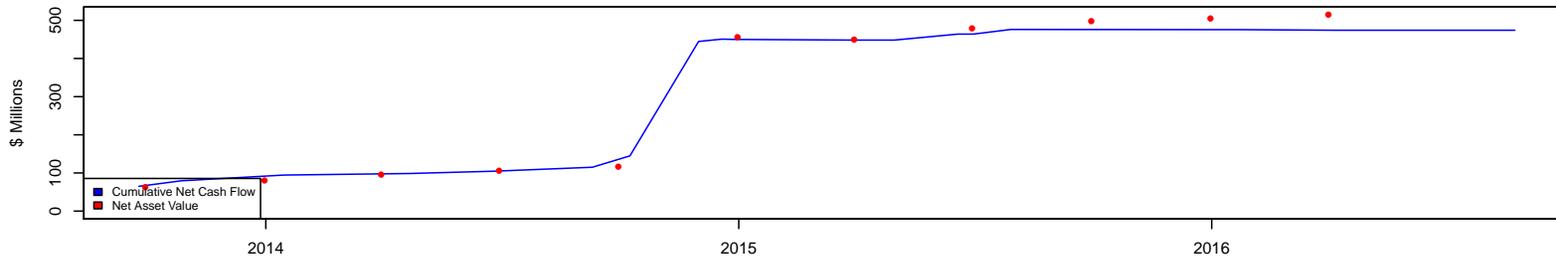
# Farmland and Infrastructure Performance

Farmland and Infrastructure IRRs compared to CPI+350  
Inception through indicated date

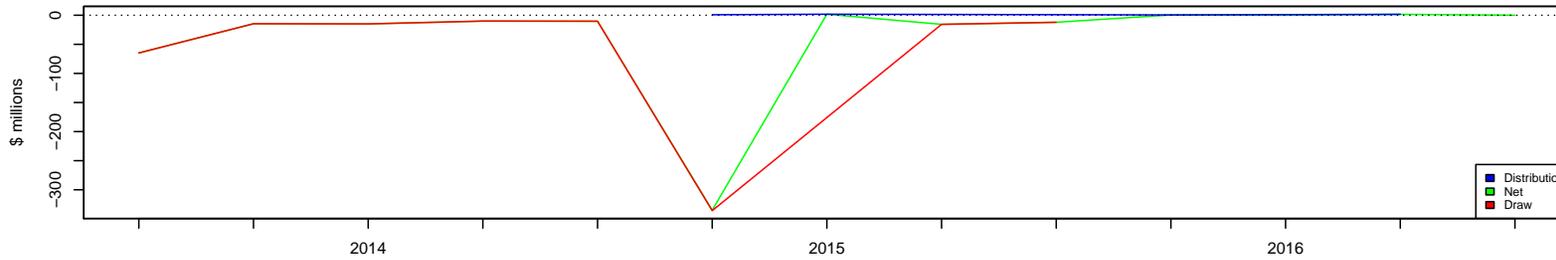


# Farmland and Infrastructure Performance (Continued)

Farm Infra Cum. Net Capital Contributed  
 Compared to Value



Farm Infra  
 Quarterly Draws and Distributions



## Private Markets Returns

### Returns as of March 31, 2016

	Benchmark	Portfolio Return	Benchmark Return	Excess Return
Private Equity	Russell 2000	10.65	8.78	1.87
Private Real Estate	ODCE Net	8.07	7.26	0.81
Private Opportunistic Equity	Absolute Eight	23.59	8.00	15.59
Opportunistic Fixed Income	Absolute Eight	8.96	8.00	0.96
Private Debt	Lev Loan+250	10.59	4.10	6.49
Farmland	Core CPI+350	5.26	5.63	-0.37

Portfolio Positioning  
Public Equity Performance  
Public Markets Returns  
Private Markets Performance  
Private Markets Returns  
LTD Plan

# LTD Plan

Long Term Disability (LTD)										Monday, October 10, 2016					
Account Manager	Account	Account Manager Style	Fixed Income	Equity	Inflation Linked	Total	Pct of Fund	Target (Range)	trading window	check	range	LTD OW/UW	rebalancing TF OW/UW	vs TF	Rebalance
StateStreet B&T: Boston	A1UB	Cash	\$2,840,451			\$2,840,451	1.46%					1.46%			
BlackRock: San Francisco	A1QR	Fixed Core (Passive)	\$41,245,678			\$41,245,678	21.13%	19%	daily (T-2, T+3)			2.13%			
BlackRock: San Francisco	A1QP	Fixed High Yield (Passive)	\$15,078,823			\$15,078,823	7.73%	7%	weekly (T-2, T+3)	28.86%	12% 41%	0.73%			
							<b>30.32%</b>	<b>26% (19-36%)</b>		30.32%	19% 36%	<b>2.86%</b>	<b>4.25%</b>	-1.39%	\$ 2,709,085.09
BlackRock: San Francisco	A1QO	Russell 1000 (Passive)		\$40,851,037		\$40,851,037	20.93%	24%	daily (T-1, T+3)			-3.07%			
BlackRock: San Francisco	A1QN	Russell 2000 (Passive)		\$27,025,584		\$27,025,584	13.85%	12%	daily (T-1, T+3)			1.85%			
							<b>34.78%</b>	<b>36% (26-46%)</b>		34.78%	26% 46%	<b>-1.22%</b>	<b>-1.58%</b>	0.36%	\$ (703,317.14)
BlackRock: San Francisco	A1QM	EAFE (Passive)		\$32,319,258		\$32,319,258	16.56%	18%	weekly (T-3, T+3)			-1.44%			
BlackRock: San Francisco	A1QL	EAFE SC (Passive)		\$4,202,994		\$4,202,994	2.15%	2%	weekly (T-3, T+3)			0.15%			
BlackRock: San Francisco	A1QJ	Emerging Markets (Passive)		\$9,090,448		\$9,090,448	4.66%	5%	weekly (T-3, T+3)			-0.34%			
							<b>23.37%</b>	<b>25% (15-35%)</b>		23.37%	15% 35%	<b>-1.63%</b>	<b>-2.22%</b>	0.59%	\$ (1,157,080.17)
BlackRock: San Francisco	A1QI	Dow Jones UBS Commodities (Passive)			\$1,714,984	\$1,714,984	0.88%	2% (0-4%)	weekly (T-2, T+1)	0.88%	0% 4%	-1.12%			
BlackRock: San Francisco	A1UG	US Real Estate (Passive)			\$20,788,531	\$20,788,531	10.65%	11% (9-13%)	daily (T-1, T+3)	10.65%	9% 13%	-0.35%			
							<b>11.53%</b>	<b>13% (10-16%)</b>		11.53%	10% 16%	<b>-1.47%</b>	<b>0.14%</b>	-1.61%	\$ 3,140,131.94
		<b>TOTAL Amounts</b>	\$59,164,952	\$113,489,321	\$22,503,515	<b>\$195,157,789</b>	<b>100.00%</b>								
		<b>Actual Portfolio</b>	30.32%	58.15%	11.53%										
		<b>Policy</b>	<b>26% (19-36%)</b>	<b>61% (51-68%)</b>	<b>13% (10-16%)</b>										
									<b>Monthly Cash Raise</b>						
									\$ 3,000,000.00	1.54%					

Blackrock Funds #567908 LTD	
DJ UBS Commodities Index	A1QI
EAFE SC Equity Index Fund	A1QL
EAFE Equity Index Fund B	A1QM
MSCI Emerging Markets Ind	A1QJ
Russell 1000 Index Fund B	A1QO
Russell 2000 Index Fund B	A1QN
US Debt Index Fund B	A1QR
US Real Estate Index Fund	A1UG
US High Yield Index Fund B	A1QP

Blackrock Funds	Plan, System & HBS
MSCI EAFE (#685681)	A1ZY
MSCI EAFE SC (#680249)	A1SU
US Eqty (#569102)	A1VH
MSCI EAFE Country (#3027)	A1U5
Emerging Markets (#684842)	A1QA
US Debt (#608863)	A1VI
Long Term Gov Bond Index	A1U3
Intermed Gov Credit (#6608)	A1ZV

# Public Markets Performance Chart Pack

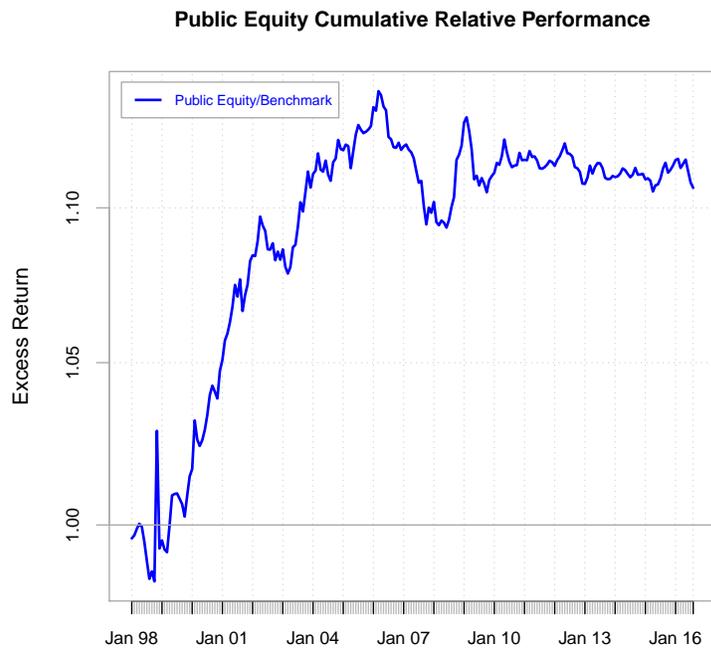
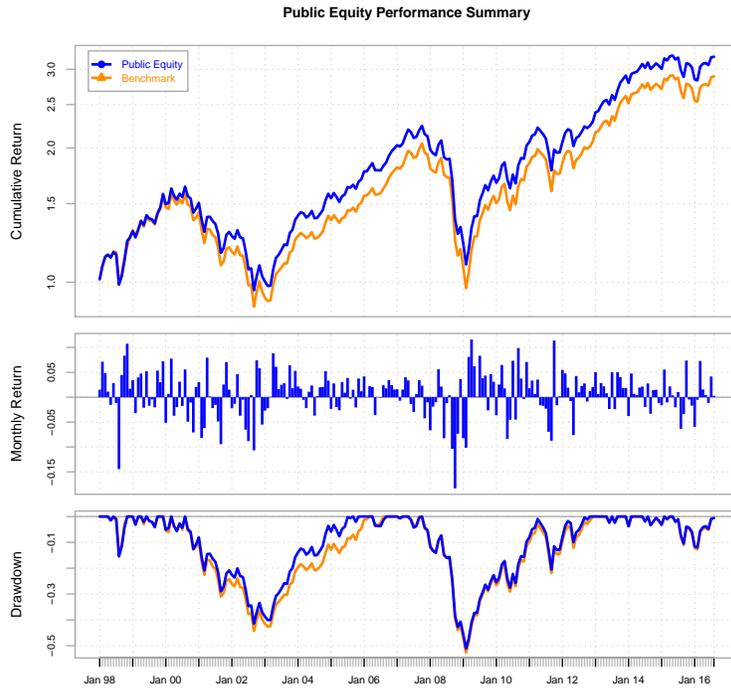
*Investment Management Division*

*Performance through August 31, 2016*

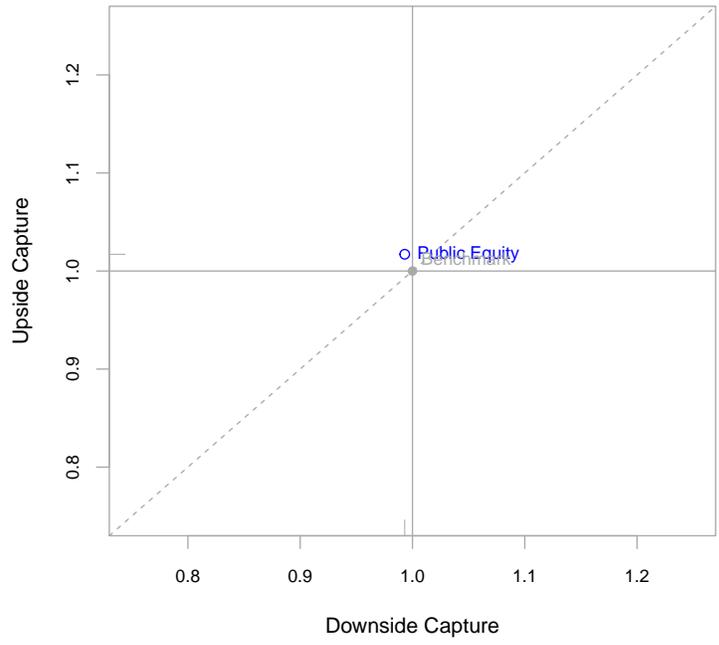
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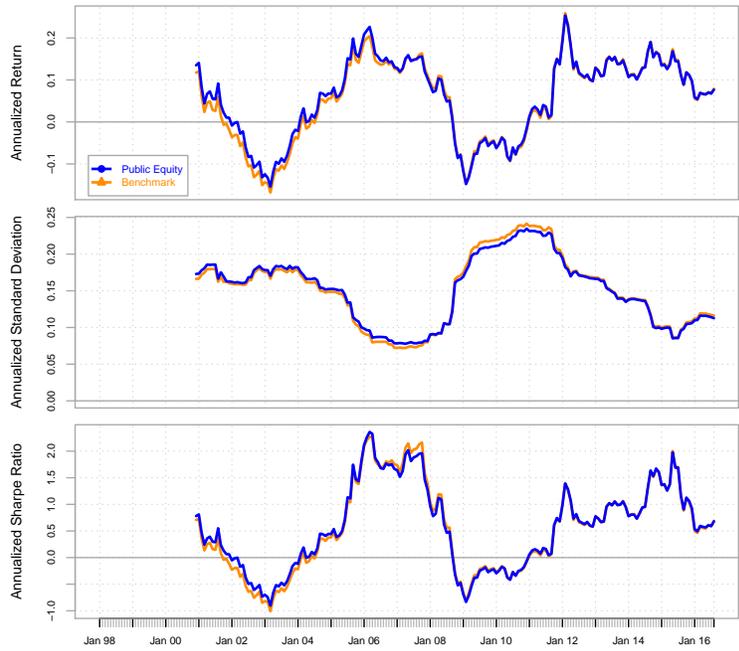
# Total Public Equity



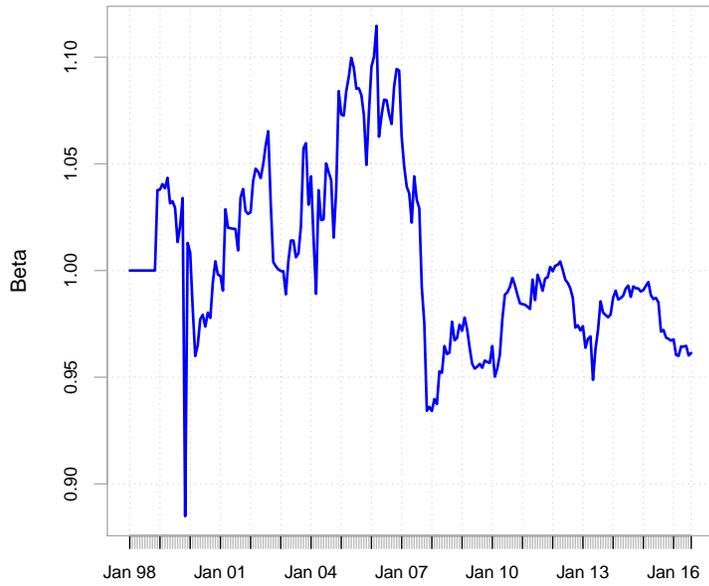
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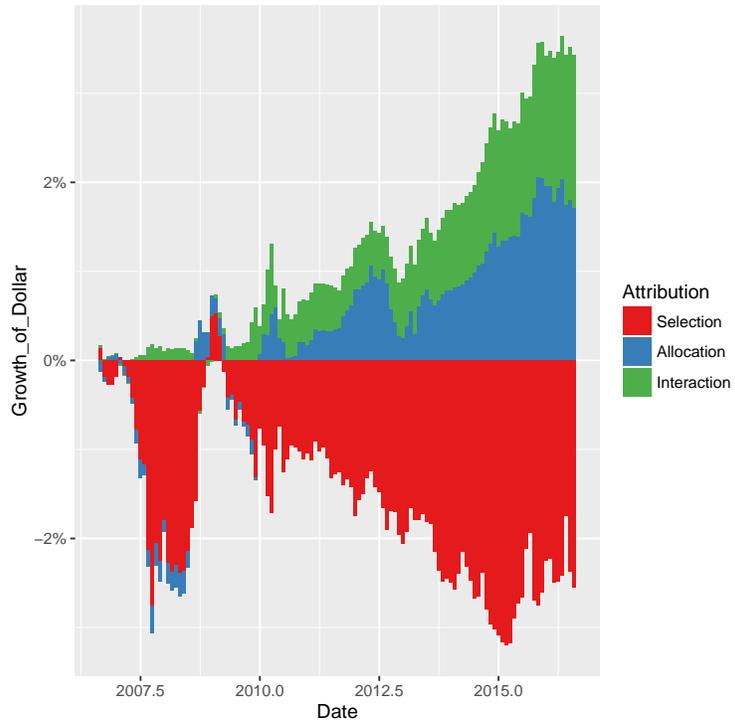
### Public Equity Rolling 3 Year Performance



Public Equity Rolling 12 Month Beta



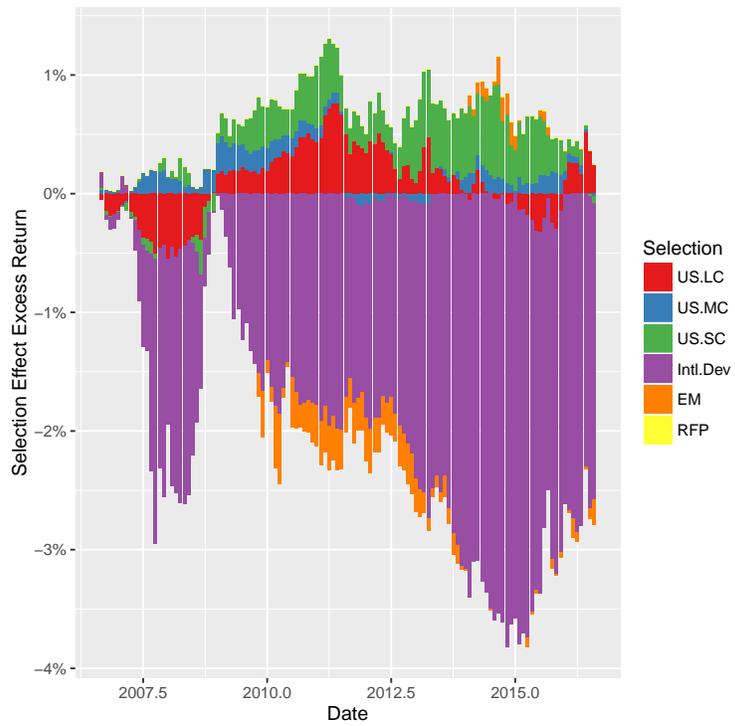
Brinson Return Attribution



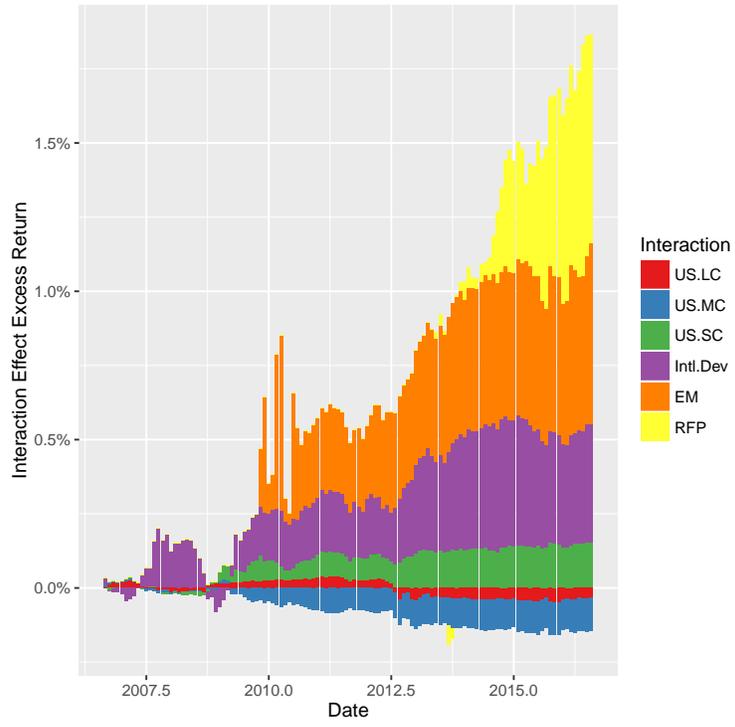
Over/Under Weights & Cumulative Allocation Effect (Line)



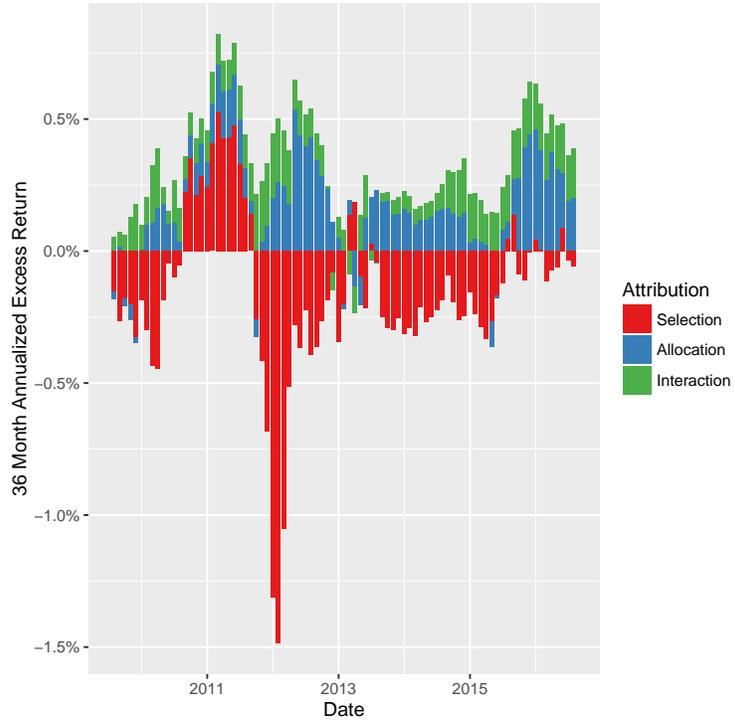
Cumulative Selection Effect



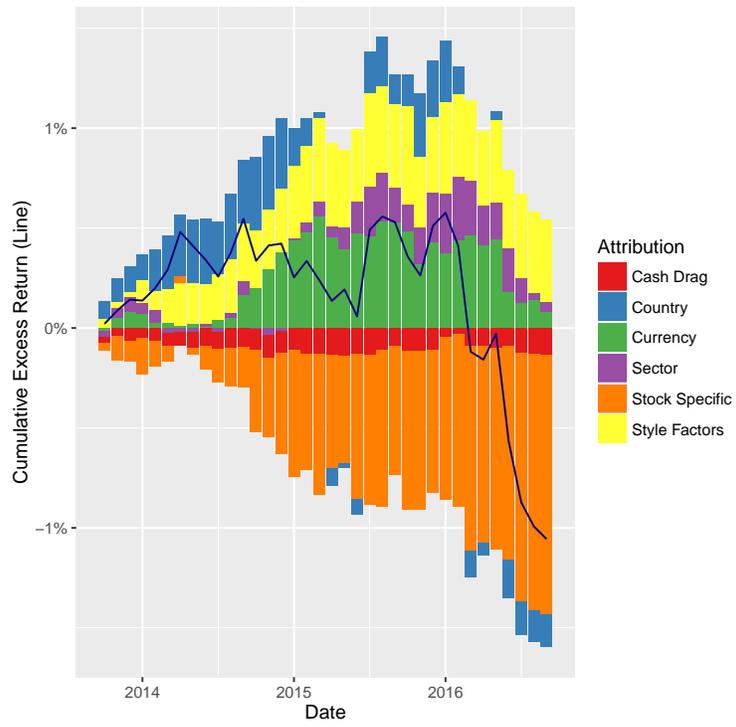
Cumulative Interaction Effect



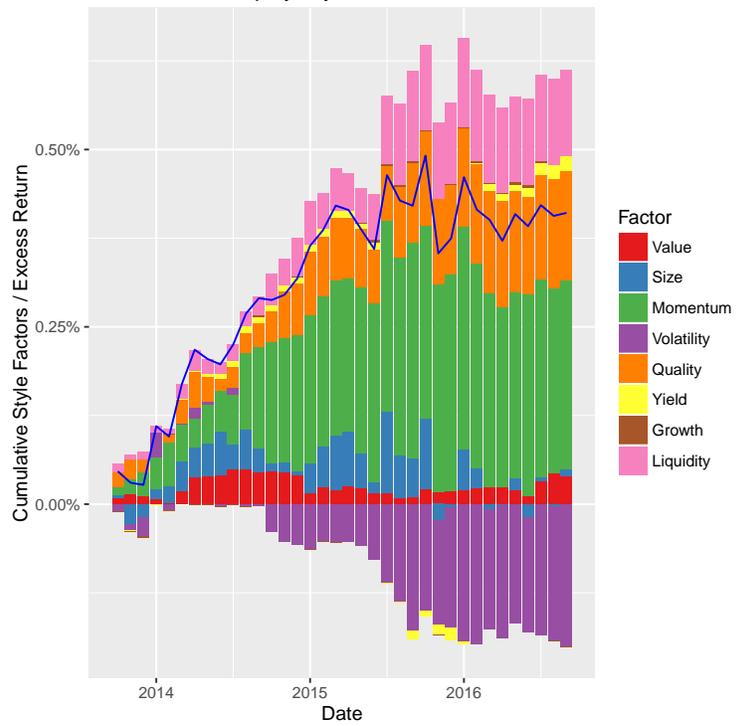
Rolling 36 Month Attribution Analysis



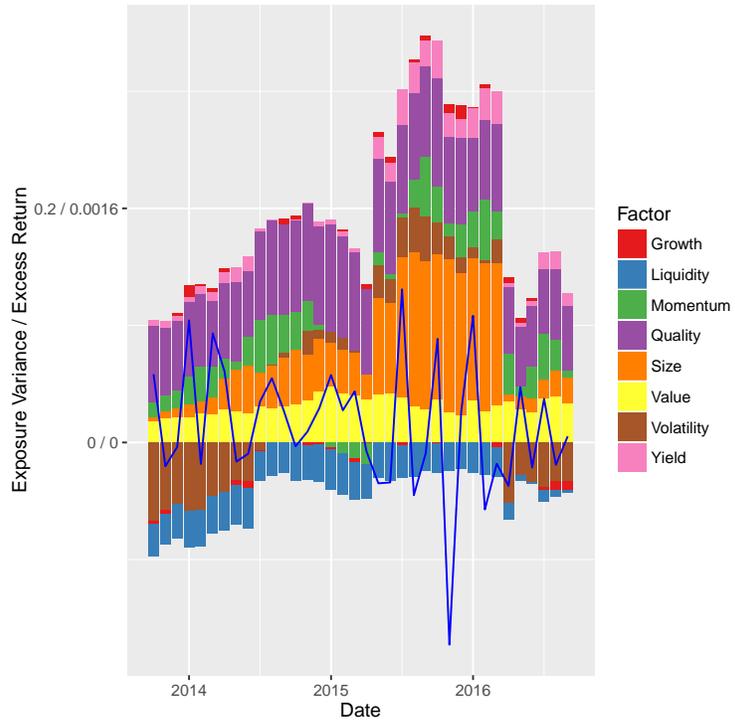
### Public Equity Style Factor Attribution



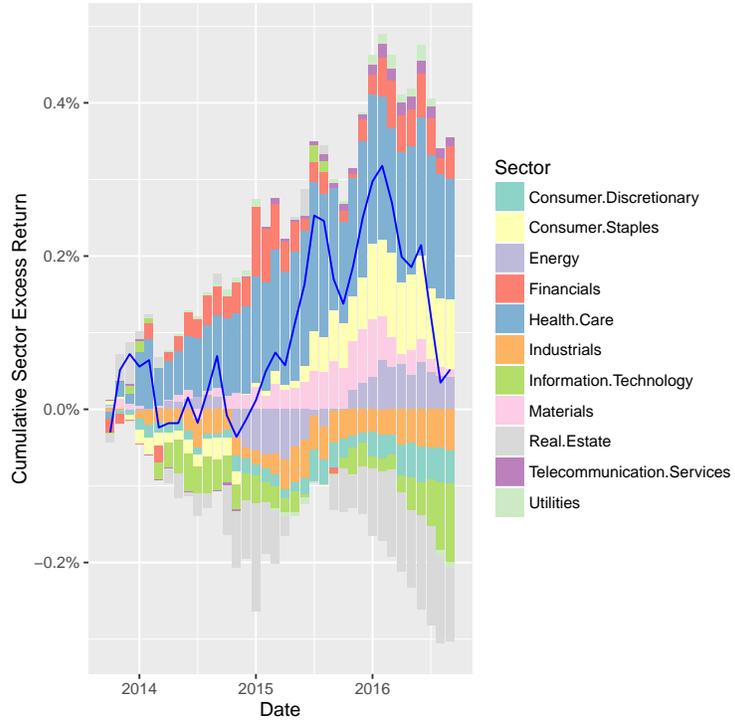
### Public Equity Style Factor Breakout



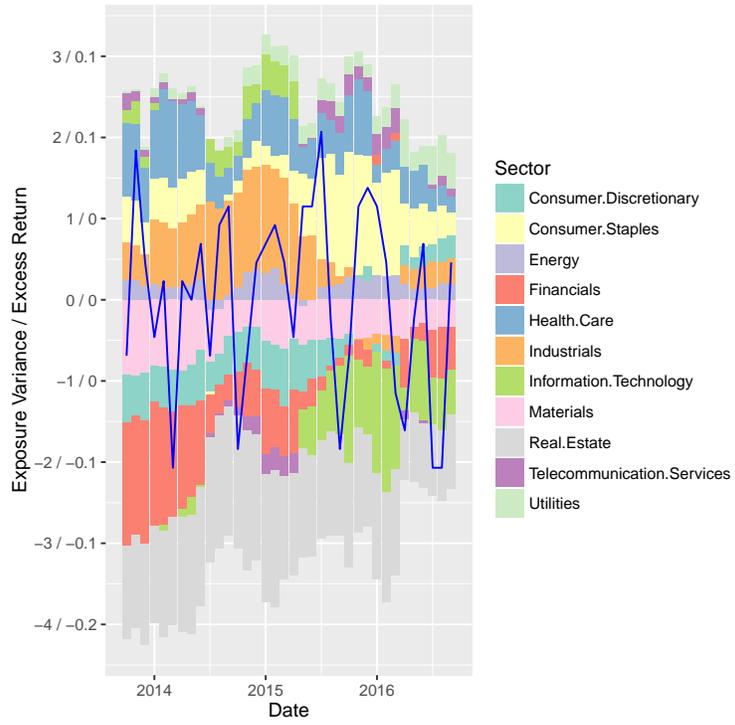
Public Equity Monthly Style Factors Active Exposure



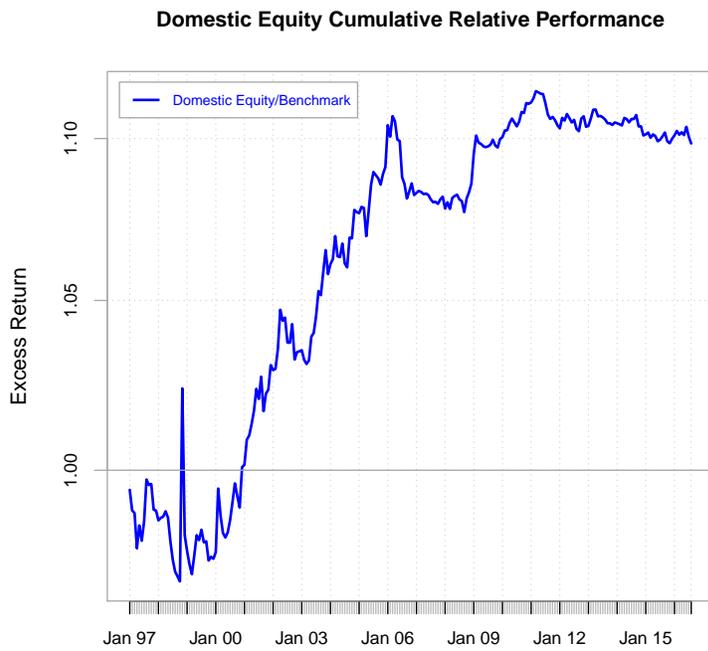
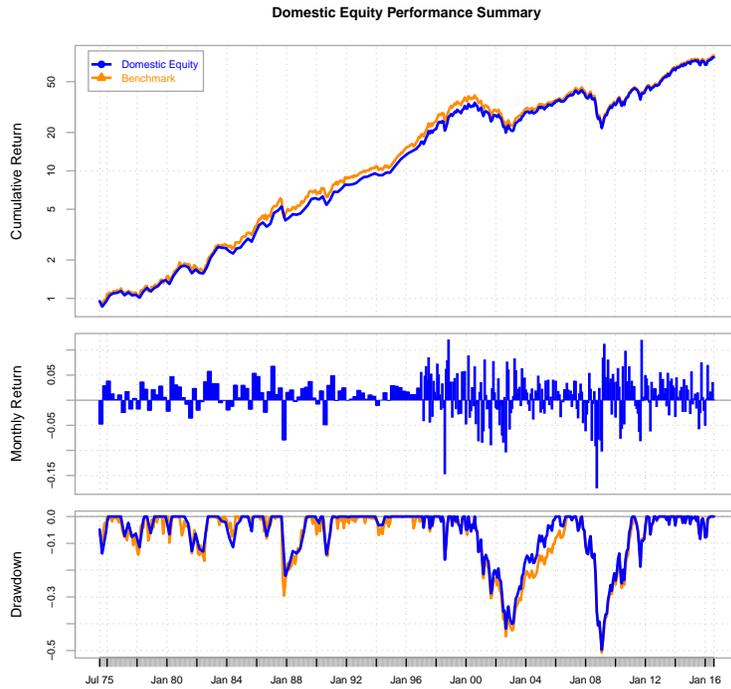
Public Equity Monthly GICS Sector Return



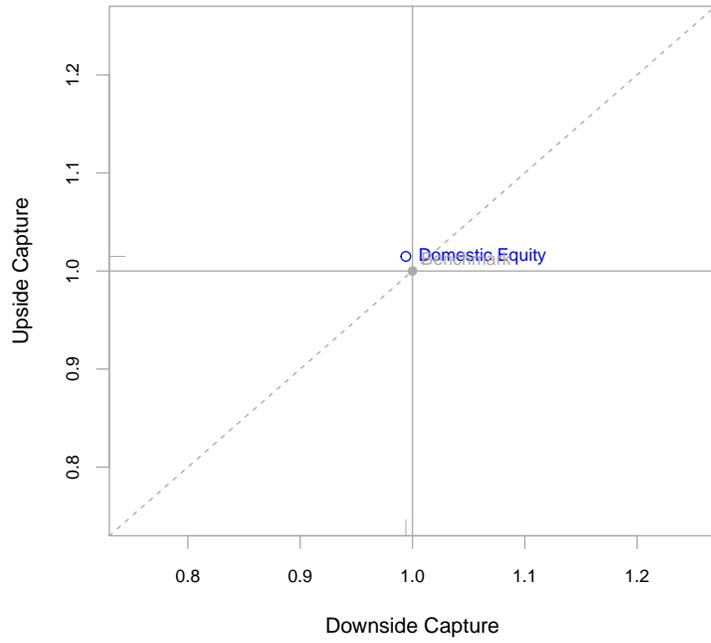
Public Equity GICS Sector Active Exposure



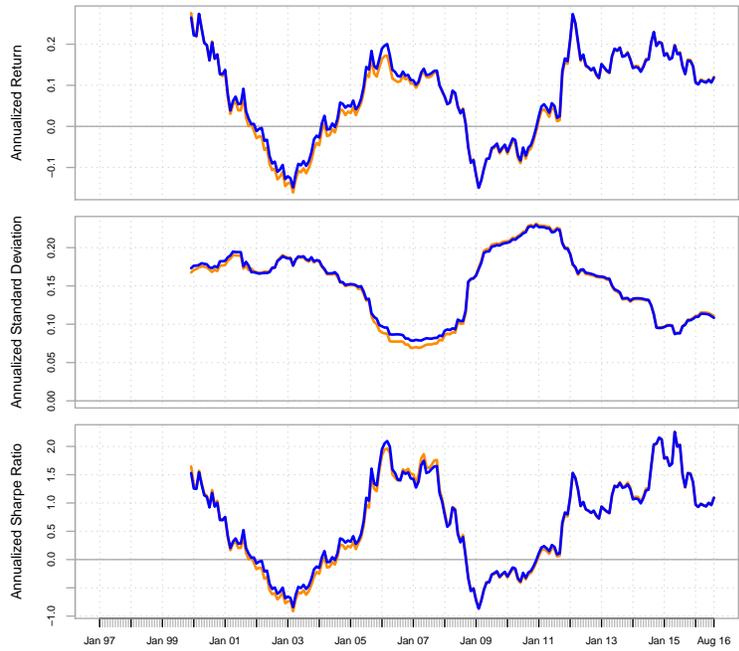
# Domestic Equity & International Equity



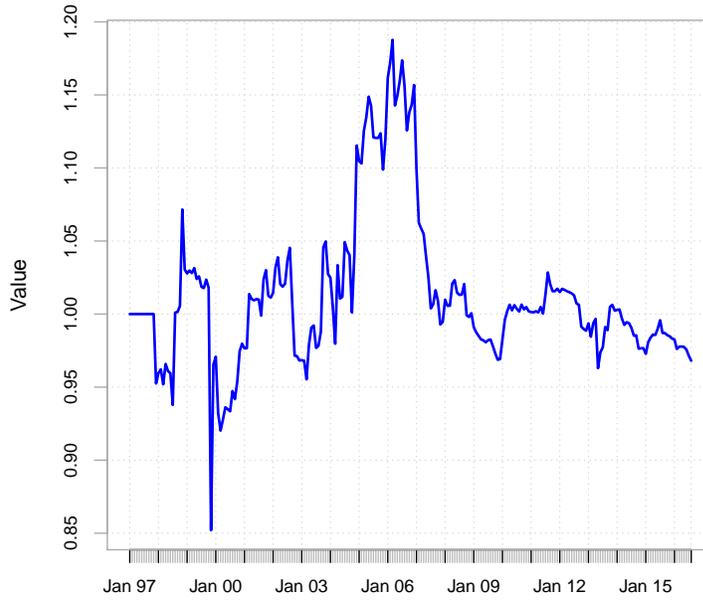
### Domestic Equity Capture Ratios



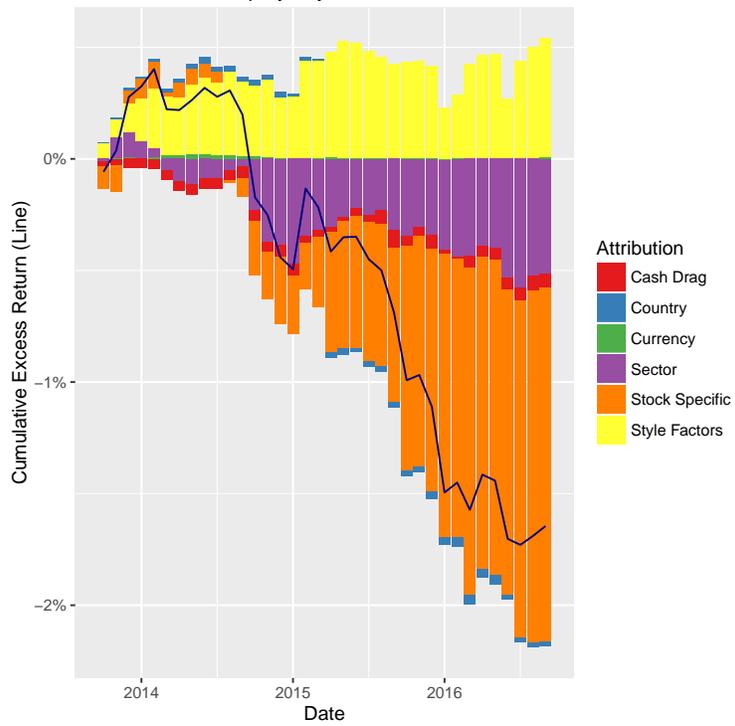
### Domestic Equity Rolling 3 Year Performance



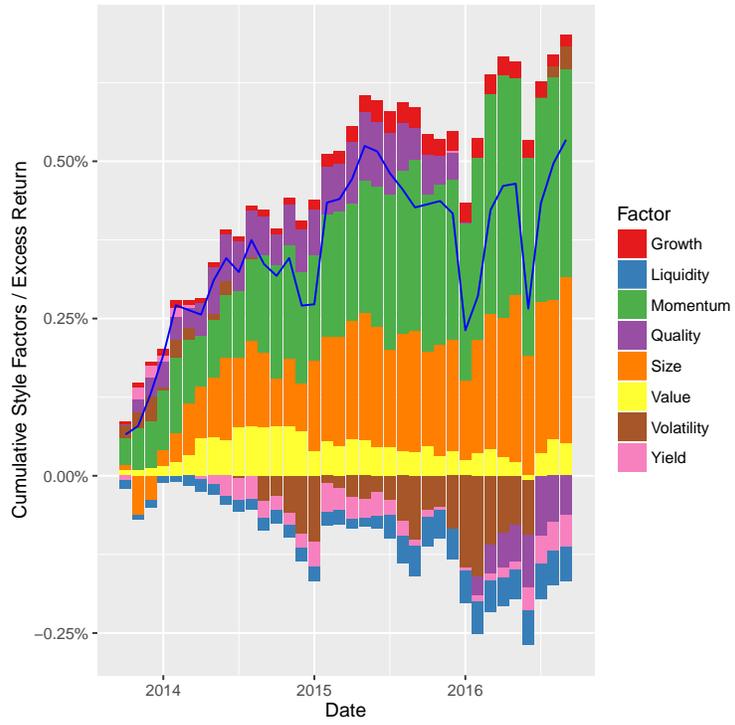
Domestic Equity Rolling 12 Month Beta



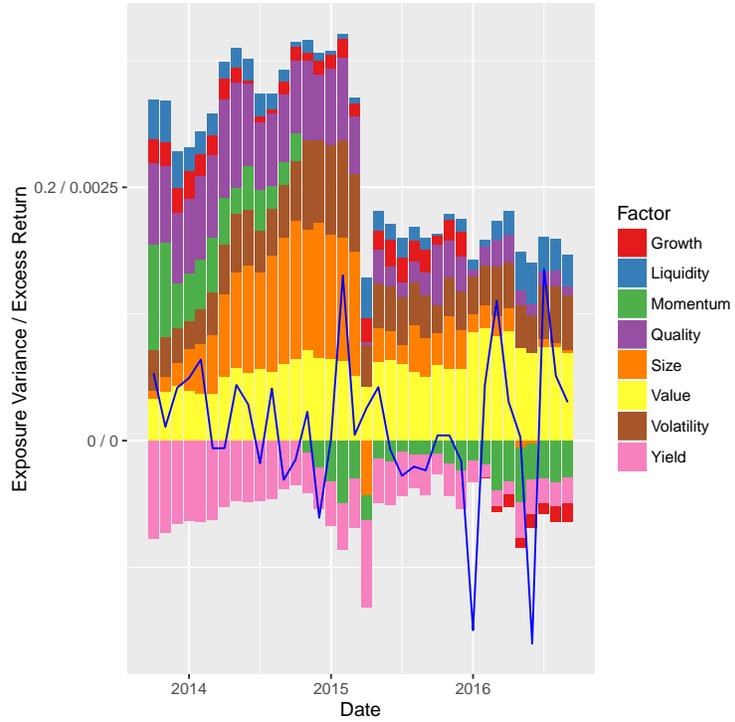
Domestic Equity Style Factor Attribution



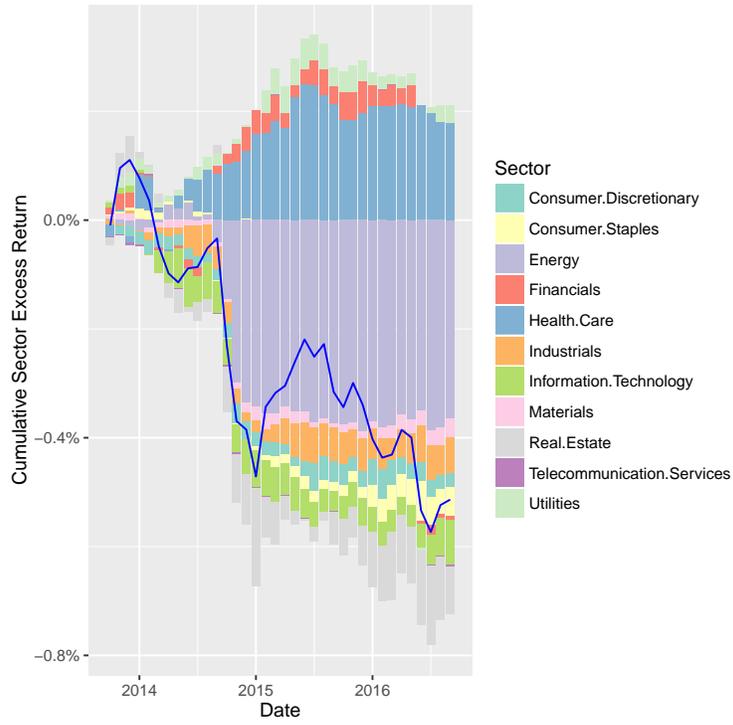
Domestic Equity Style Factor Breakout



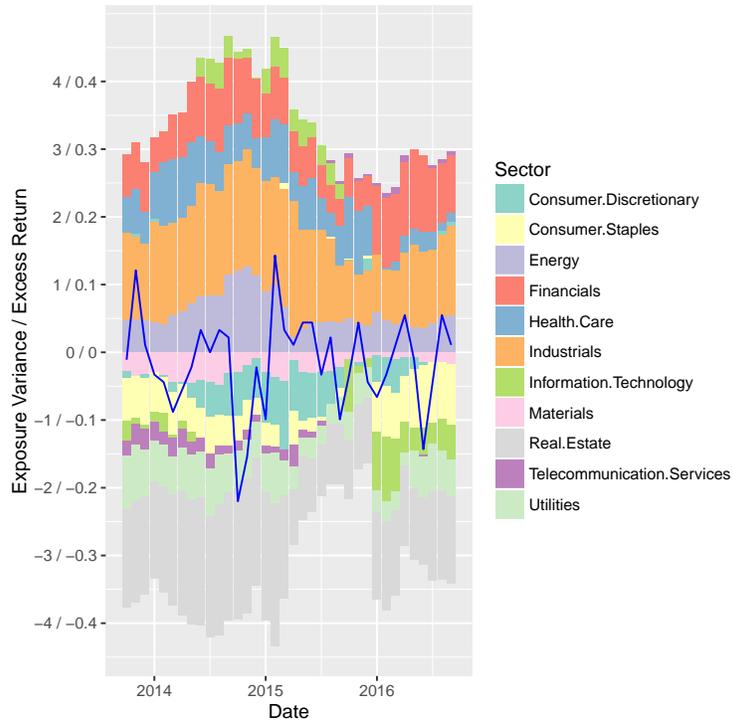
Domestic Equity Monthly Style Factors Active Exposure



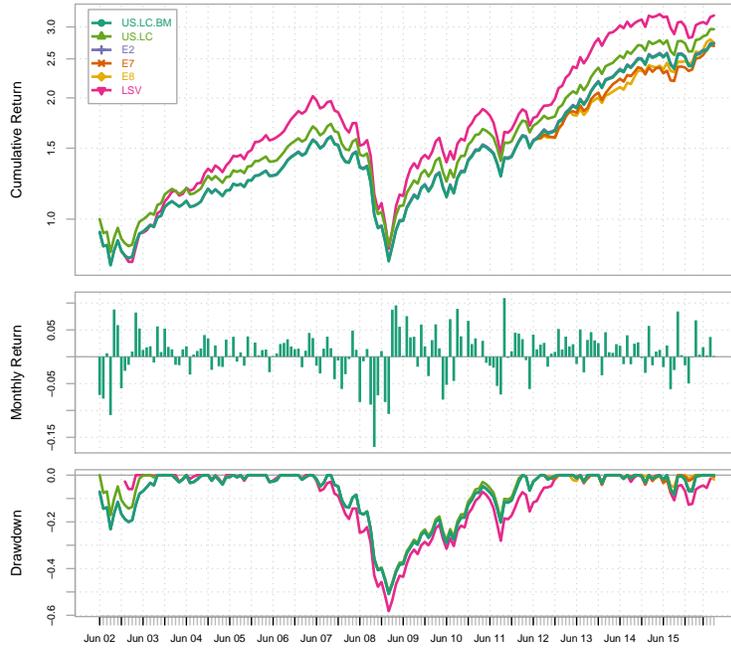
Domestic Equity Monthly GICS Sector Return



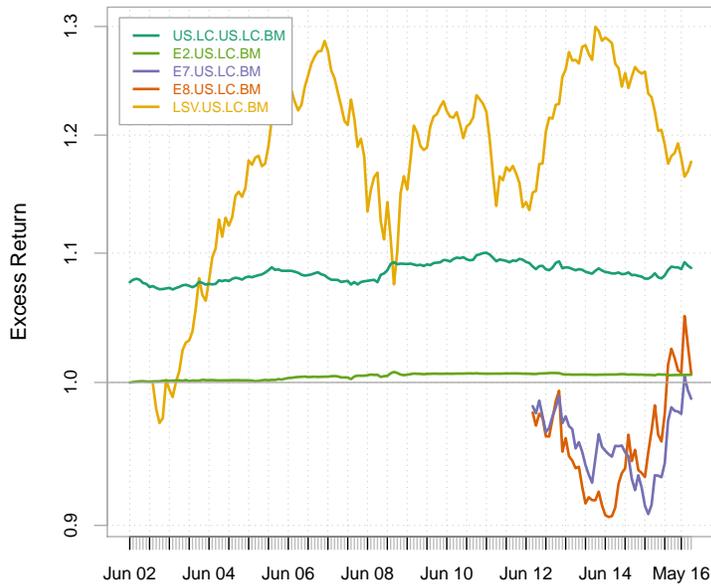
Domestic Equity GICS Sector Active Exposure



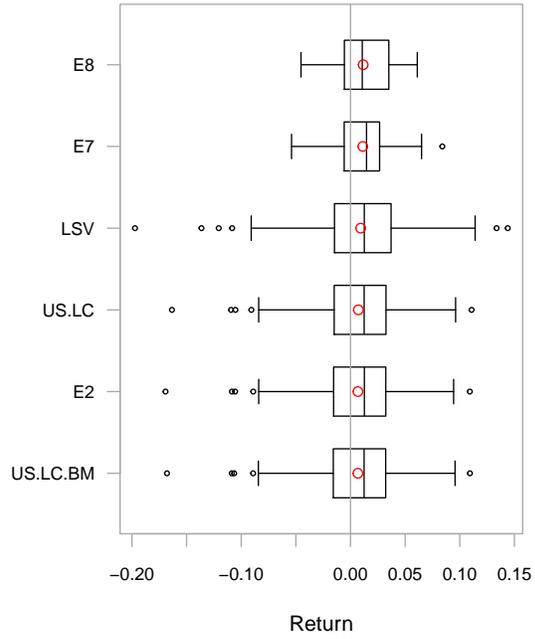
US Large Cap Performance Summary



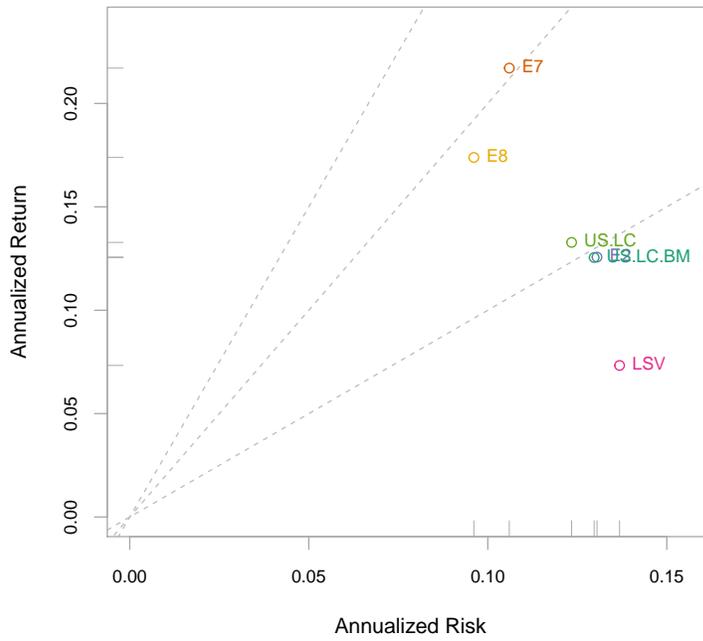
US Large Cap Cumulative Relative Performance



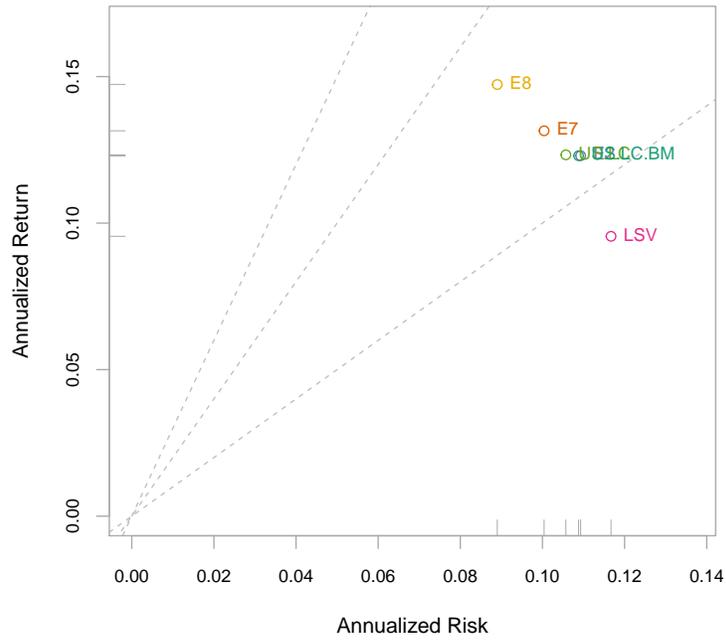
### Return Distribution Comparison



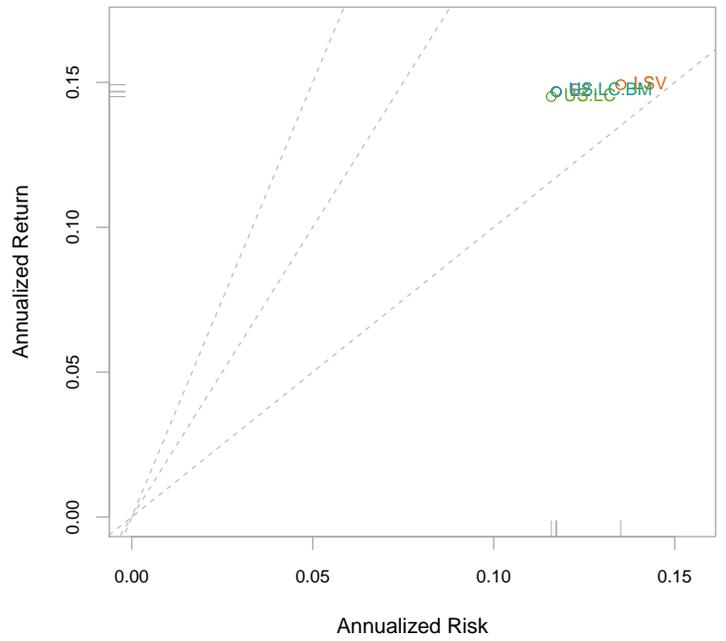
### US Large Cap Trailing 1 Year Performance vs Sharpe Ratios (1,2,3)



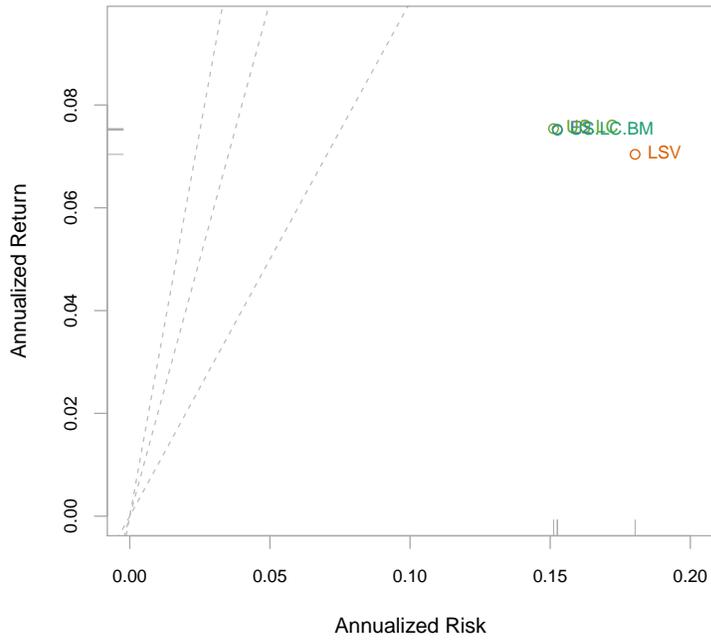
Trailing 3 Year Performance vs Sharpe Ratios (1,2,3)



Trailing 5 Year Performance vs Sharpe Ratios (1,2,3)



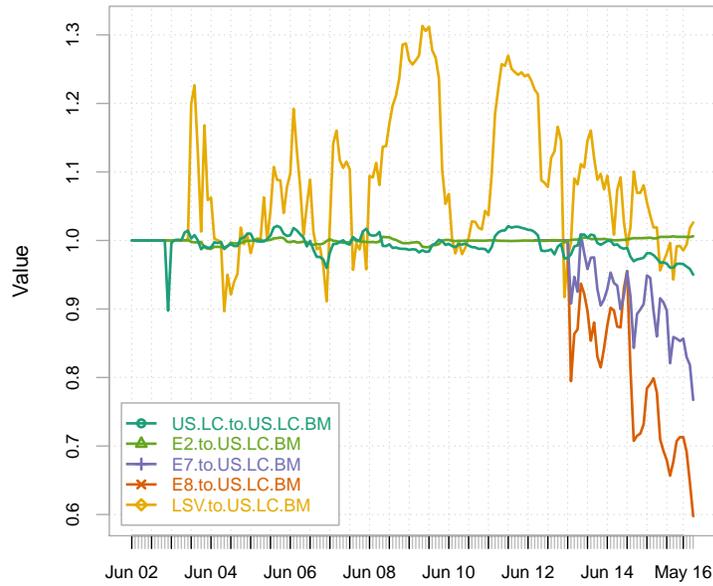
### Trailing 10 Year Performance vs Sharpe Ratios (1,2,3)



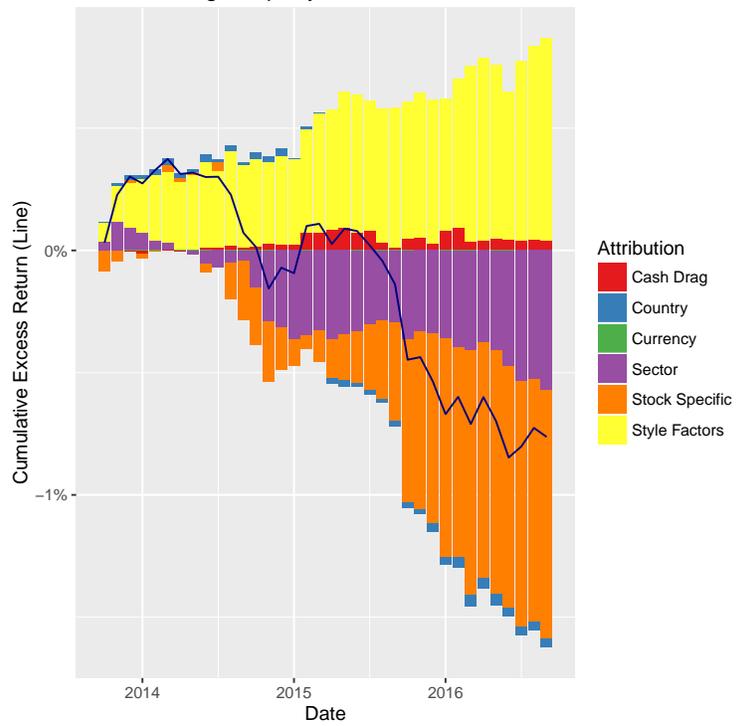
### US Large Cap Rolling 3 Year Performance



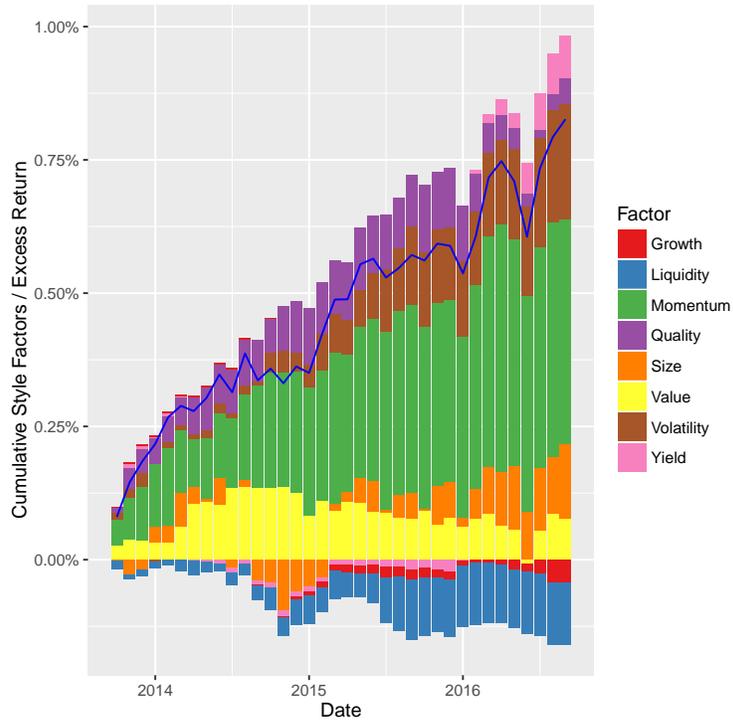
### US Large Cap Rolling 12 Month Beta



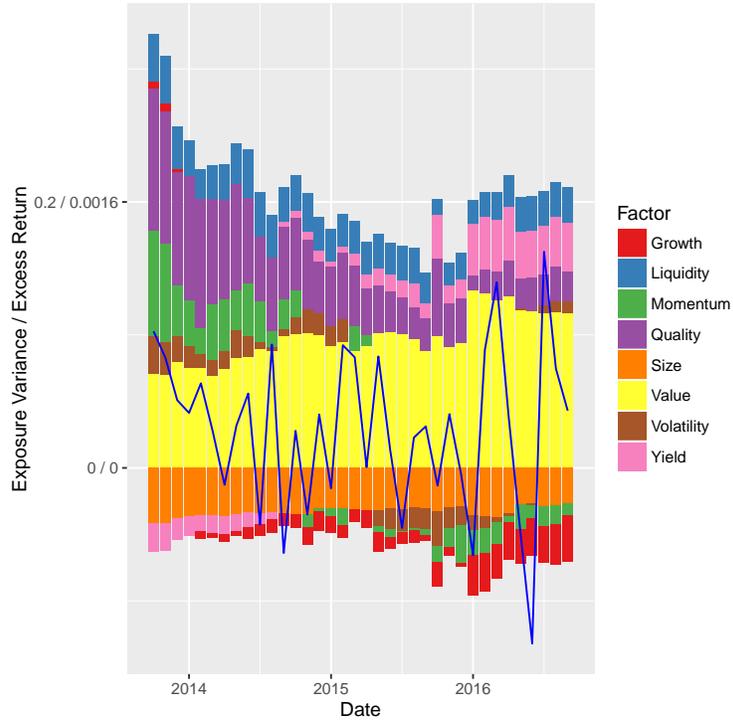
### US Large Cap Style Factor Attribution



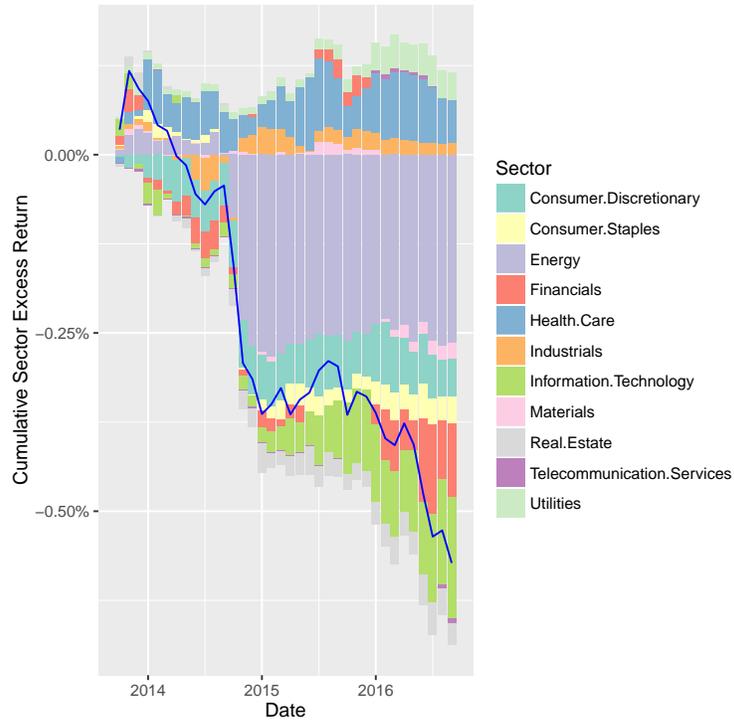
US Large Cap Style Factor Breakout



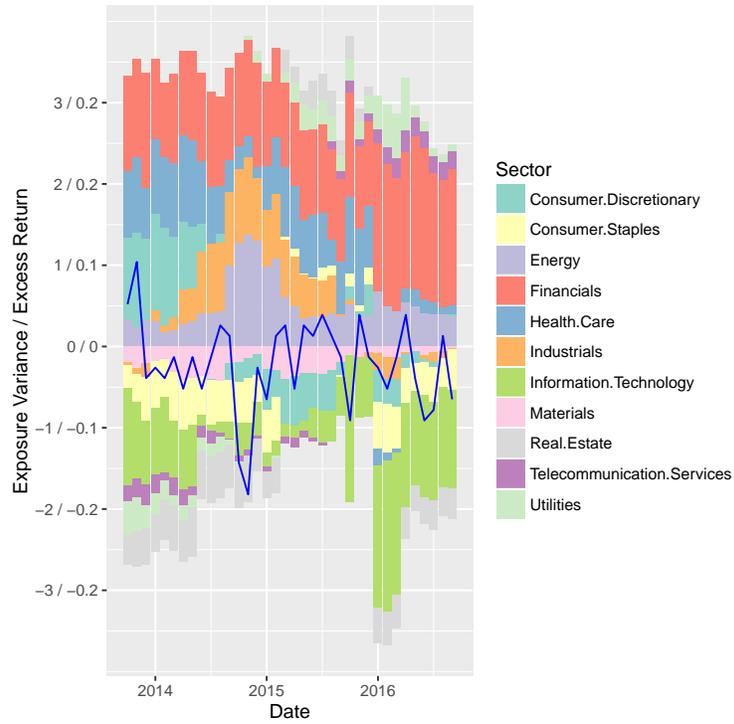
US Large Cap Monthly Style Factors Active Exposure



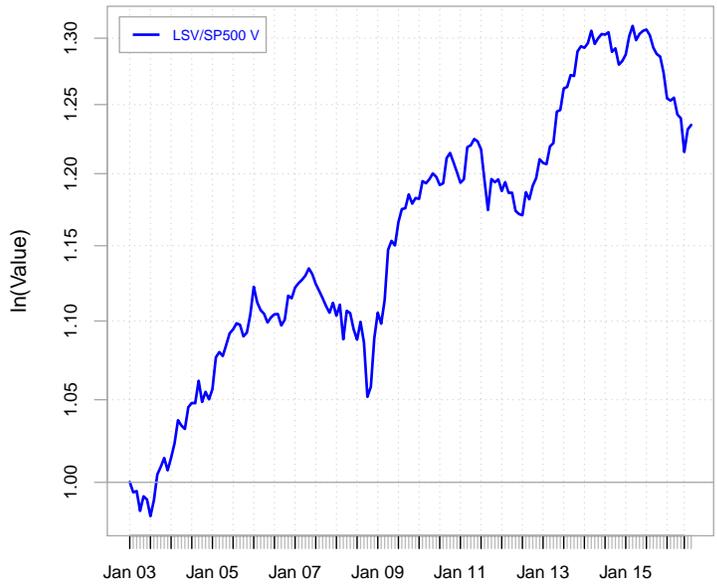
US Large Cap Monthly GICS Sector Return



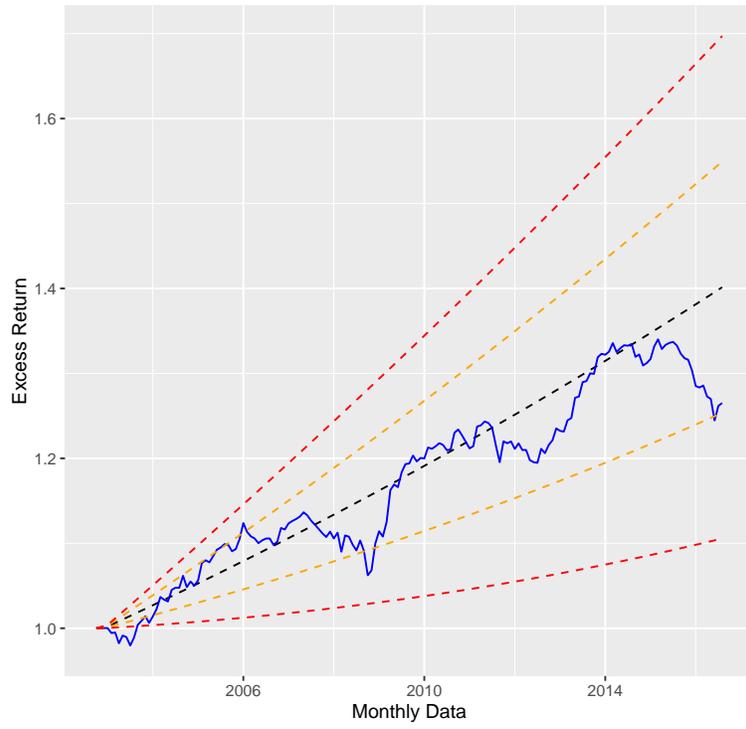
US Large Cap GICS Sector Active Exposure



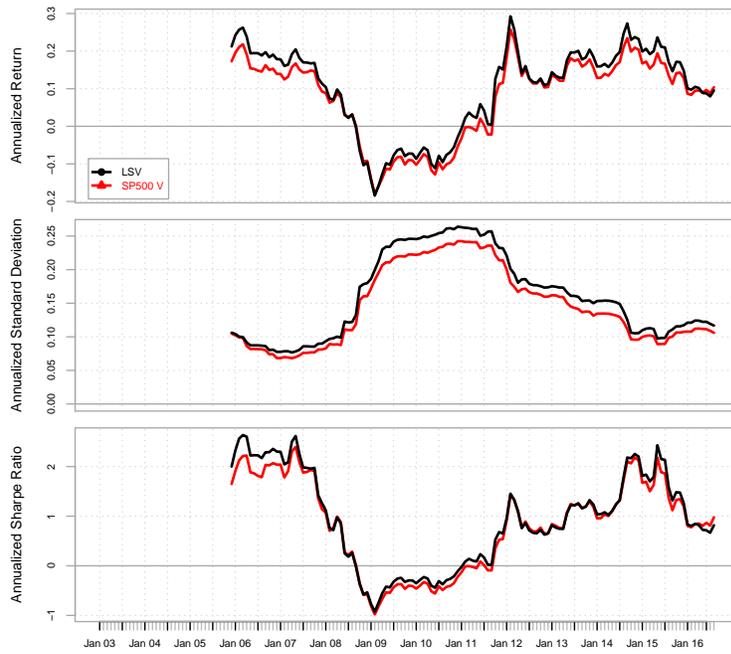
LSV Cumulative Relative Performance



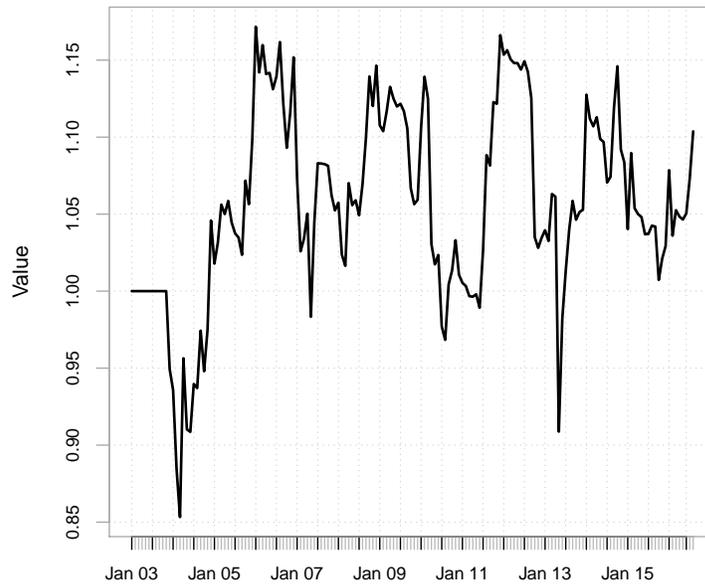
LSV Actual Excess vs Expected Excess +/- 1 & 2 Std Dev



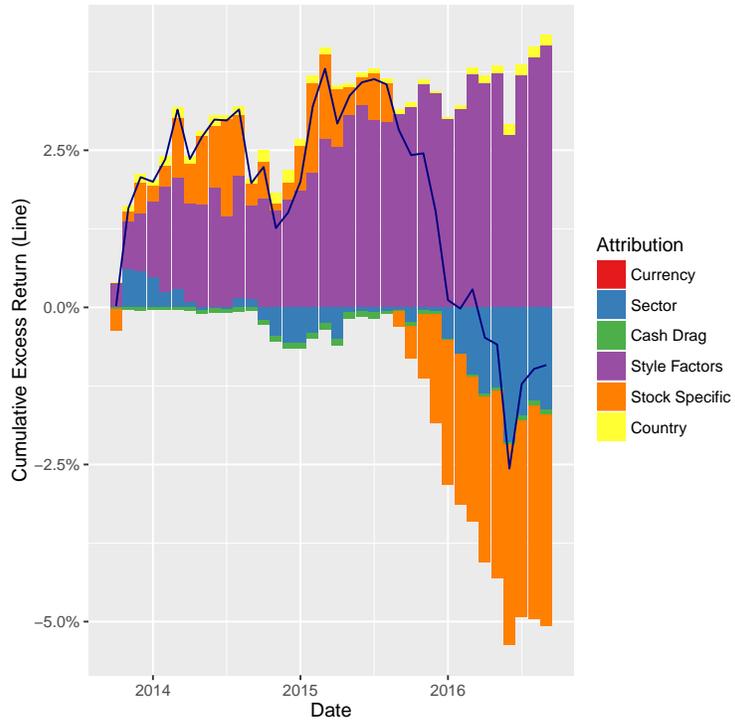
LSV Rolling 3 year Performance



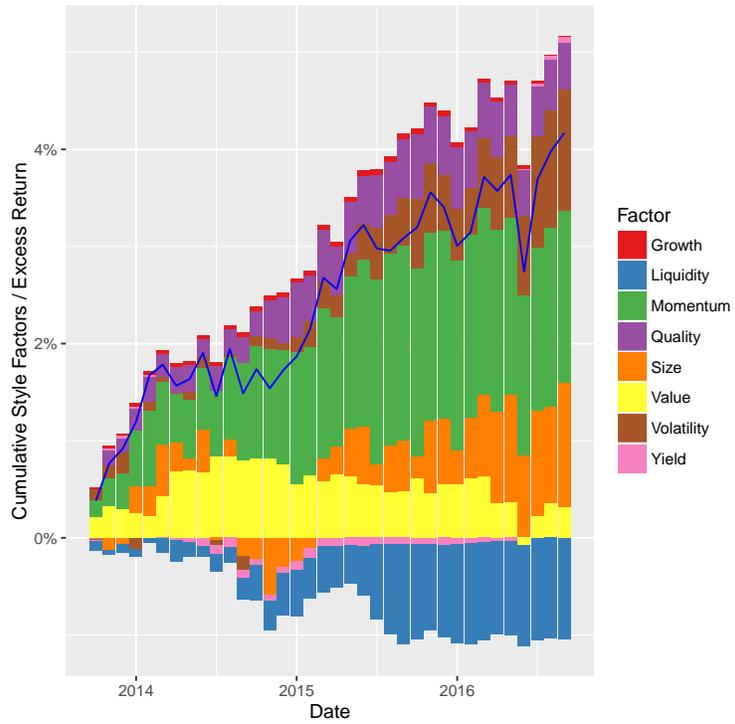
LSV Rolling 12 Month Beta



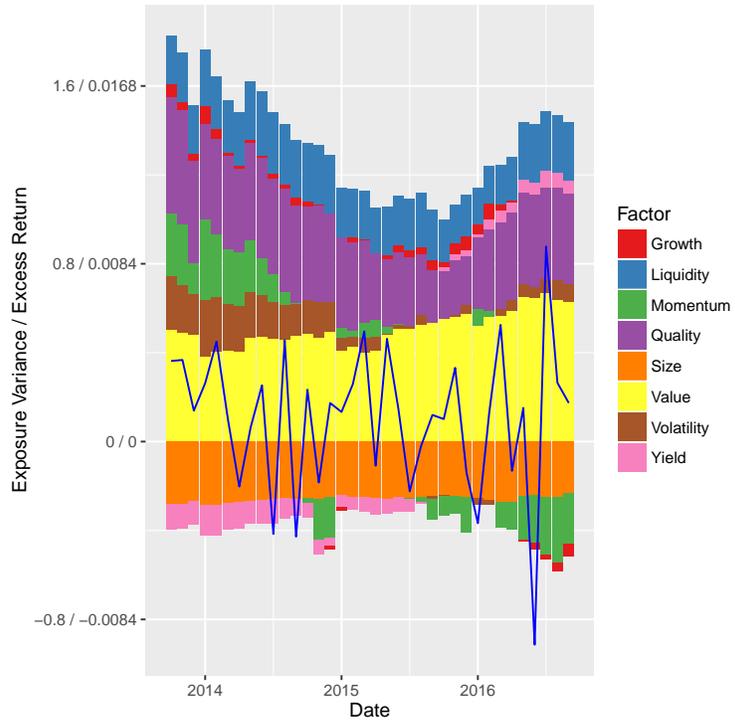
LSV Style Factor Attribution



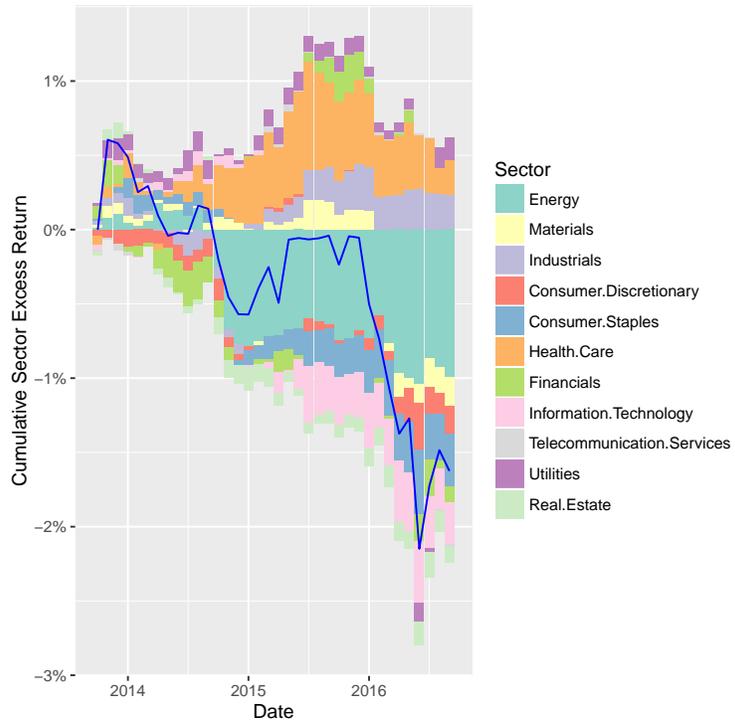
LSV Style Factor Breakout



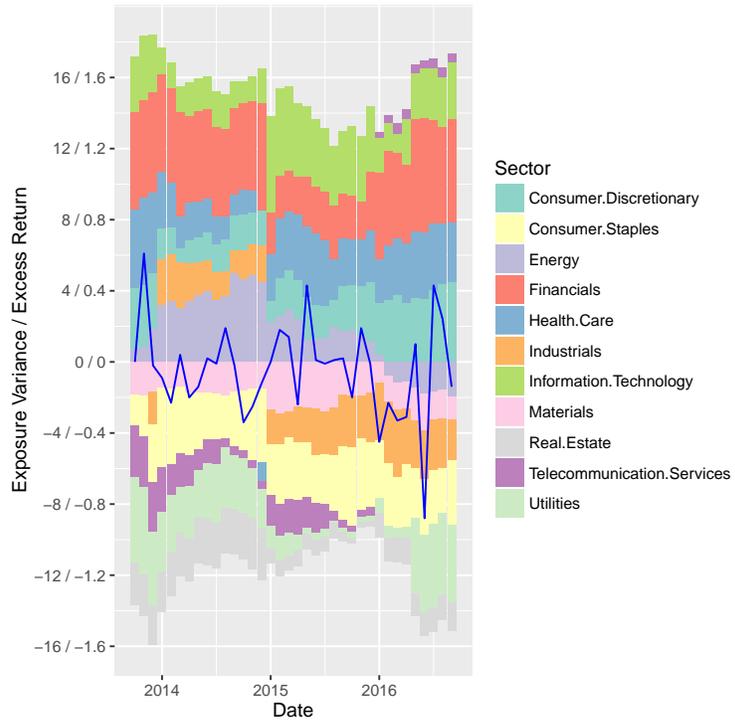
LSV Monthly Style Factors Active Exposure



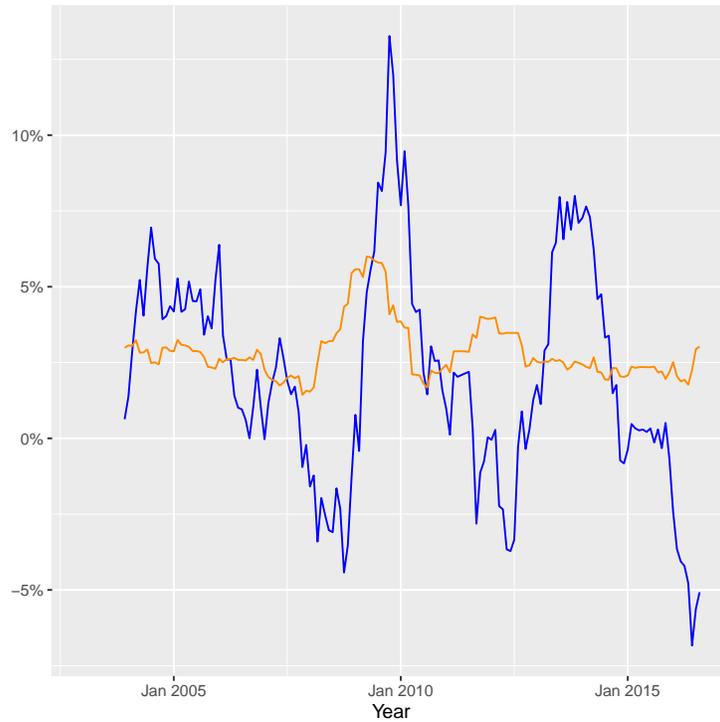
LSV Monthly GICS Sector Return



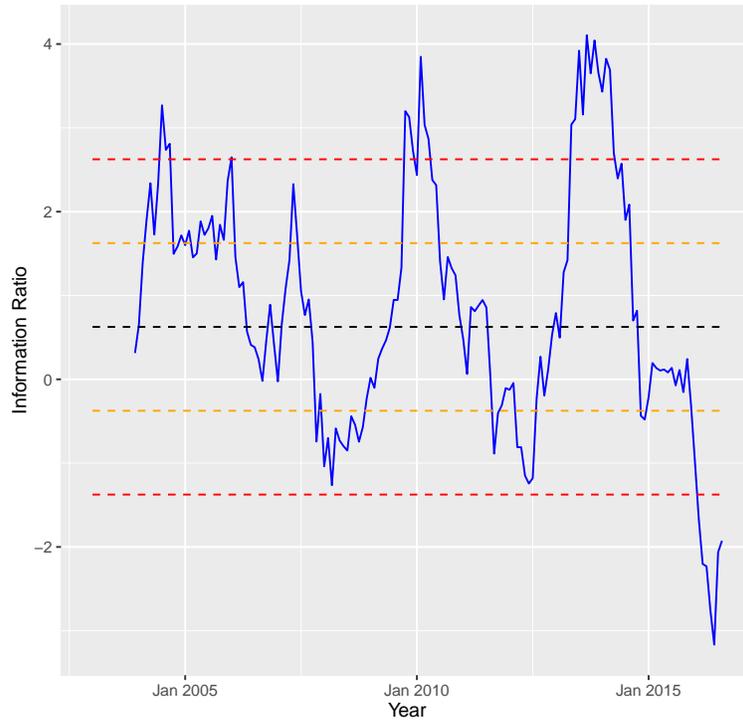
LSV GICS Sector Active Exposure



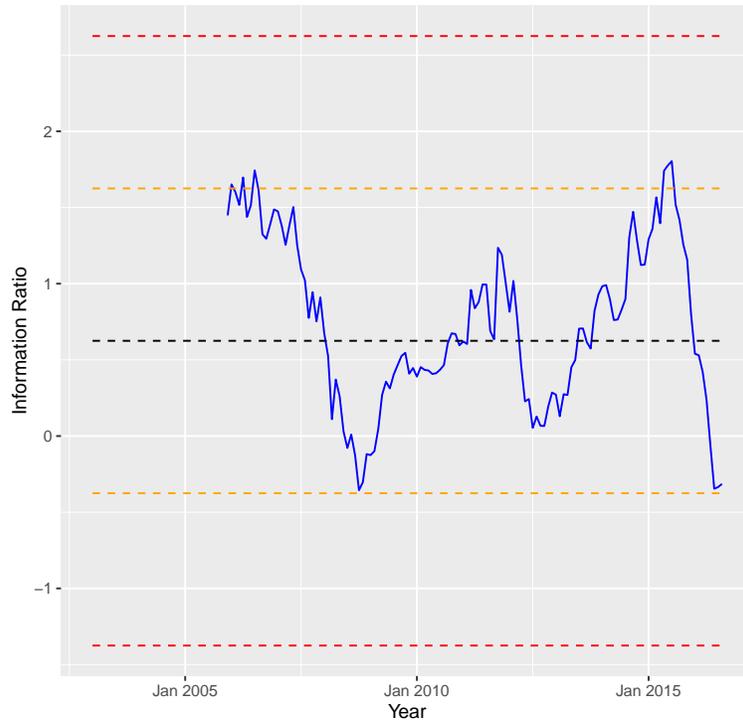
Rolling 12 Month Excess Return (Blue) & Tracking Error (Orange)



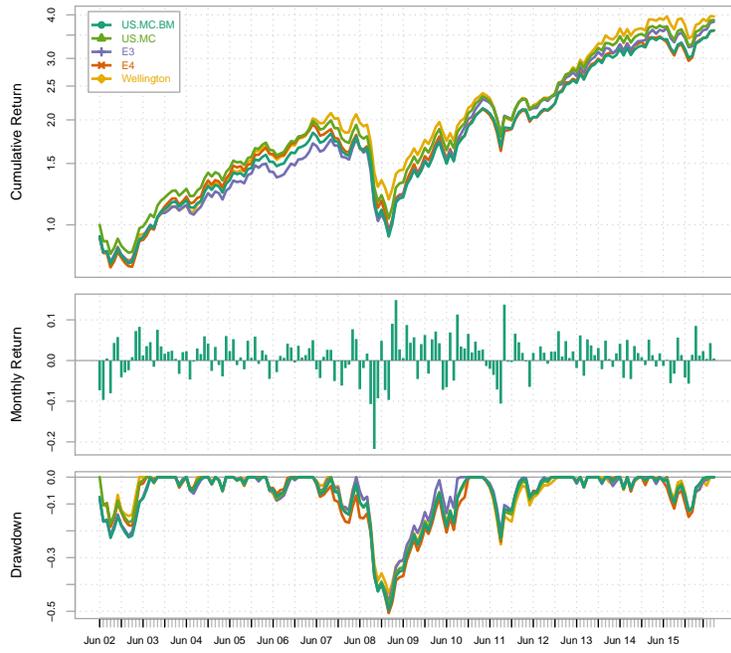
LSV Rolling 12 Month Information Ratio



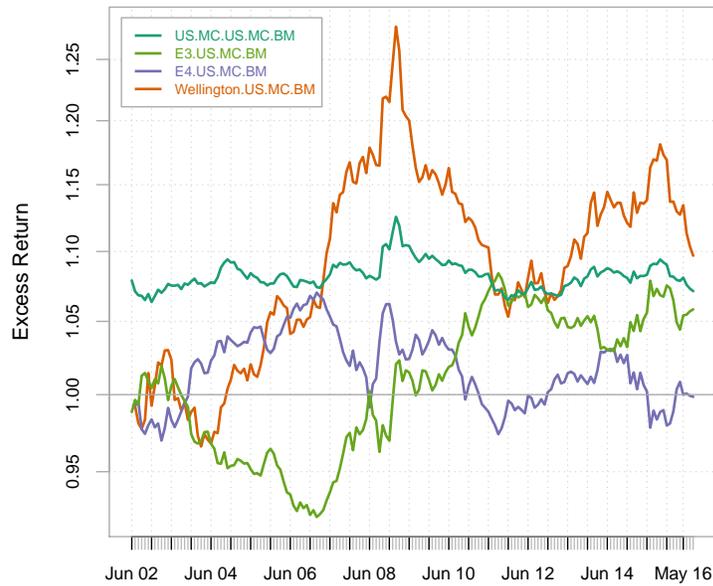
LSV Rolling 36 Month Information Ratio



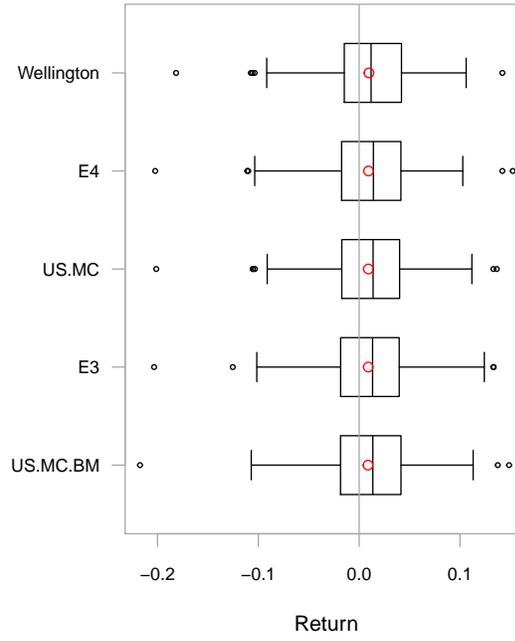
**US Mid Cap Performance Summary**



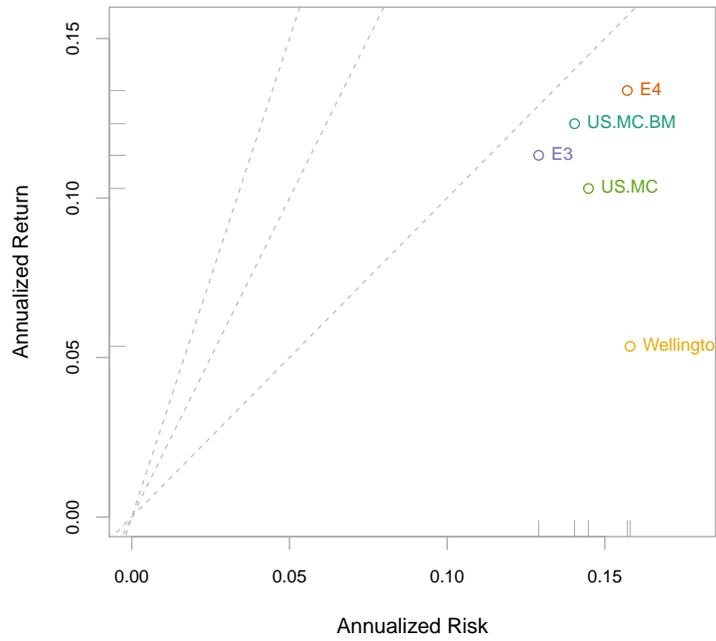
**US Mid Cap Cumulative Relative Performance**



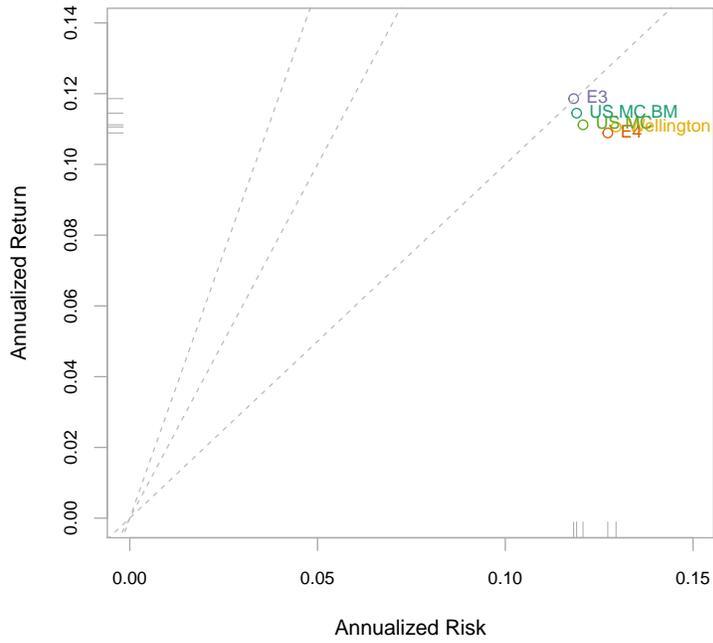
### Return Distribution Comparison



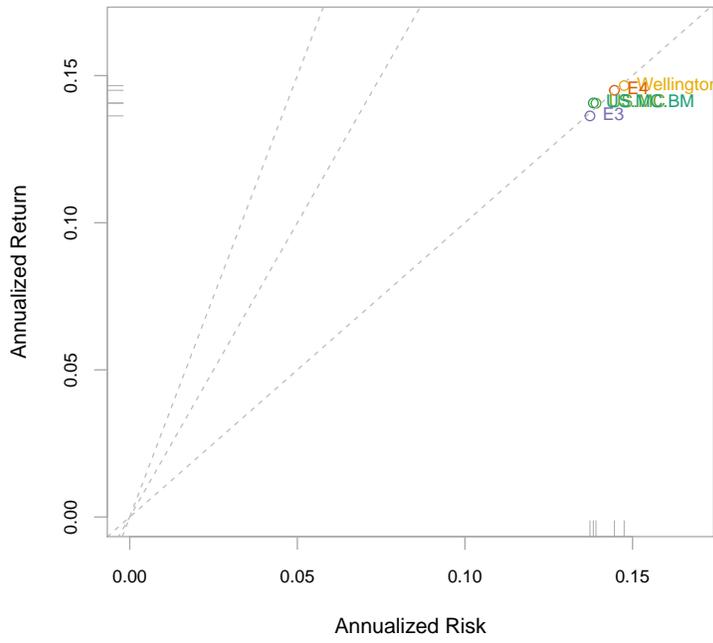
### US Mid Cap Trailing 1 Year Performance vs Sharpe Ratios (1,2,3)



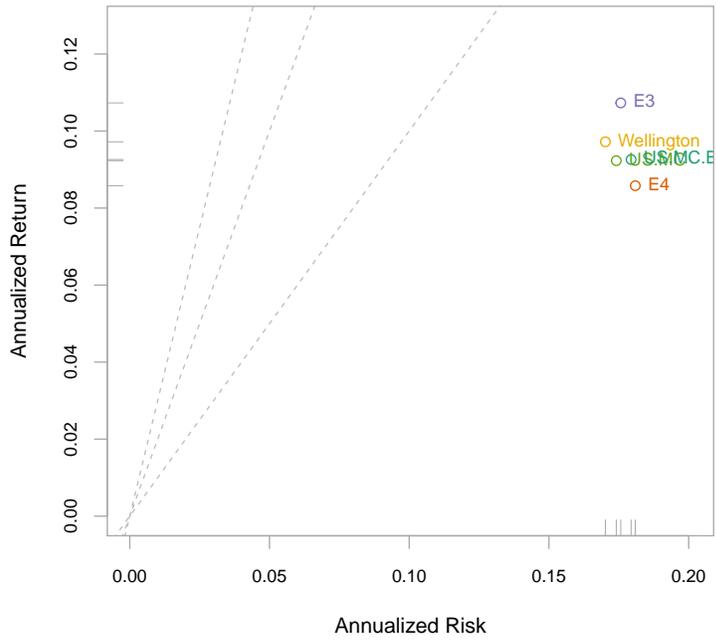
Trailing 3 Year Performance vs Sharpe Ratios (1,2,3)



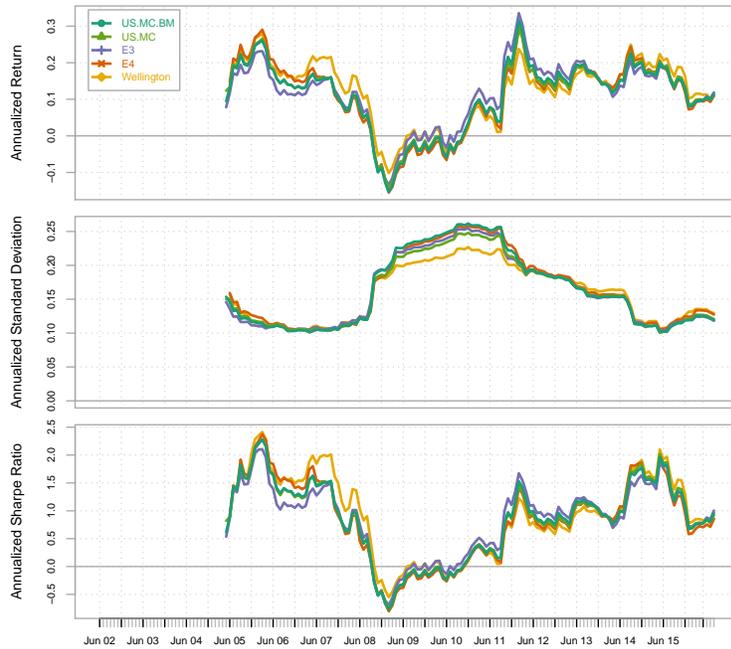
Trailing 5 Year Performance vs Sharpe Ratios (1,2,3)



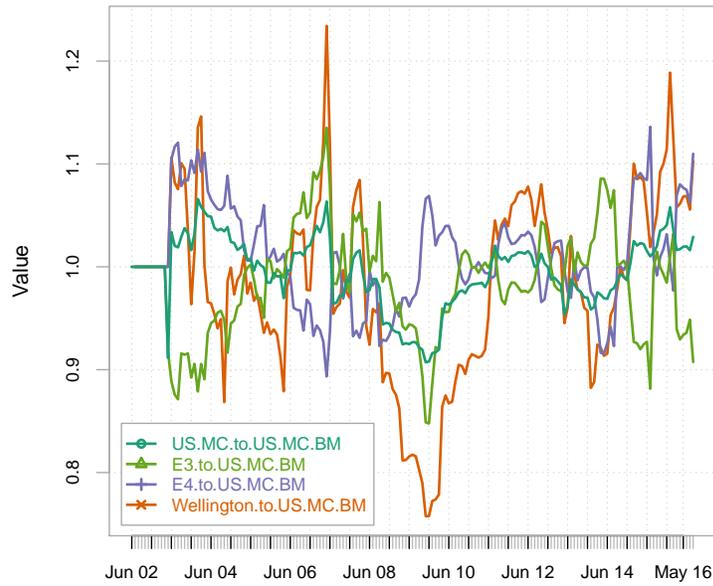
### Trailing 10 Year Performance vs Sharpe Ratios (1,2,3)



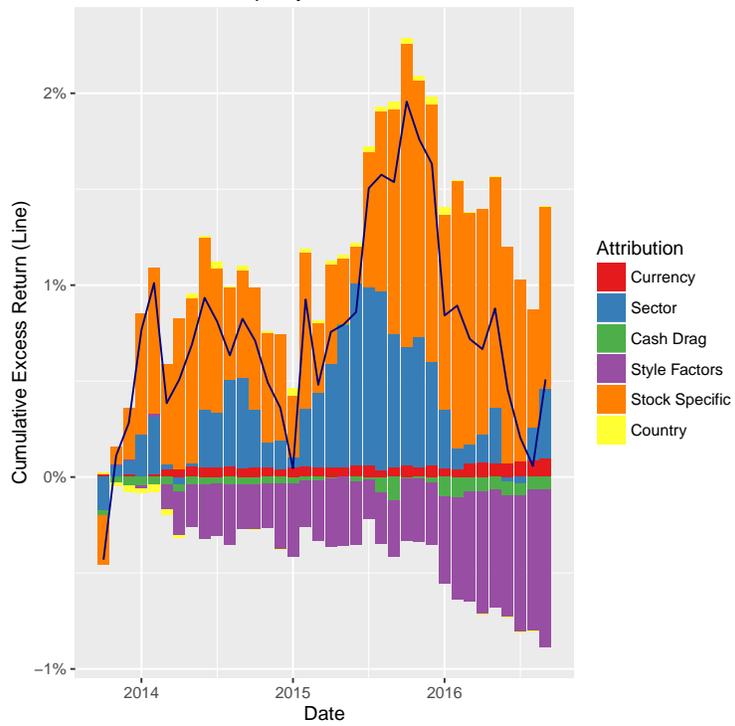
### US Mid Cap Rolling 3 Year Performance



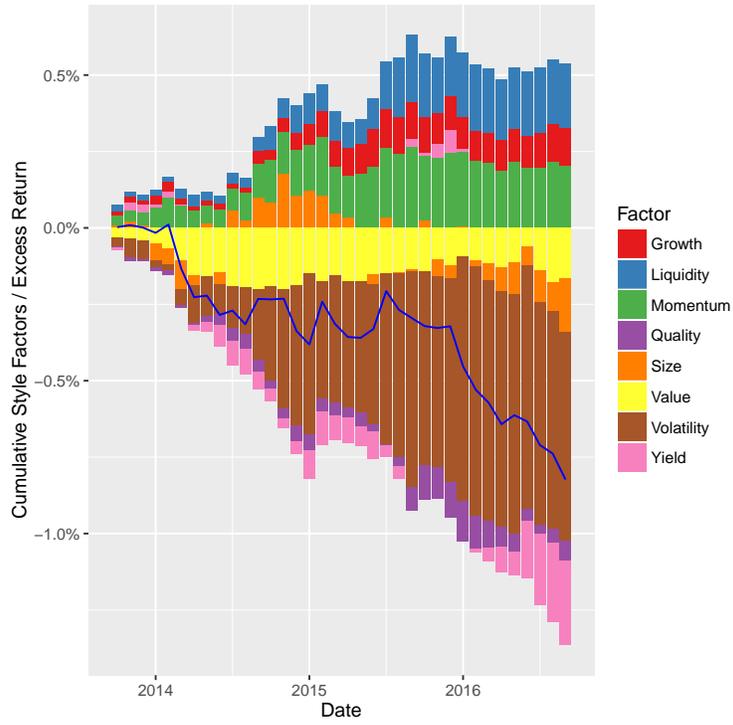
US Mid Cap Rolling 12 Month Beta



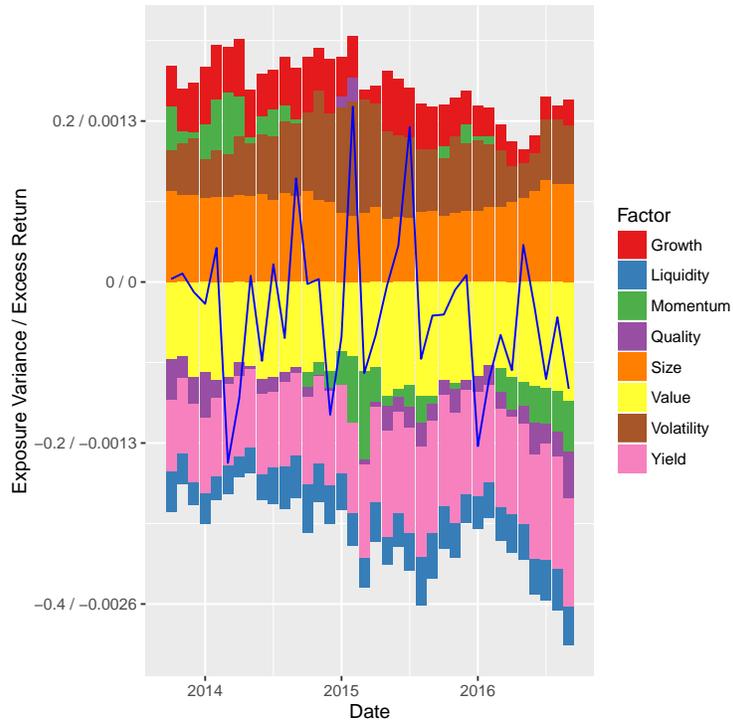
US Mid Cap Style Factor Attribution



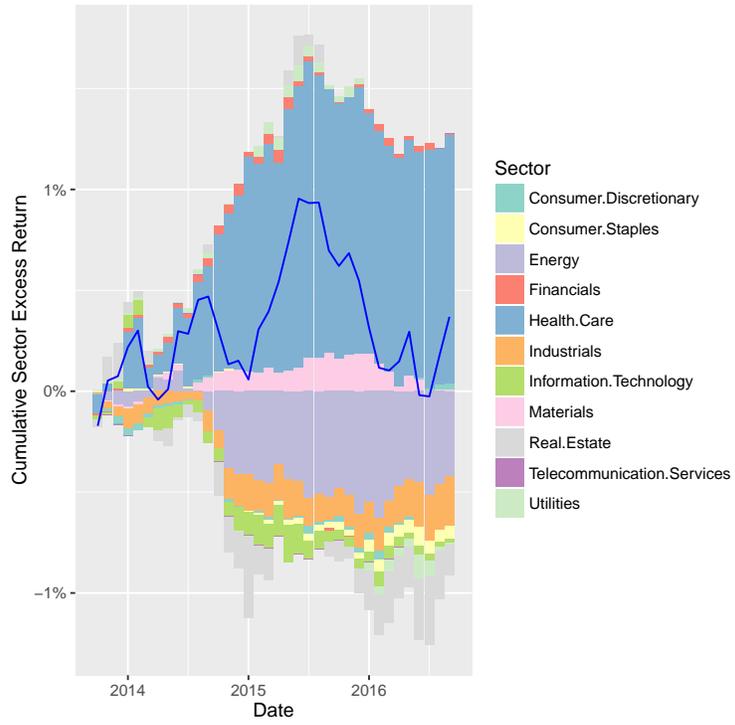
US Mid Cap Style Factor Breakout



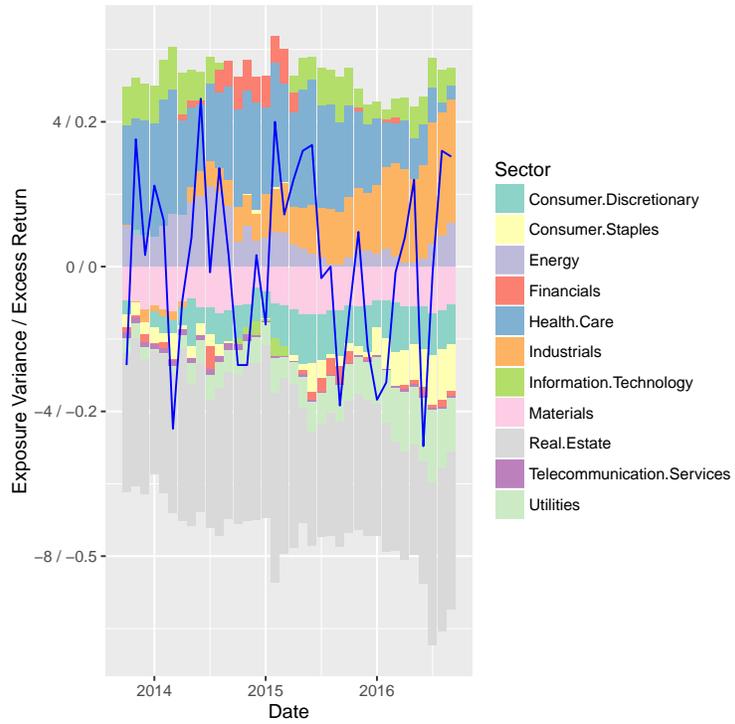
US Mid Cap Monthly Style Factors Active Exposure



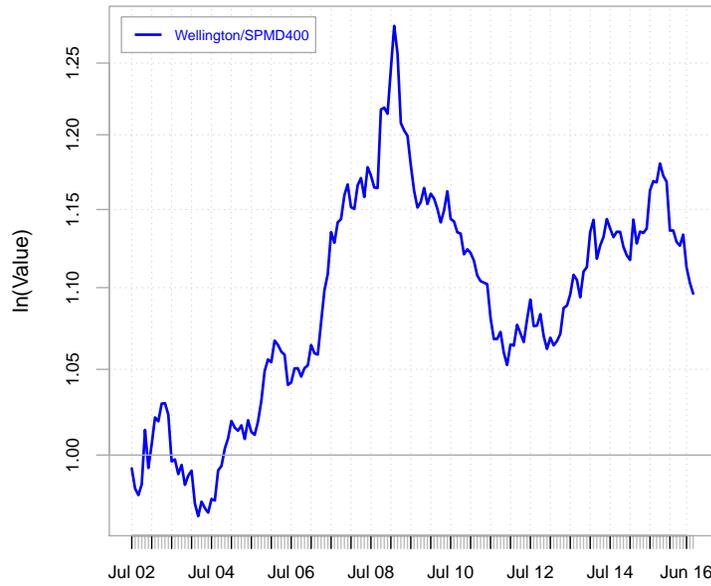
US Mid Cap Monthly GICS Sector Return



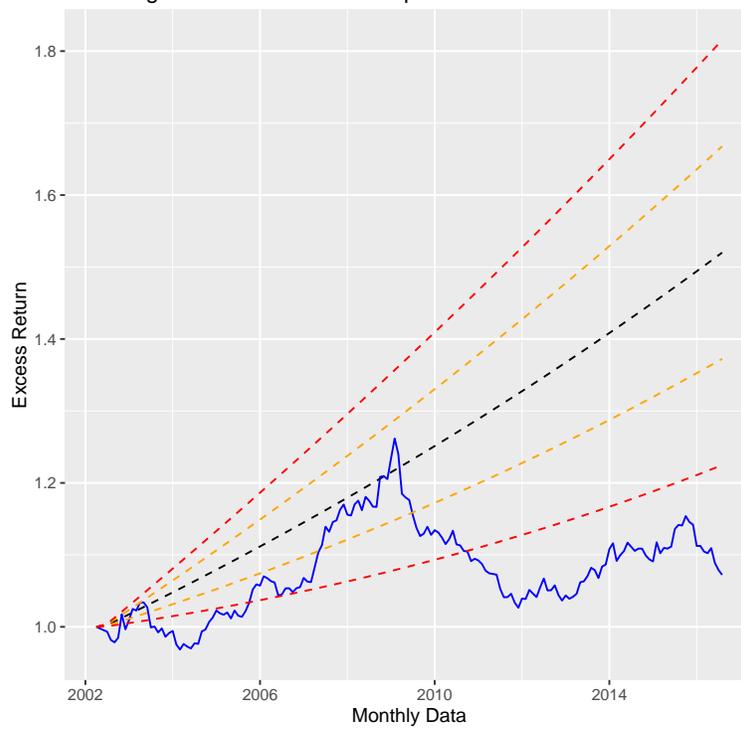
US Mid Cap GICS Sector Active Exposure



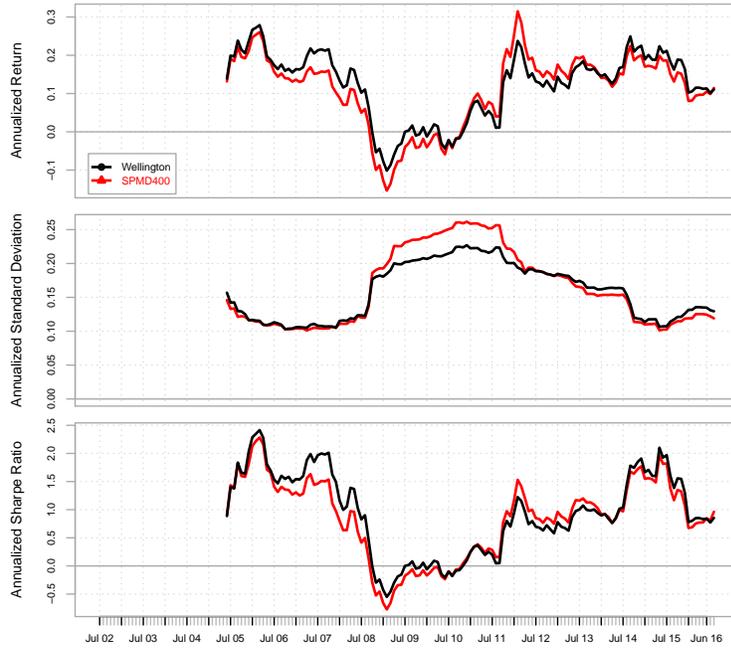
Wellington Cumulative Relative Performance



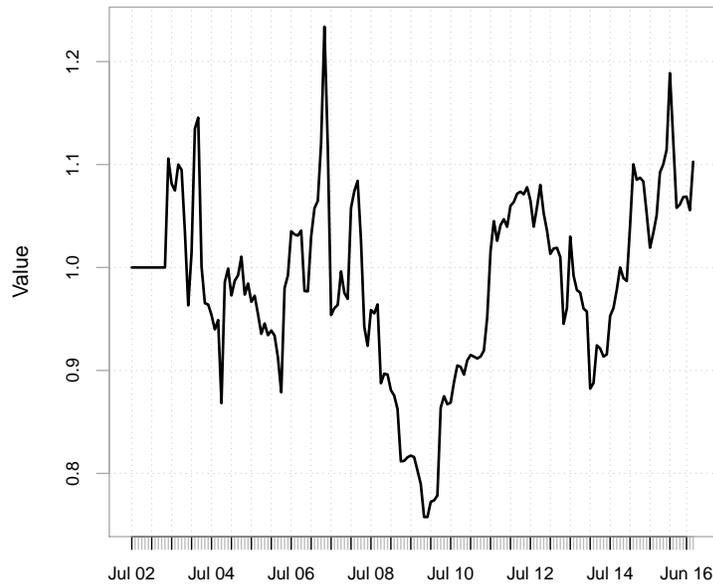
Wellington Actual Excess vs Expected Excess +/- 1 & 2 Std Dev

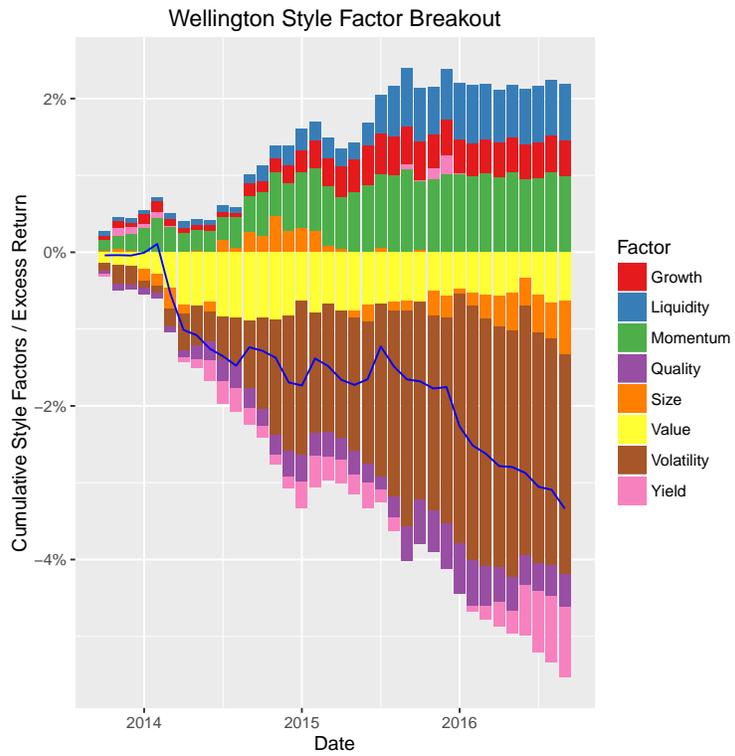
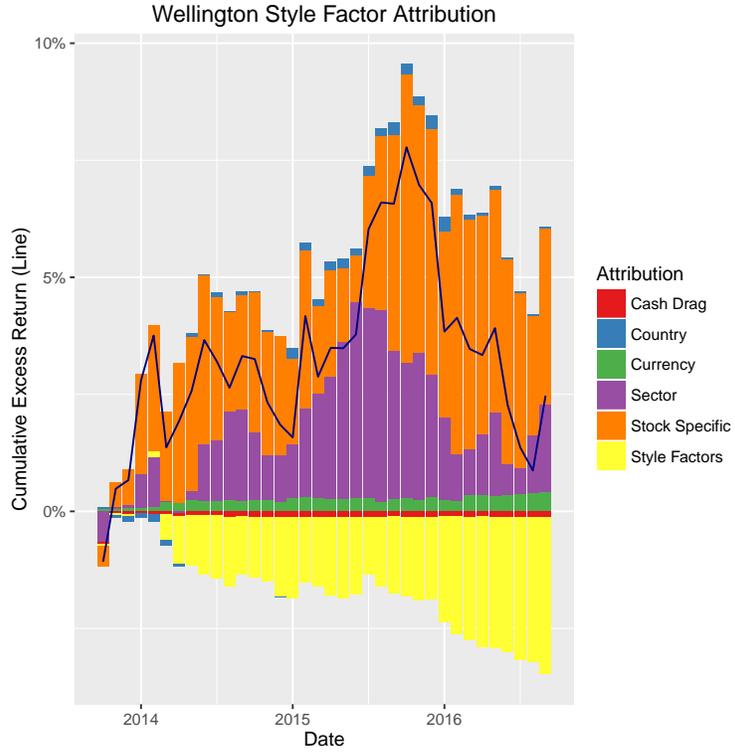


Wellington Rolling 3 year Performance

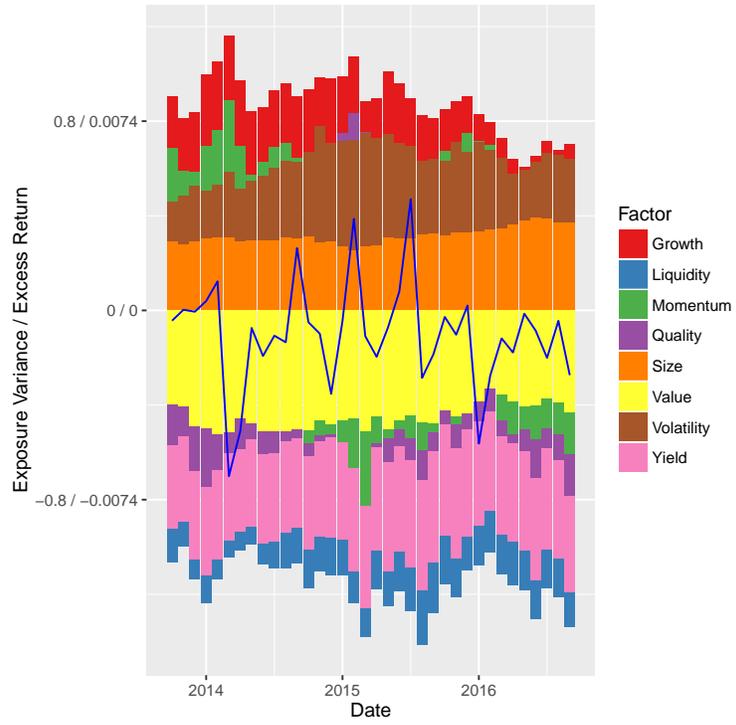


Wellington Rolling 12 Month Beta

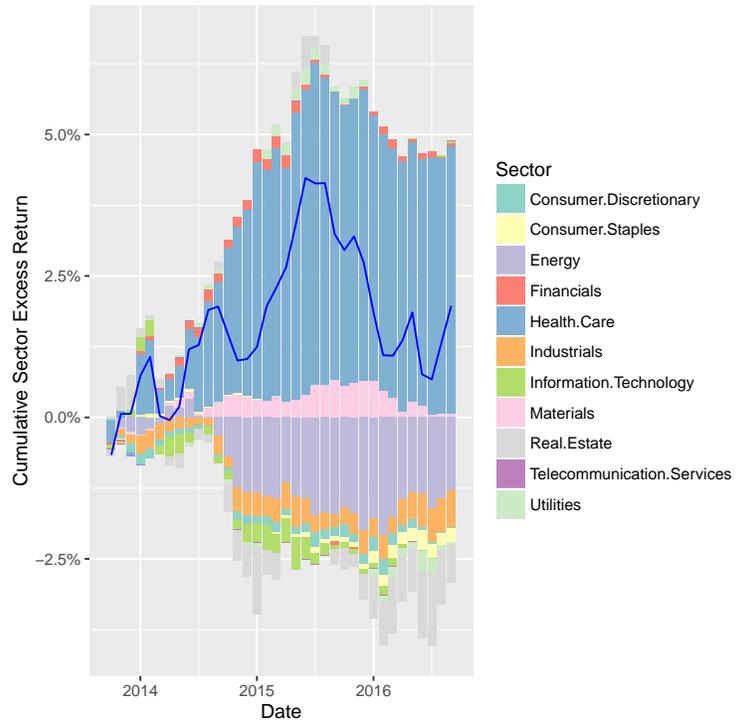




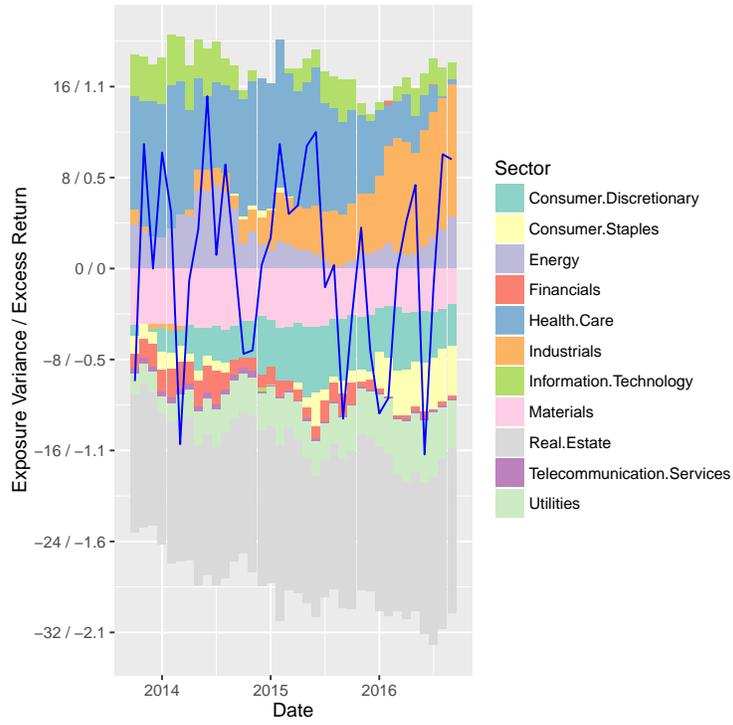
Wellington Monthly Style Factors Active Exposure



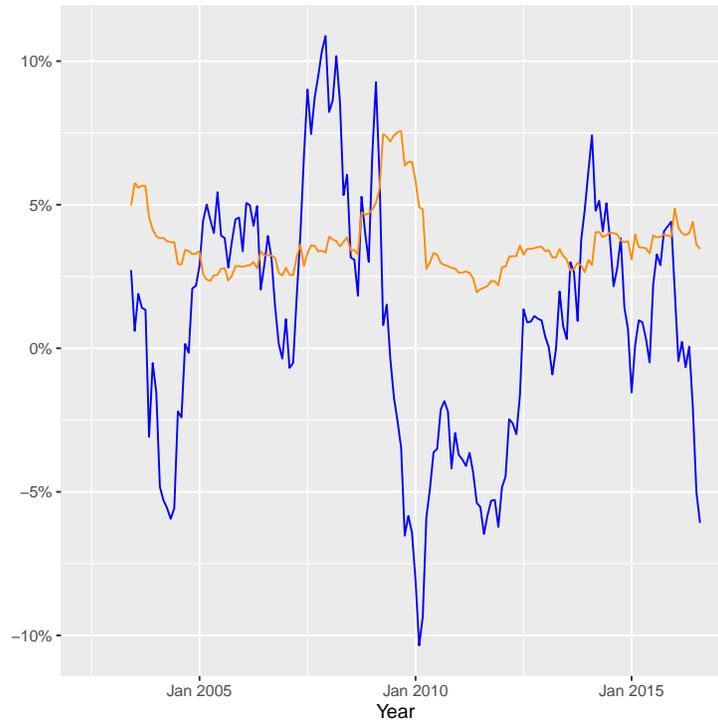
Wellington Monthly GICS Sector Return



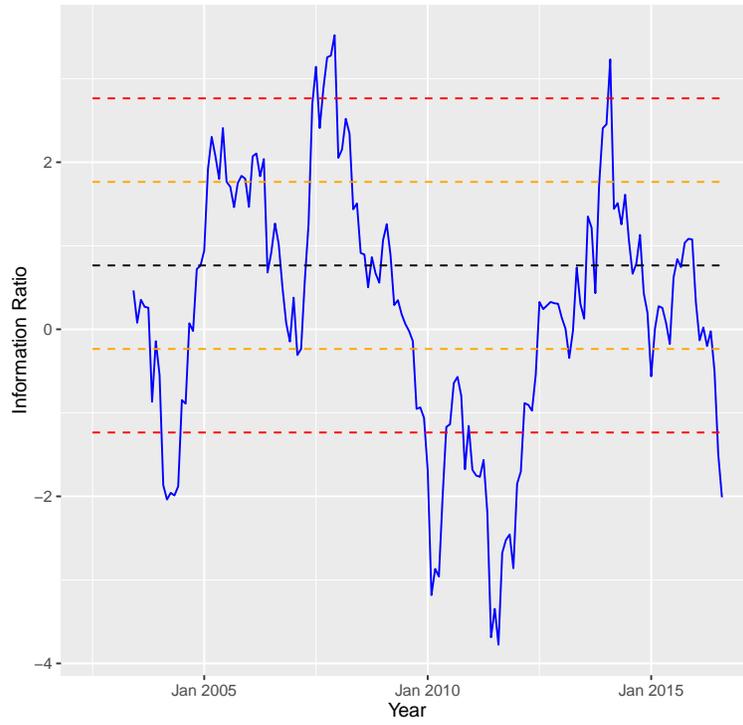
Wellington GICS Sector Active Exposure



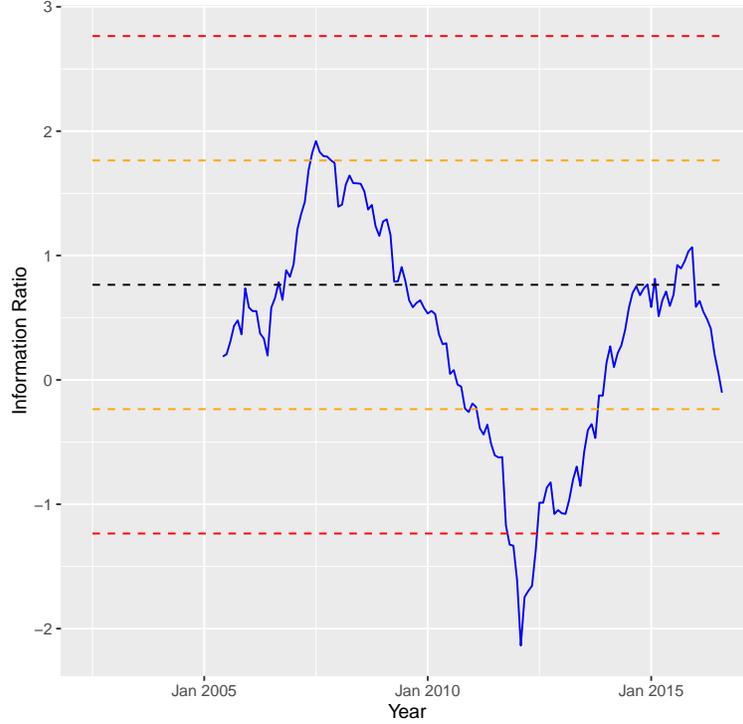
Rolling 12 Month Excess Return (Blue) & Tracking Error (Orange)



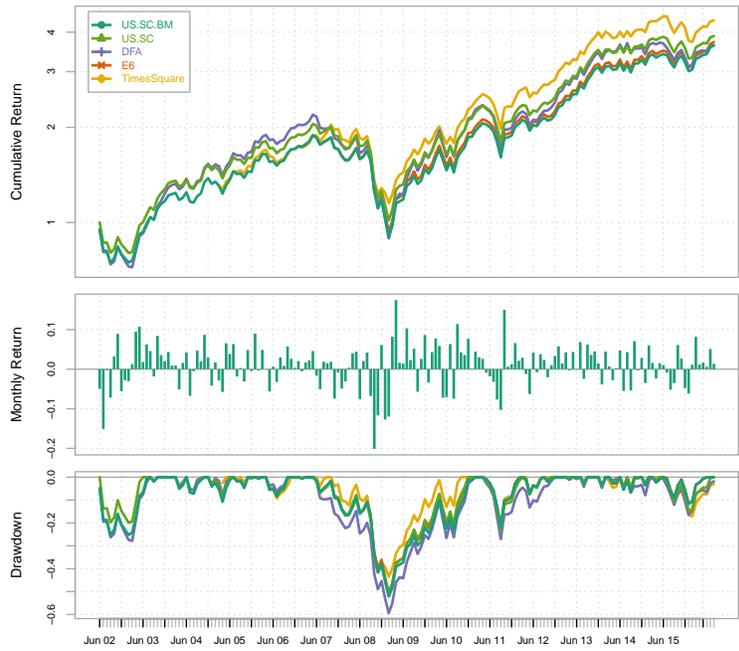
Wellington Rolling 12 Month Information Ratio



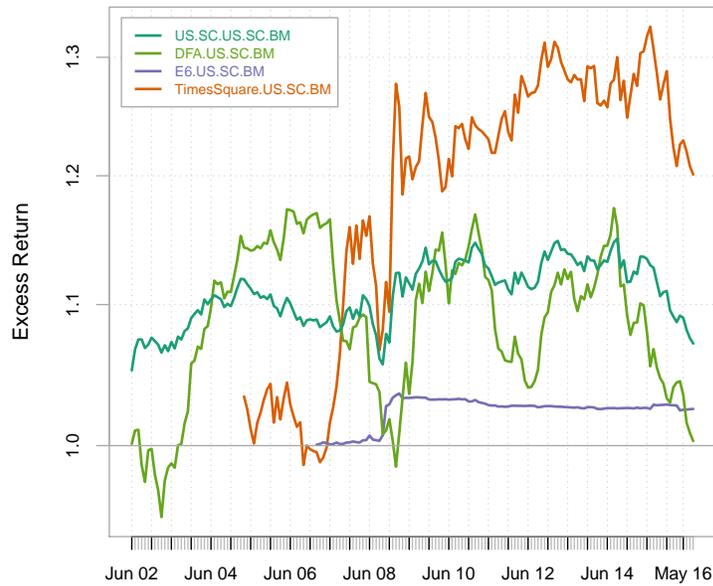
Wellington Rolling 36 Month Information Ratio



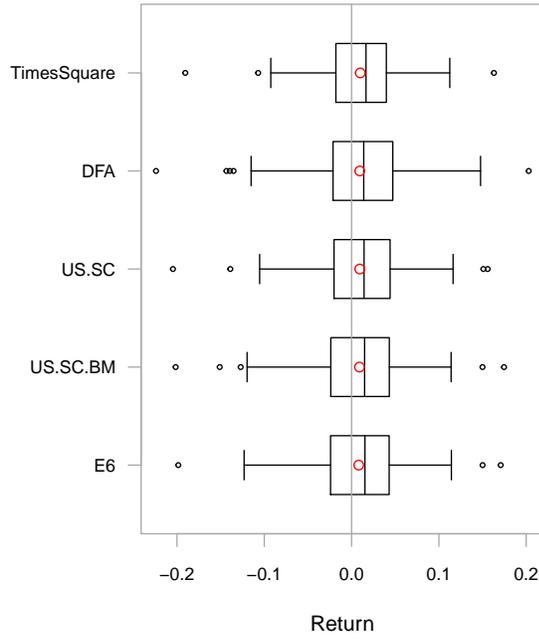
US Small Cap Performance Summary



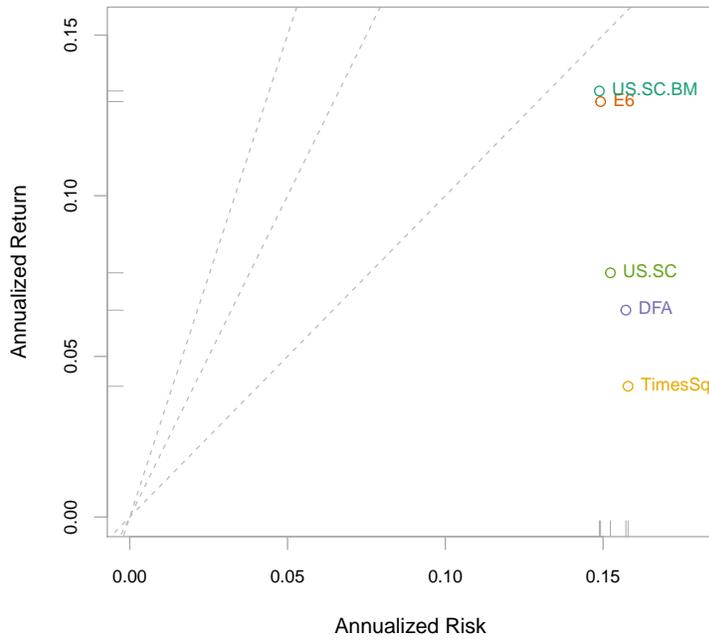
US Small Cap Cumulative Relative Performance



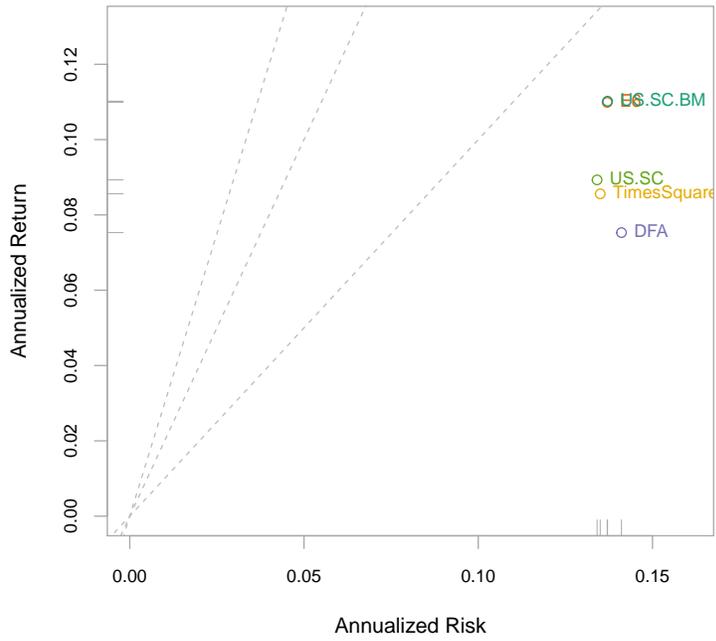
### Return Distribution Comparison



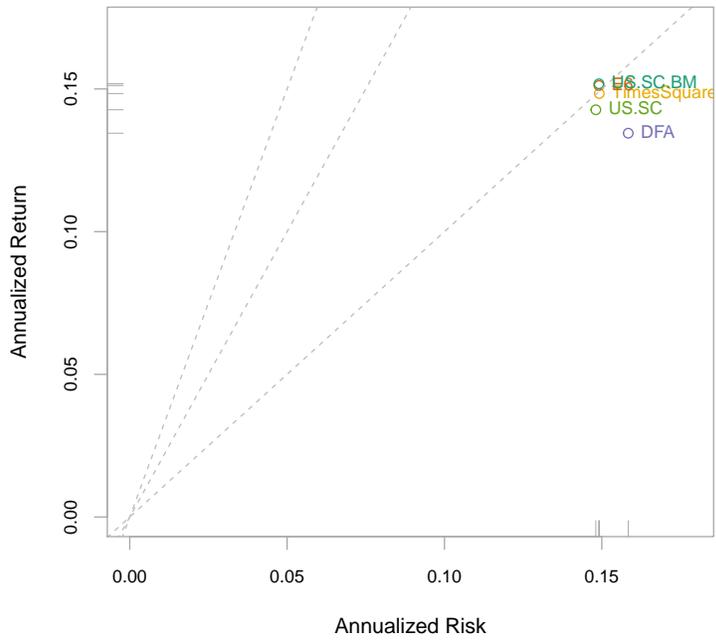
### US Small Cap Trailing 1 Year Performance vs Sharpe Ratios (1,2,3)



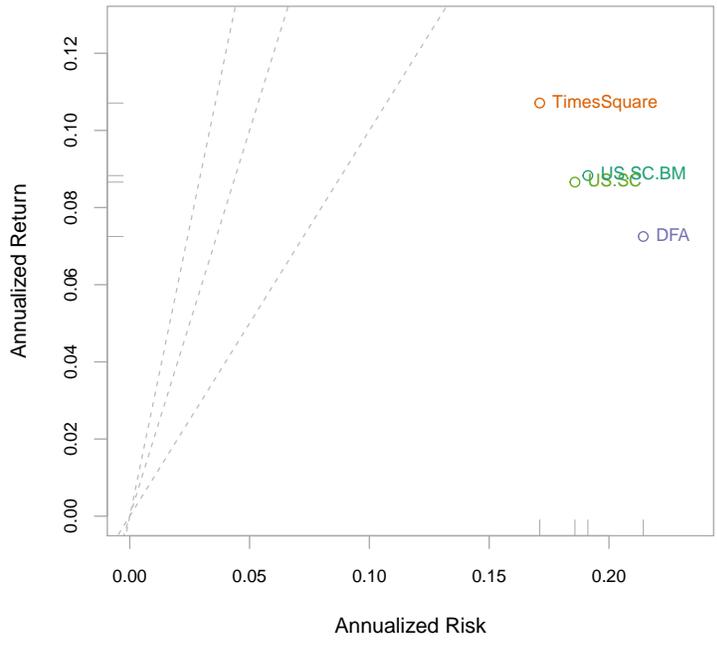
Trailing 3 Year Performance vs Sharpe Ratios (1,2,3)



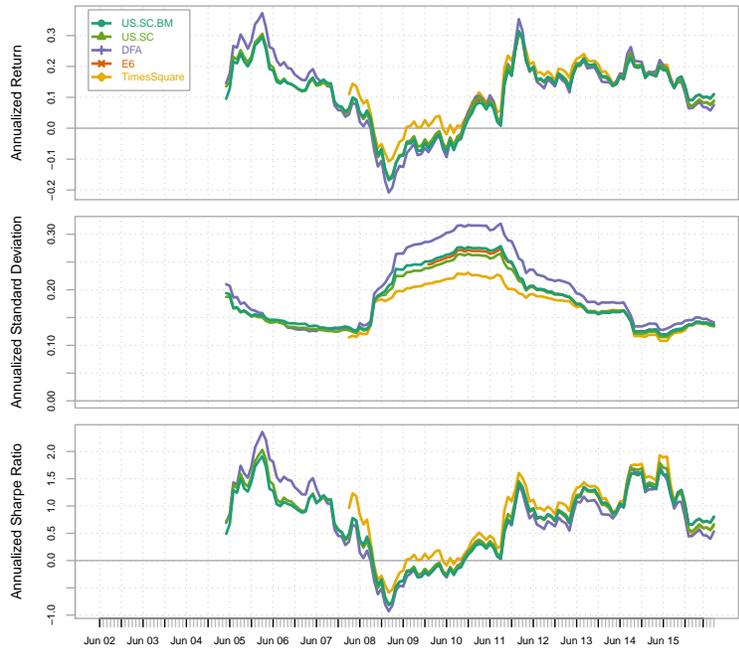
Trailing 5 Year Performance vs Sharpe Ratios (1,2,3)



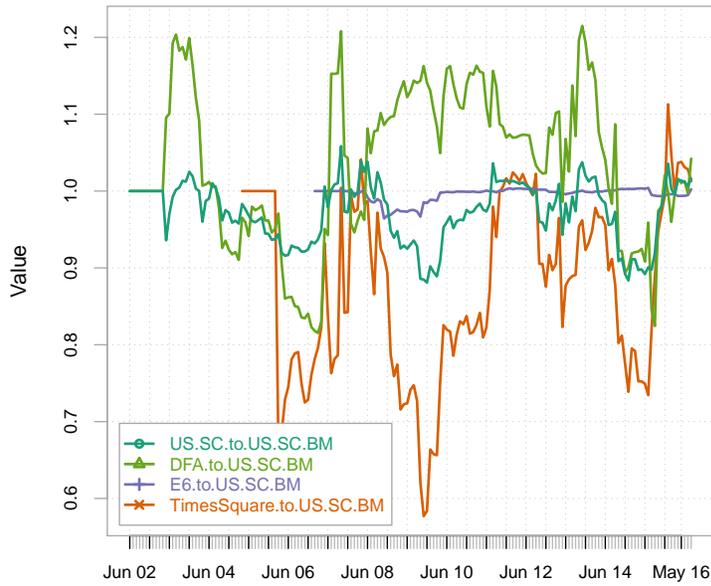
### Trailing 10 Year Performance vs Sharpe Ratios (1,2,3)



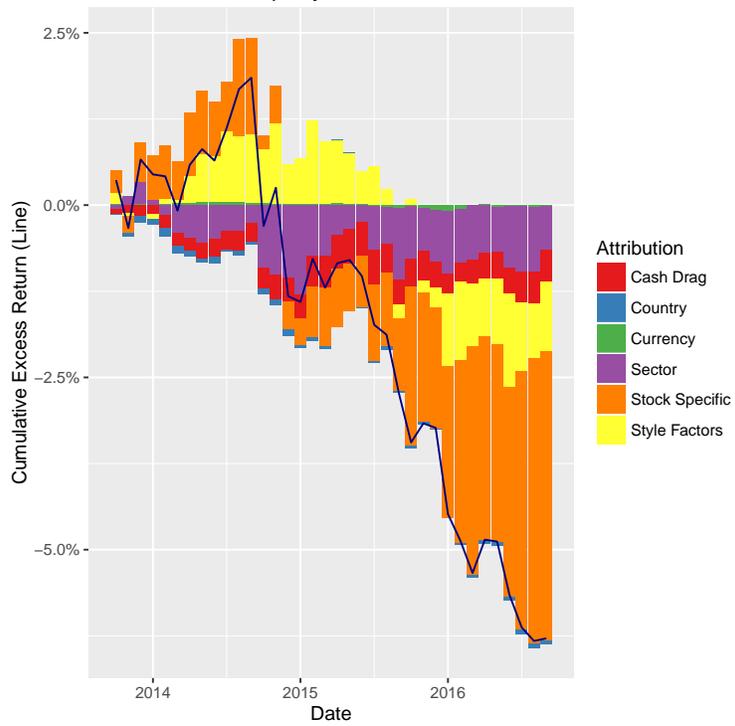
### US Small Cap Rolling 3 Year Performance



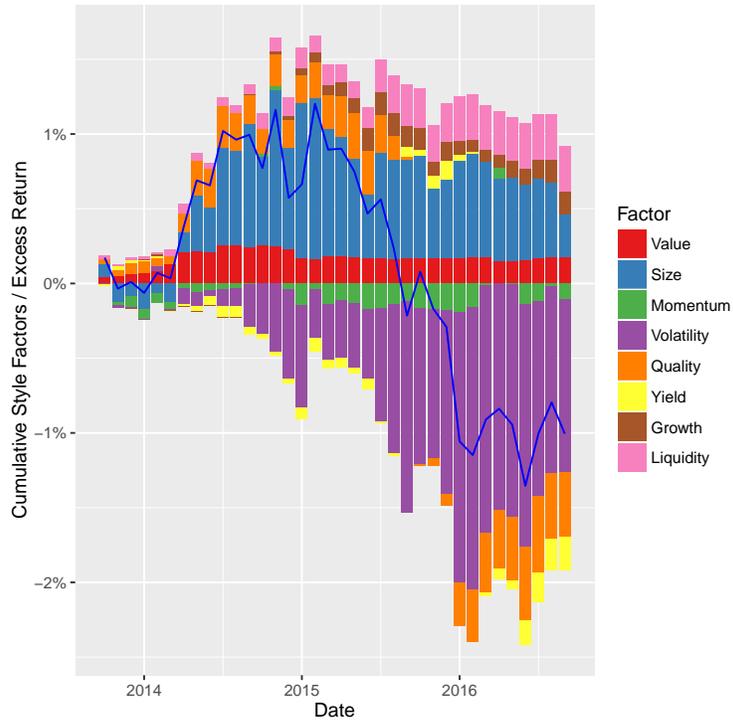
US Small Cap Rolling 12 Month Beta



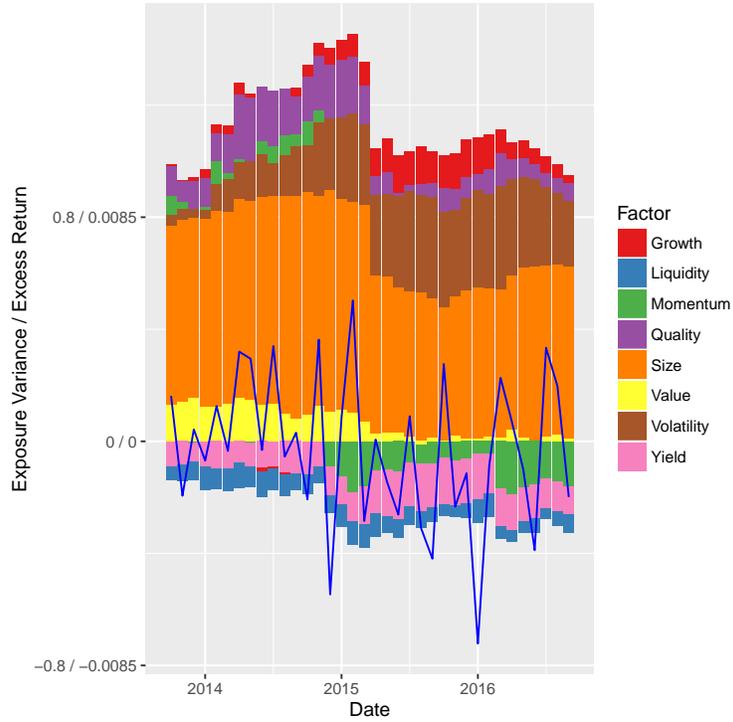
US Small Cap Style Factor Attribution



US Small Cap Style Factor Breakout



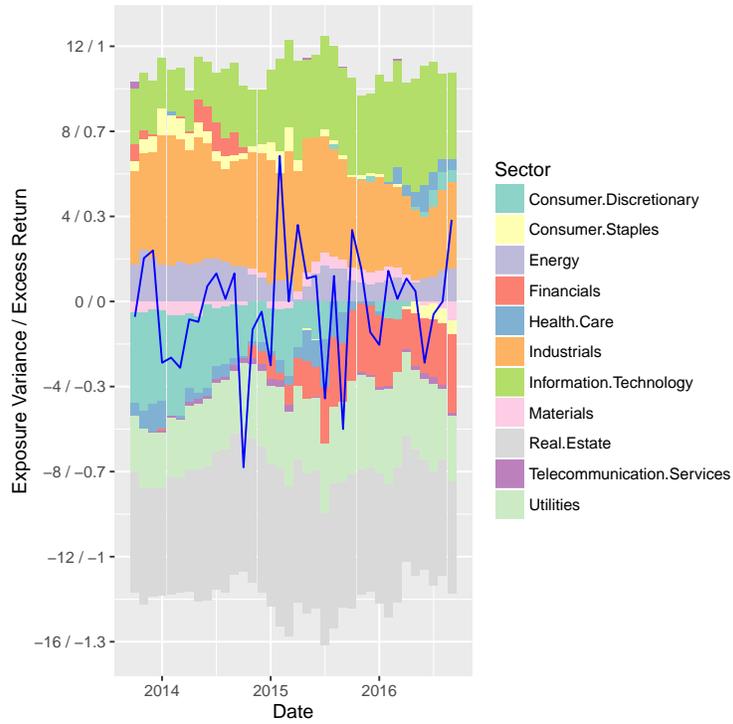
US Small Cap Monthly Style Factors Active Exposure



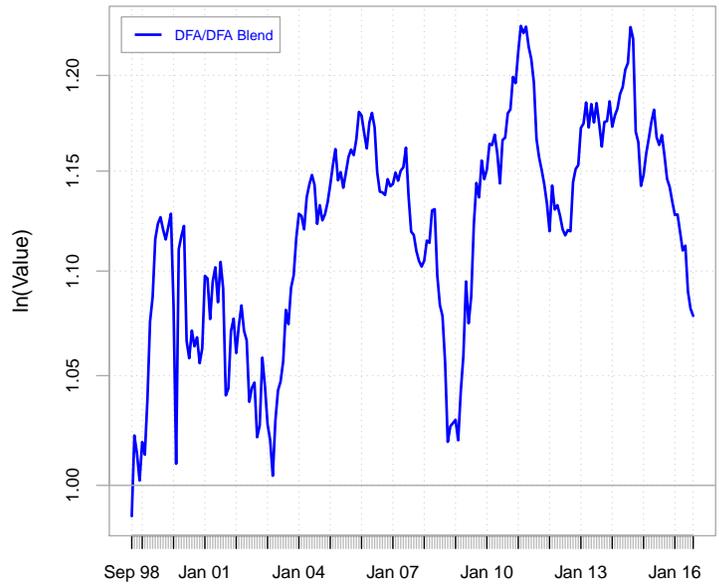
US Small Cap Monthly GICS Sector Return



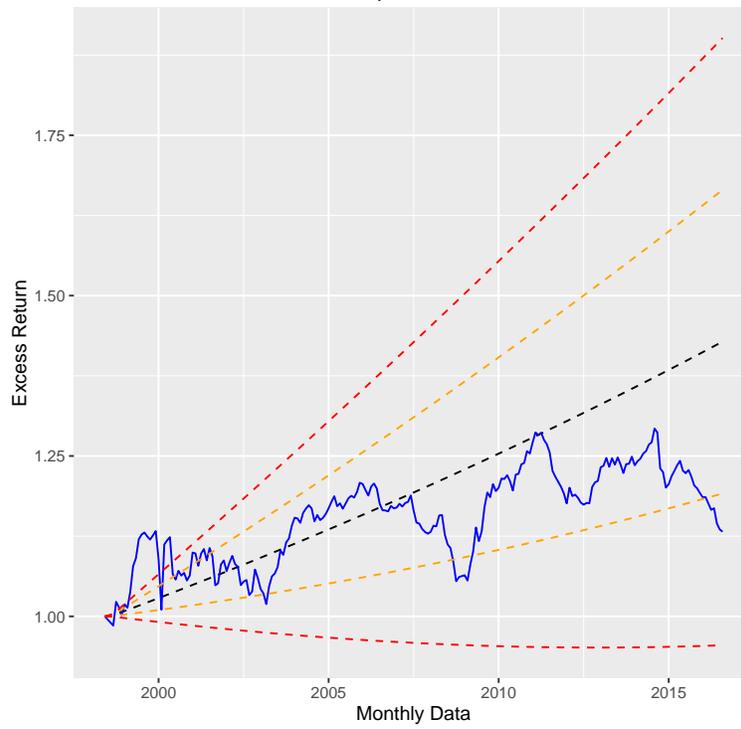
US Small Cap GICS Sector Active Exposure



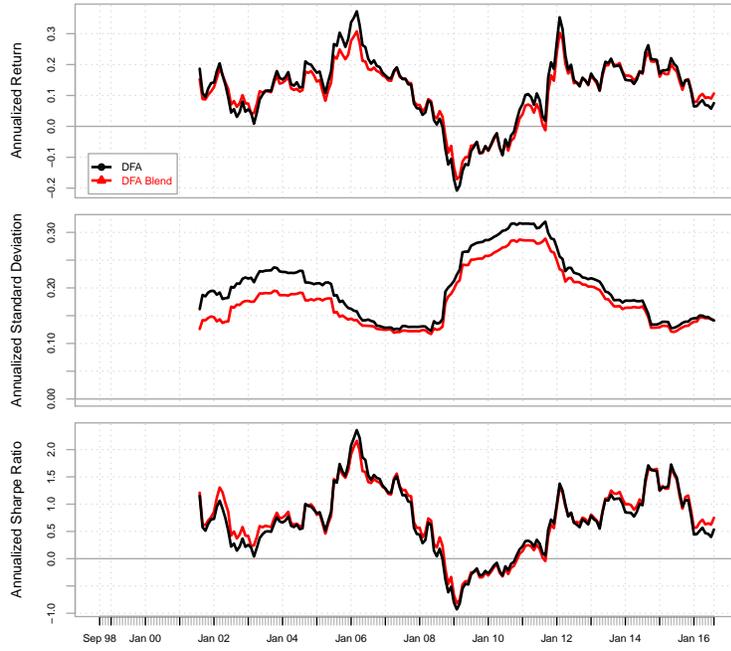
DFA Cumulative Relative Performance



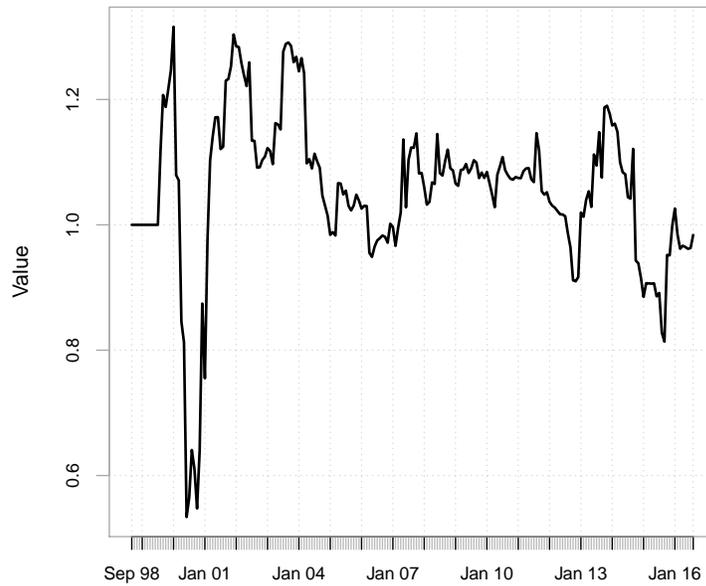
DFA Actual Excess vs Expected Excess +/- 1 & 2 Std Dev



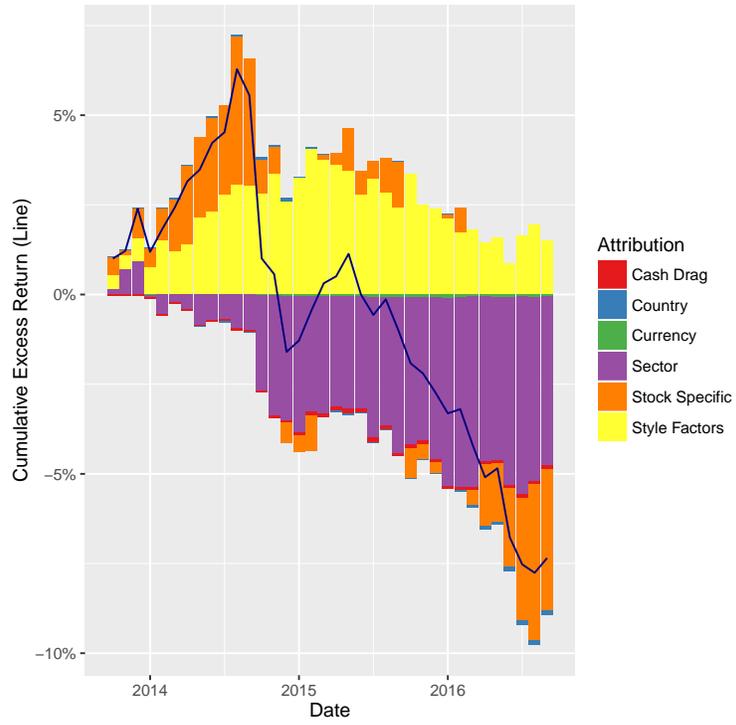
DFA Rolling 3 year Performance



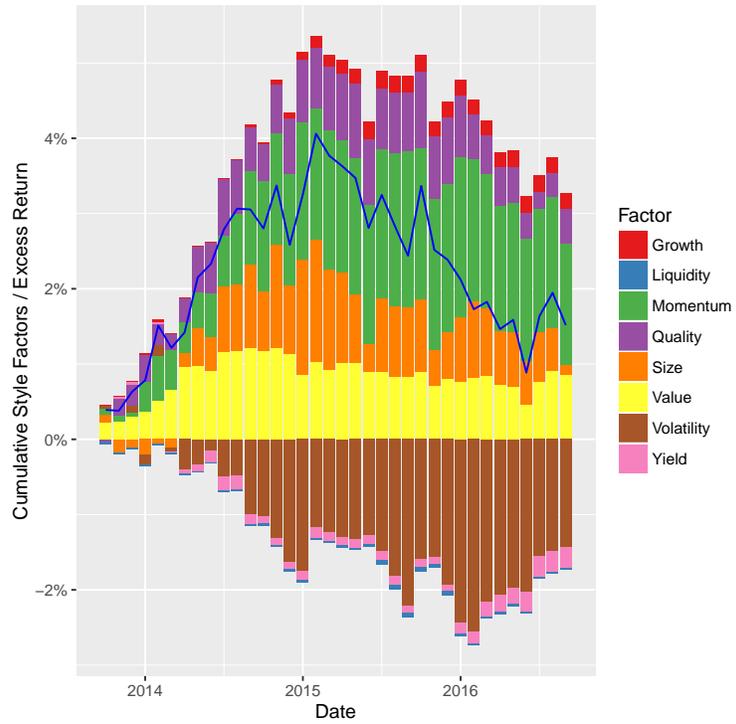
DFA Rolling 12 Month Beta



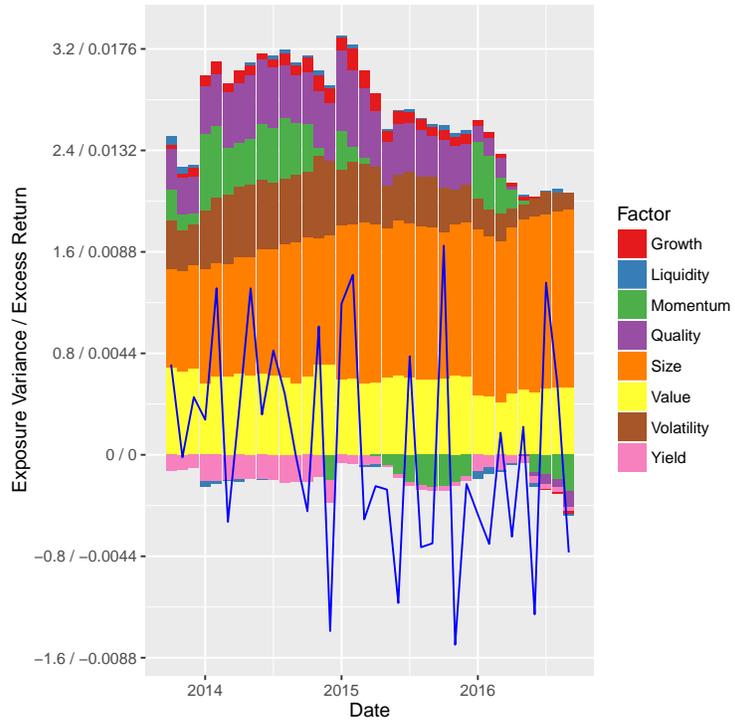
DFA Style Factor Attribution



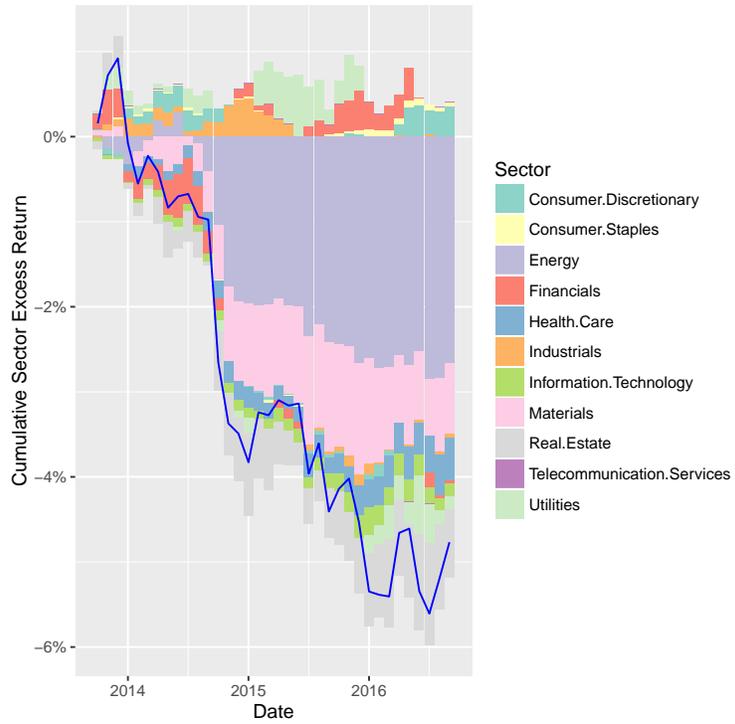
DFA Style Factor Breakout



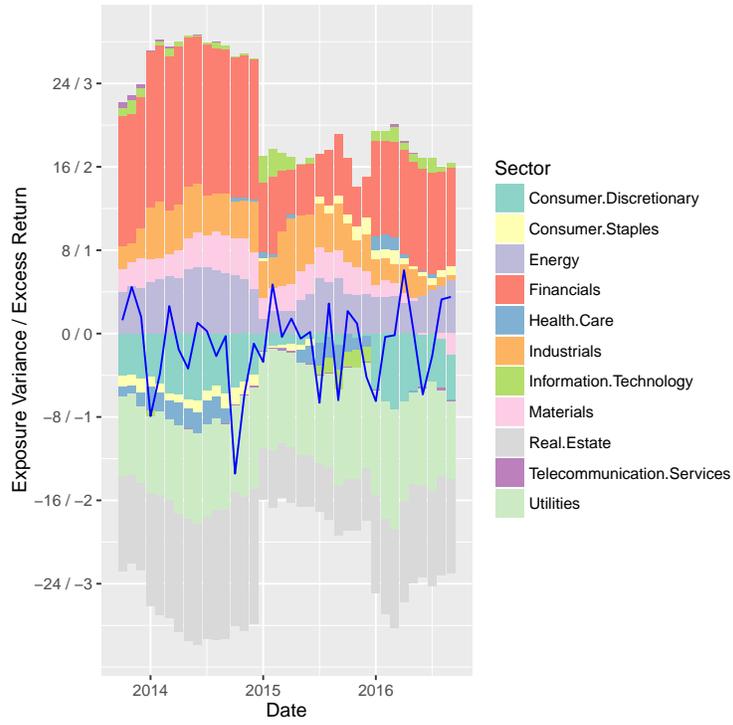
DFA Monthly Style Factors Active Exposure



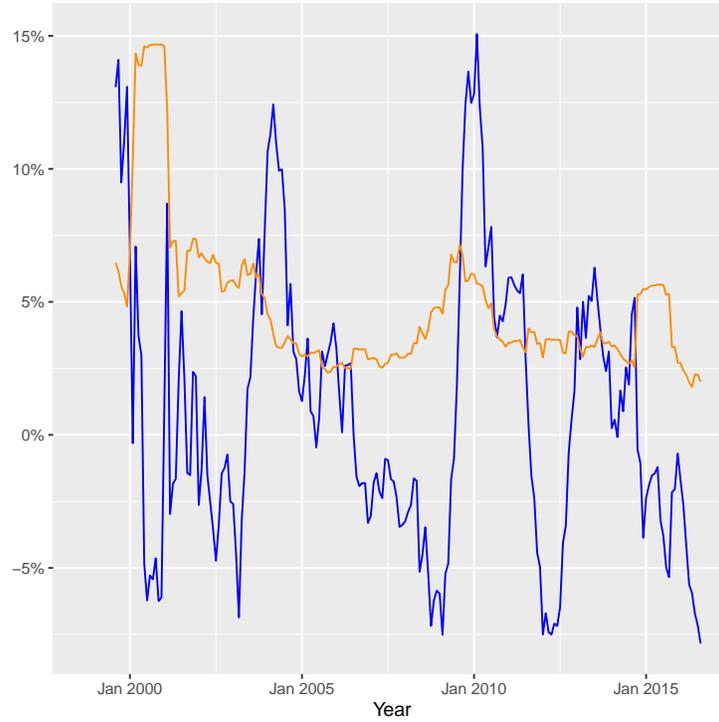
DFA Monthly GICS Sector Return



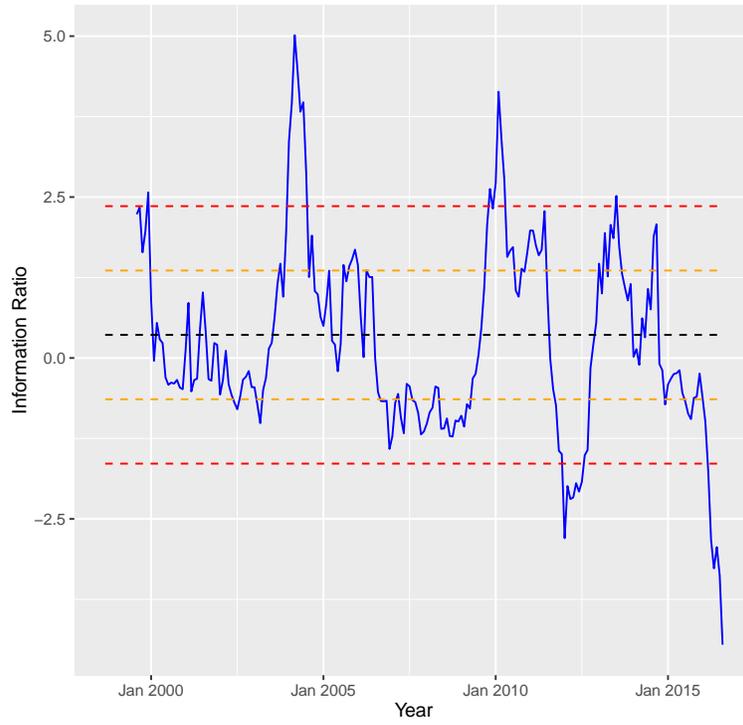
DFA GICS Sector Active Exposure



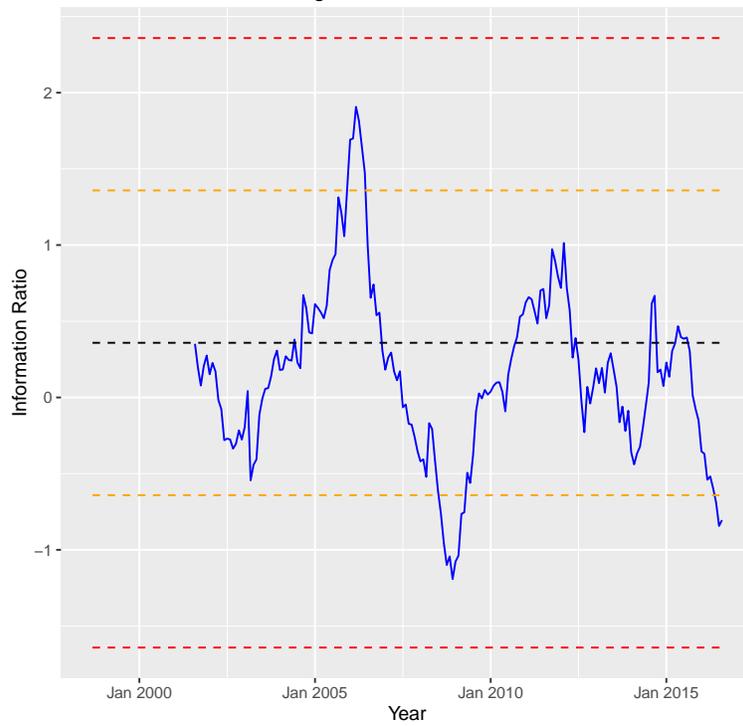
Rolling 12 Month Excess Return (Blue) & Tracking Error (Orange)



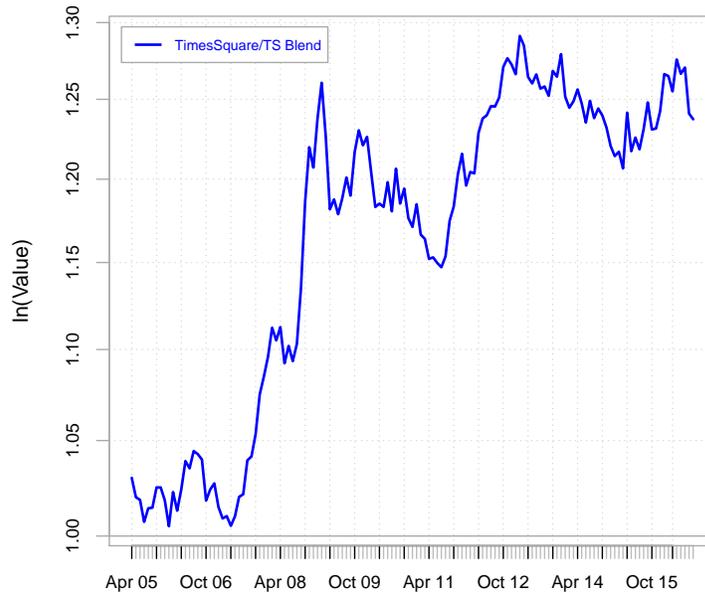
DFA Rolling 12 Month Information Ratio



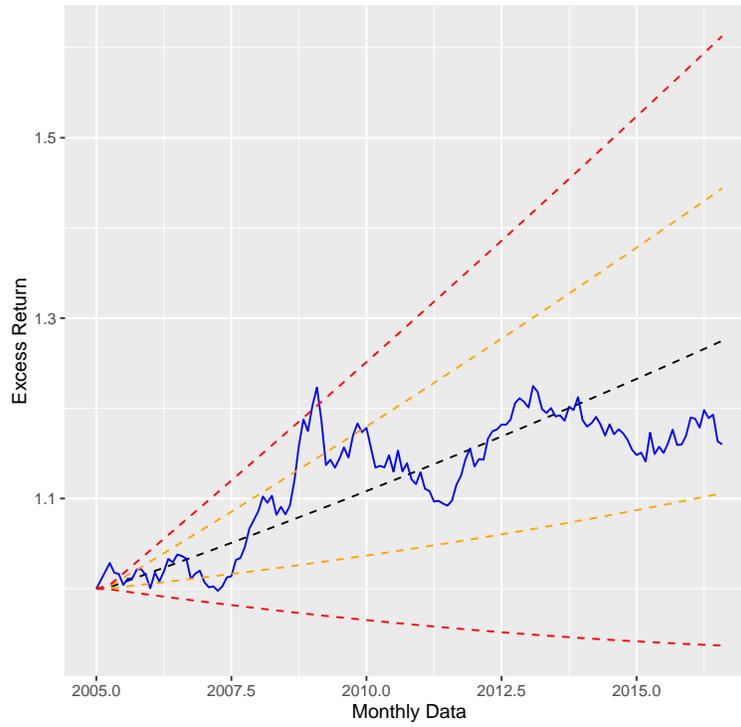
DFA Rolling 36 Month Information Ratio



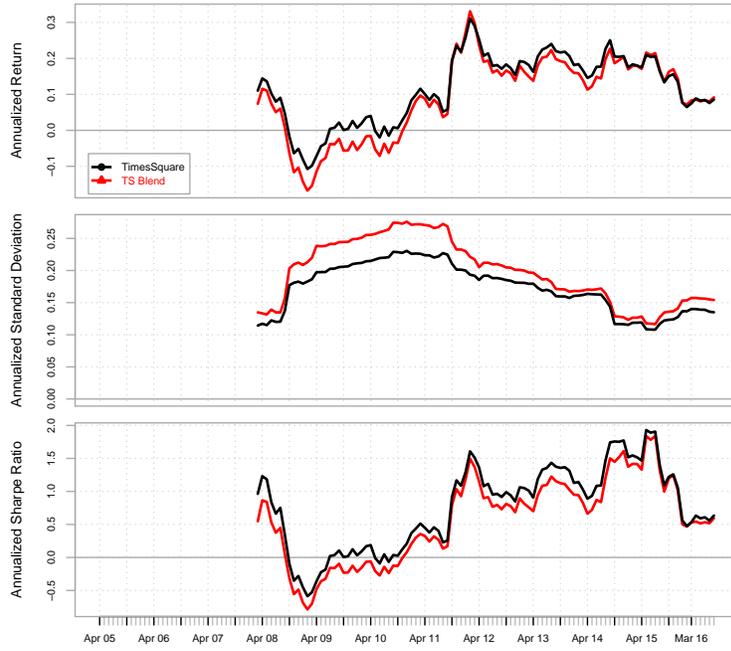
TimesSquare Cumulative Relative Performance



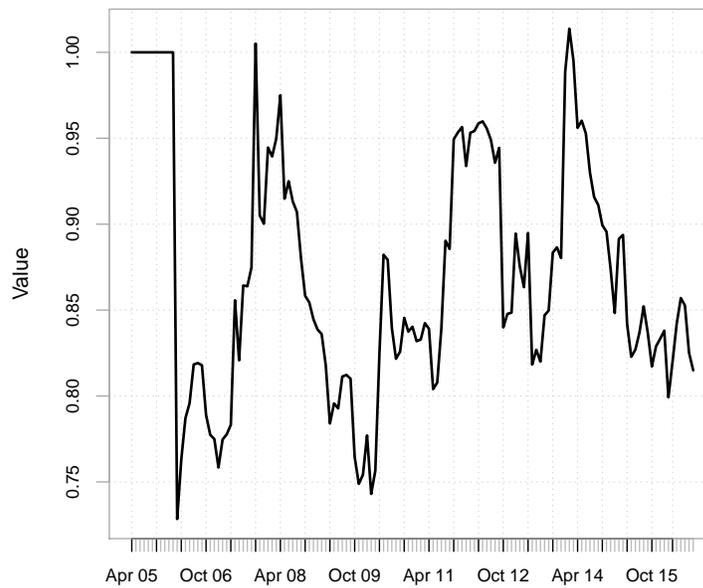
TimesSquare Actual Excess vs Expected Excess +/- 1 & 2 Std Dev



TimesSquare Rolling 3 year Performance



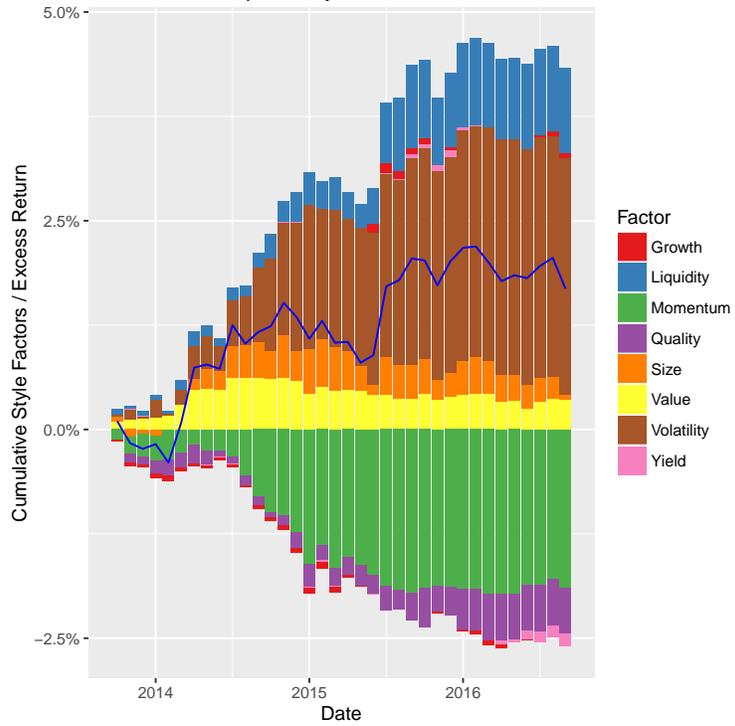
TimesSquare Rolling 12 Month Beta



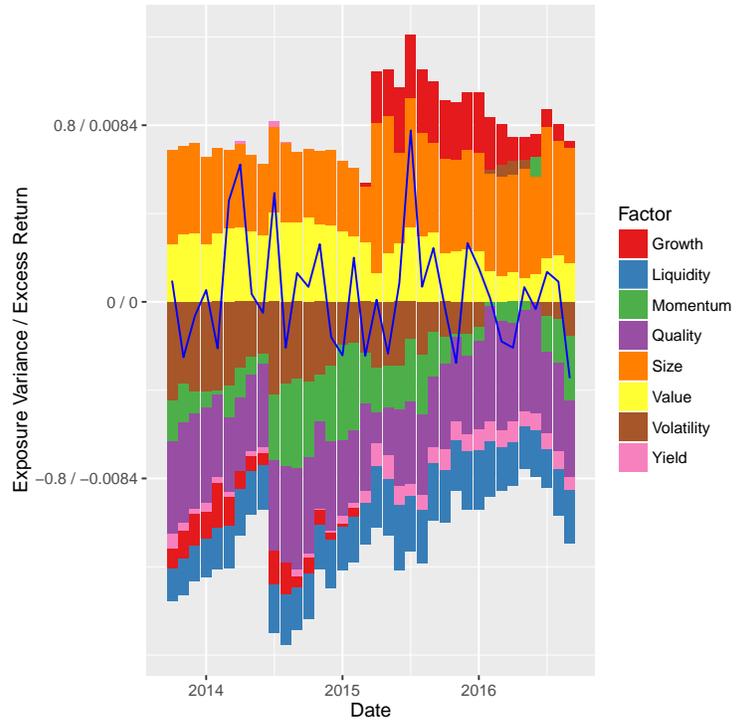
TimesSquare Style Factor Attribution



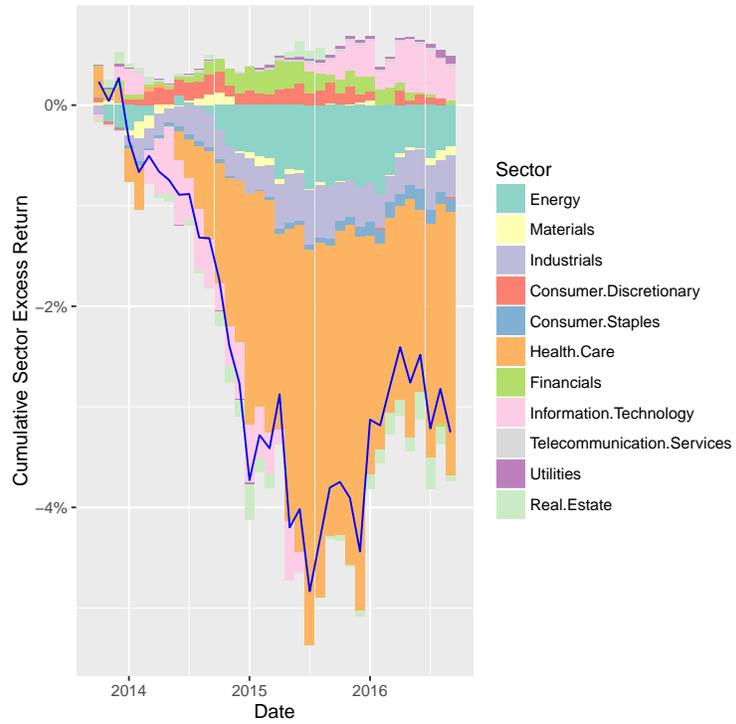
TimesSquare Style Factor Breakout



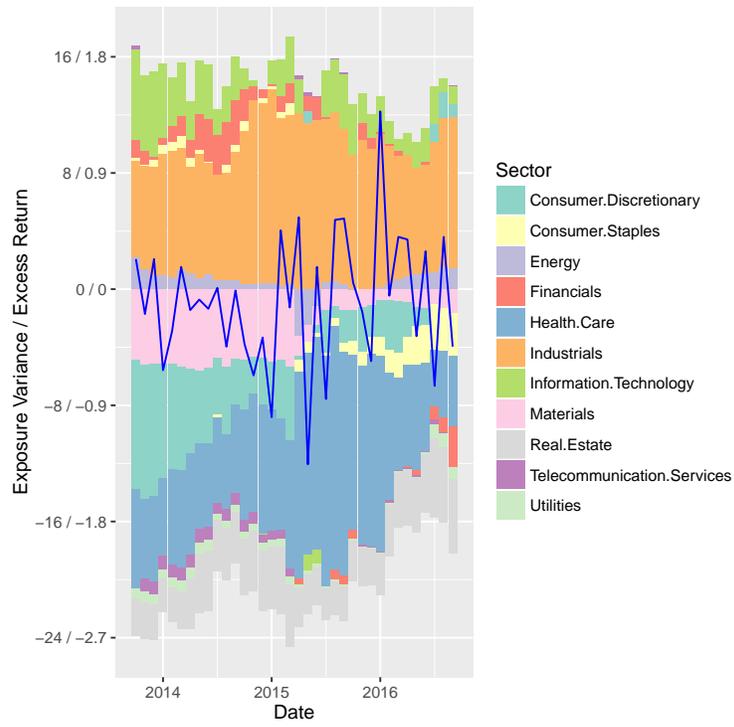
TimesSquare Monthly Style Factors Active Exposure



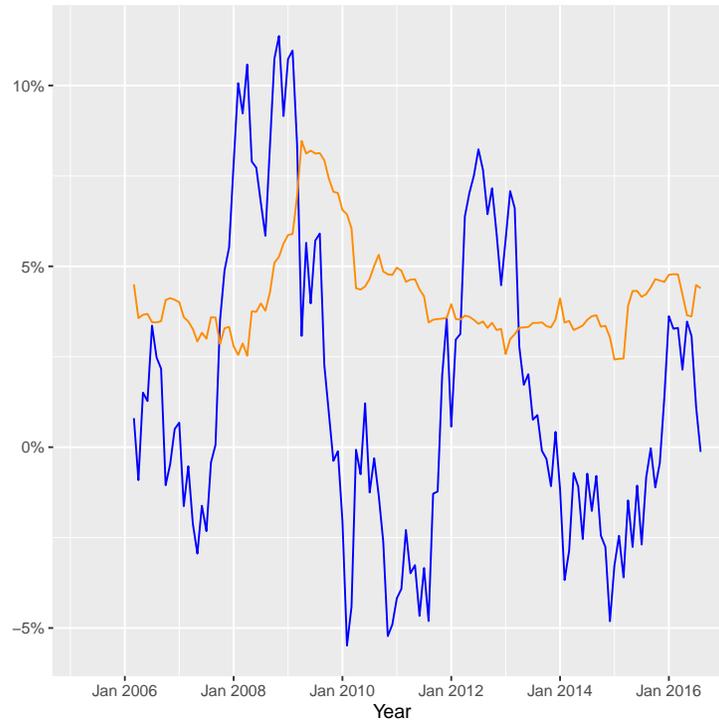
TimesSquare Monthly GICS Sector Return



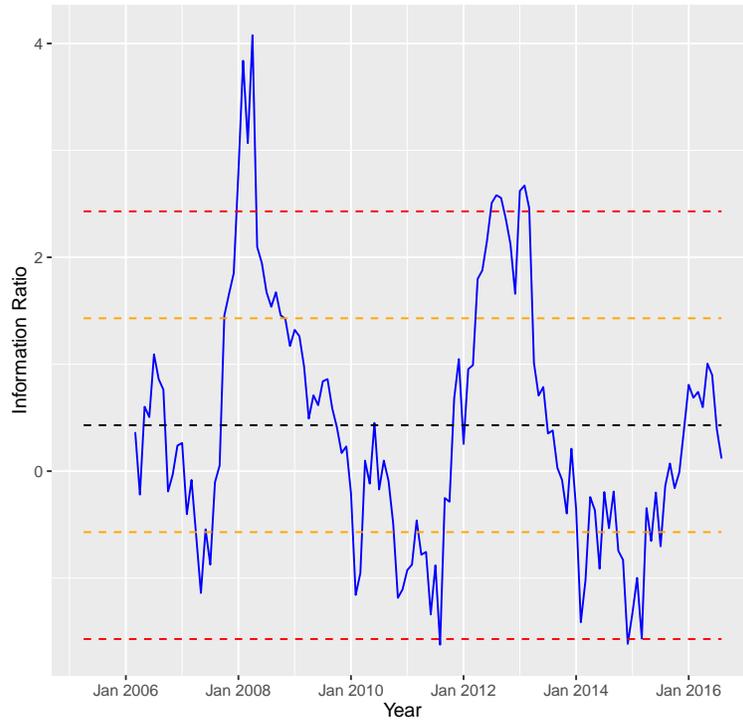
TimesSquare GICS Sector Active Exposure



Rolling 12 Month Excess Return (Blue) & Tracking Error (Orange)



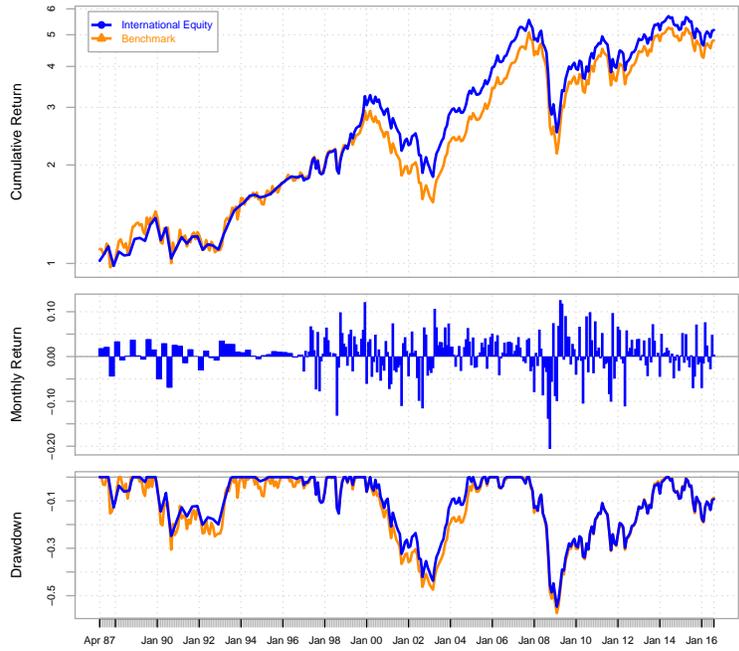
TimesSquare Rolling 12 Month Information Ratio



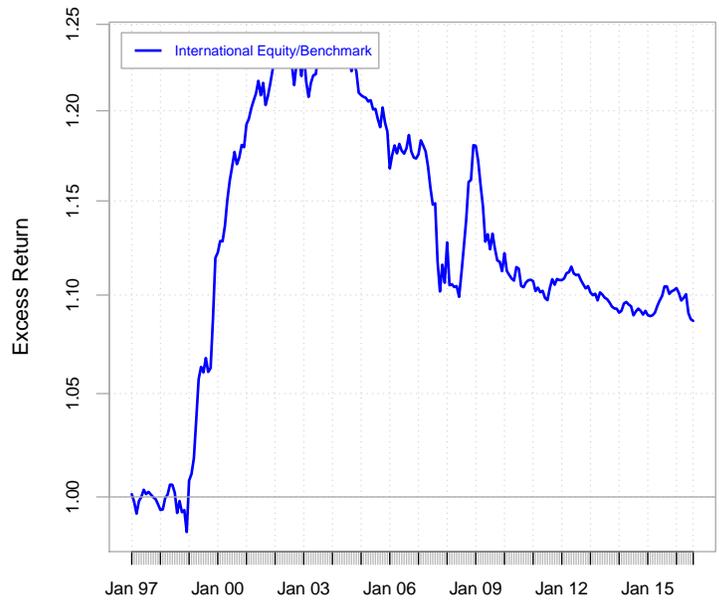
TimesSquare Rolling 36 Month Information Ratio



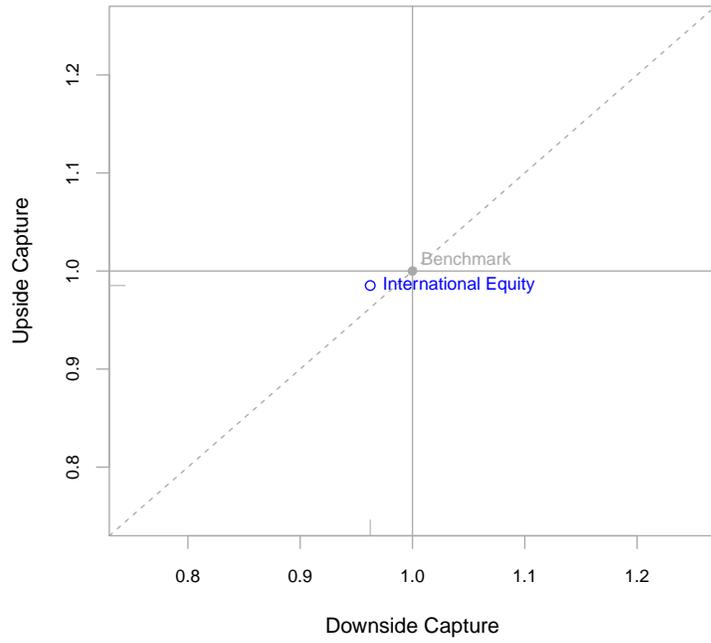
International Equity Performance Summary



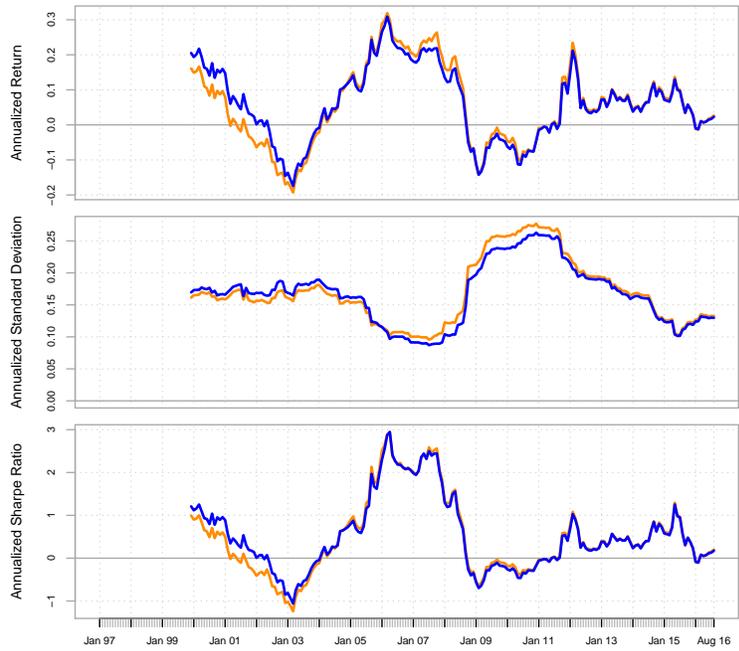
International Equity Cumulative Relative Performance



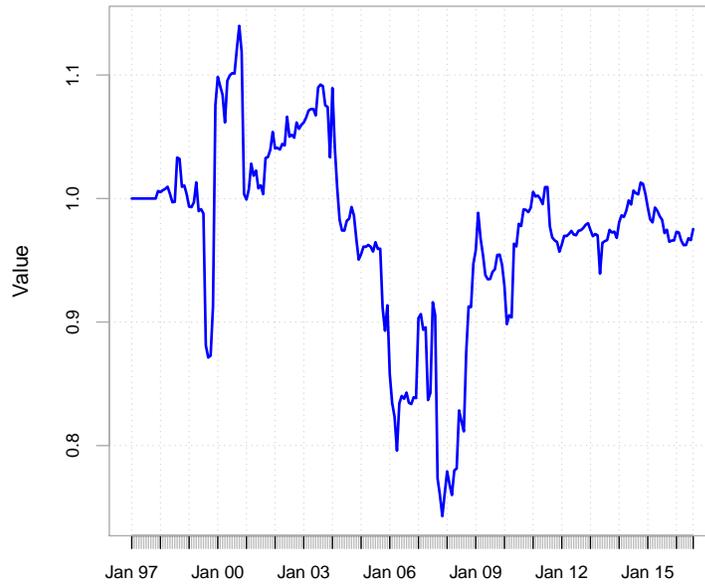
### International Equity Capture Ratios



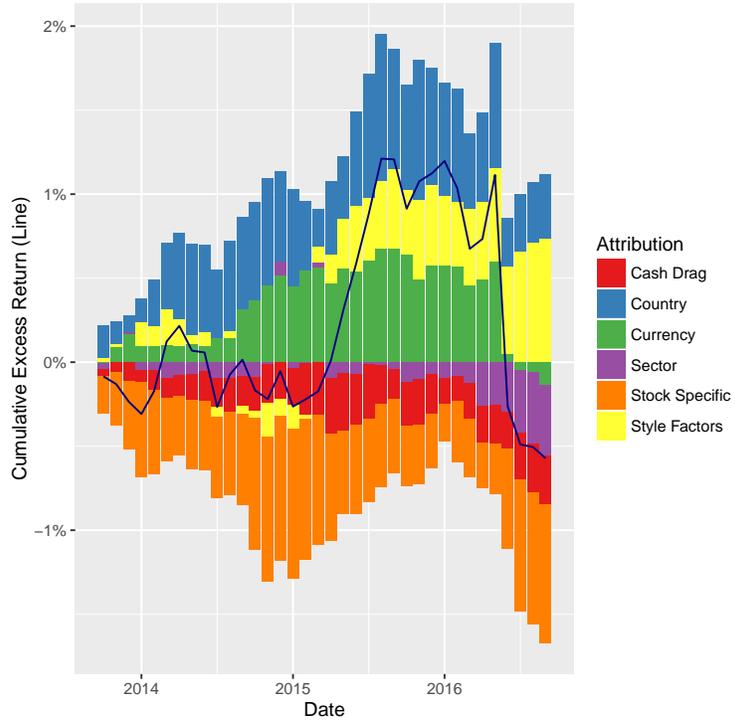
### International Equity Rolling 3 Year Performance



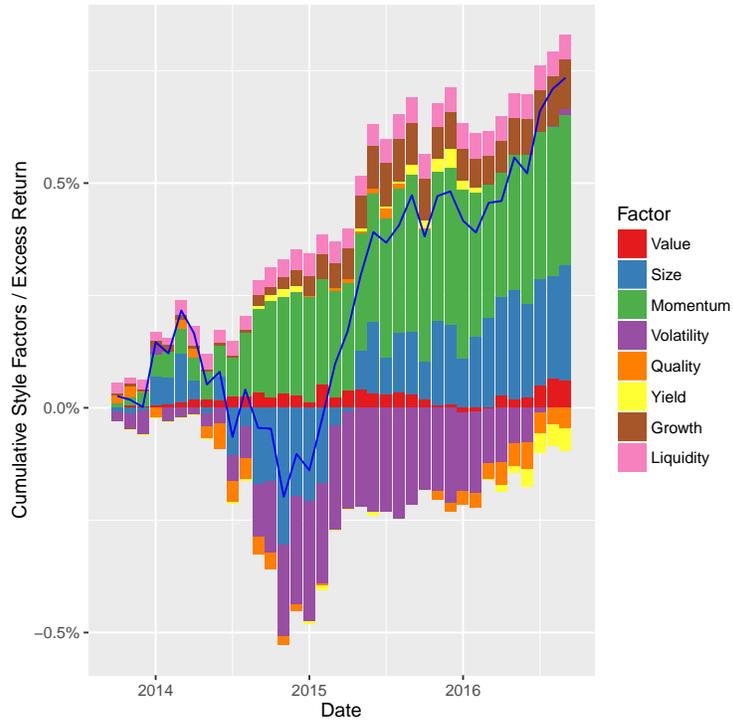
International Equity Rolling 12 Month Beta



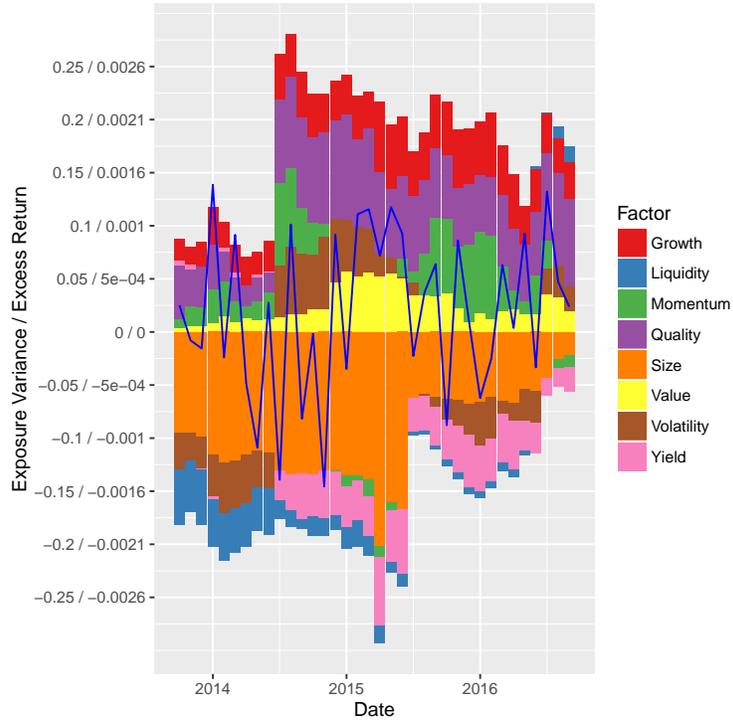
International Equity Style Factor Attribution



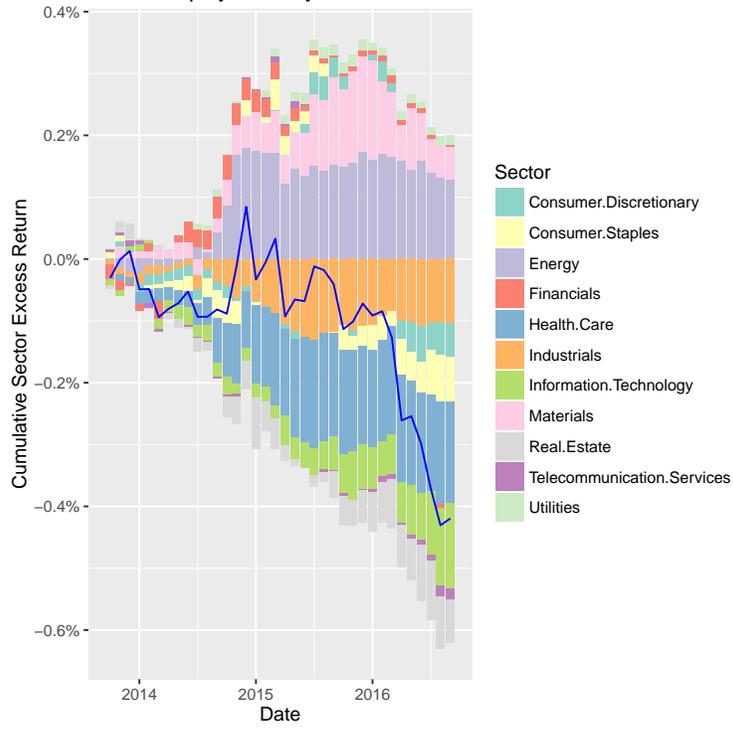
International Equity Style Factor Breakout



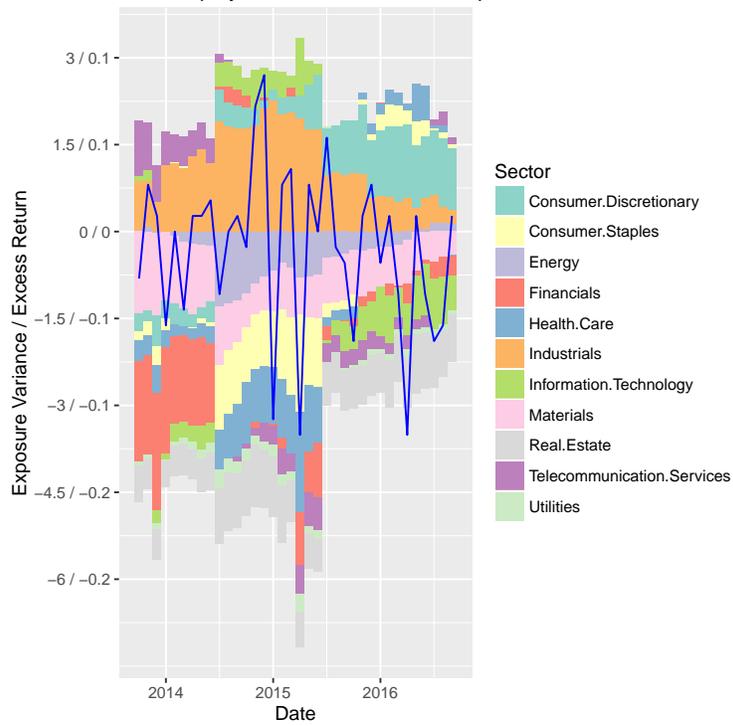
International Equity Monthly Style Factors Active Exposure



International Equity Monthly GICS Sector Return



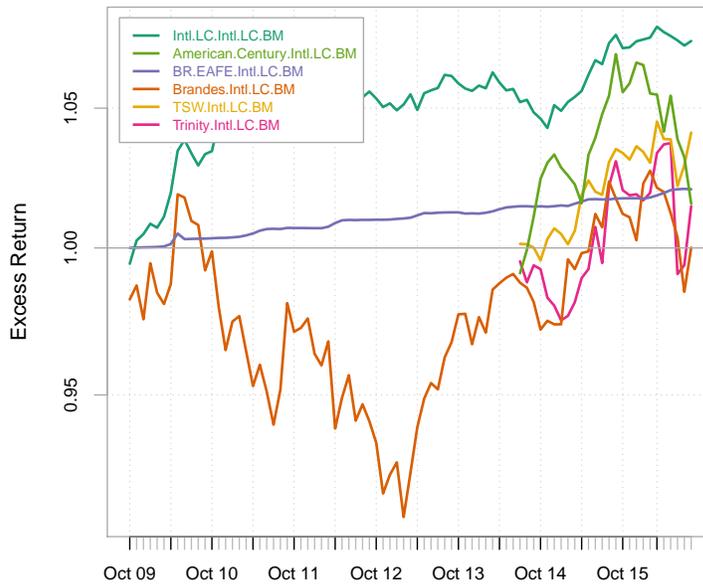
International Equity GICS Sector Active Exposure



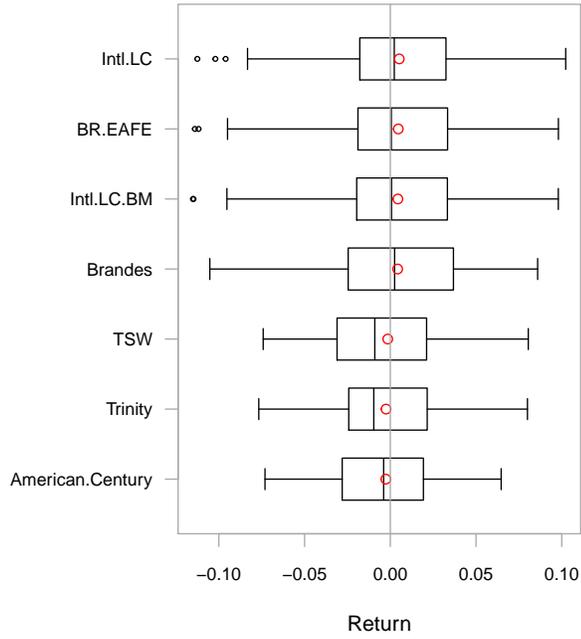
**Intl Developed Large Cap Performance Summary**



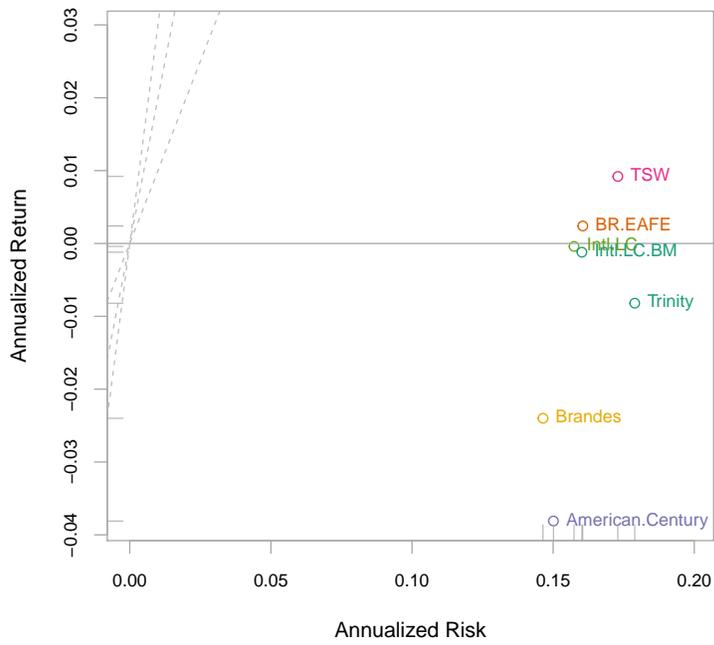
**Intl Developed Large Cap Cumulative Relative Performance**



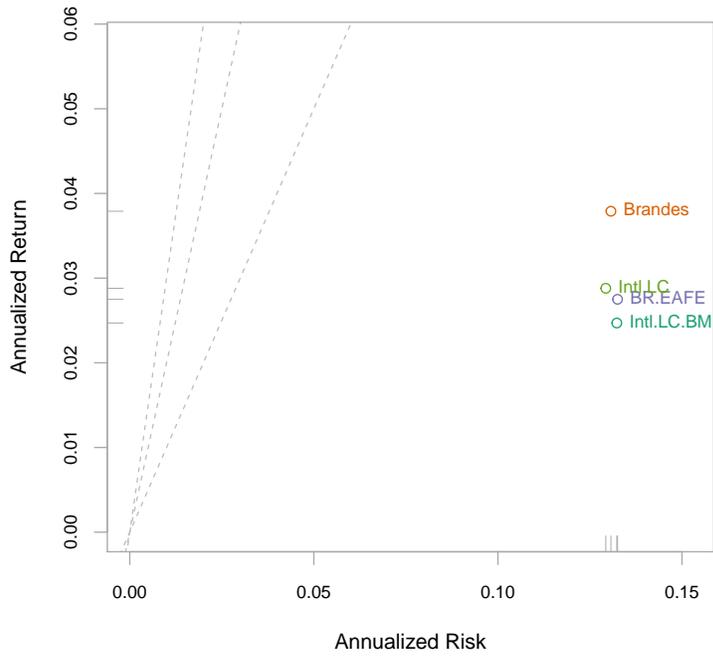
### Return Distribution Comparison



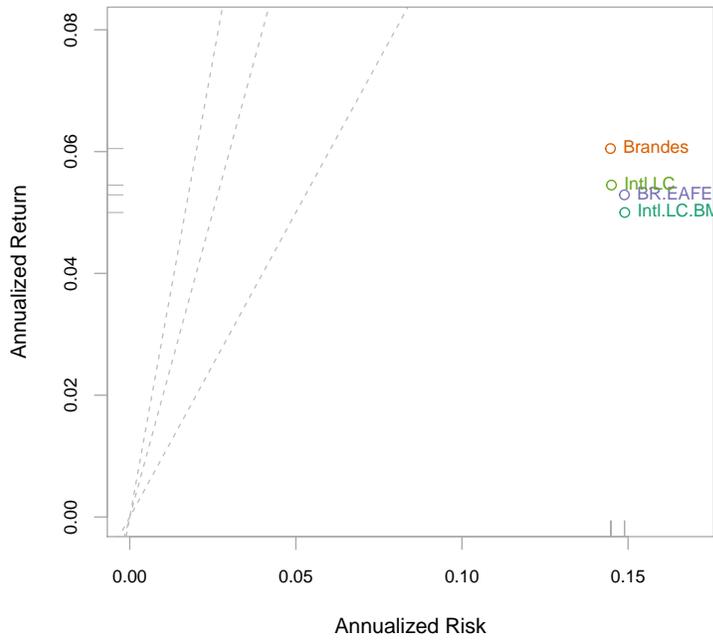
### Intl Developed Large Cap Trailing 1 Year Performance vs Sharpe Ratios (1,;



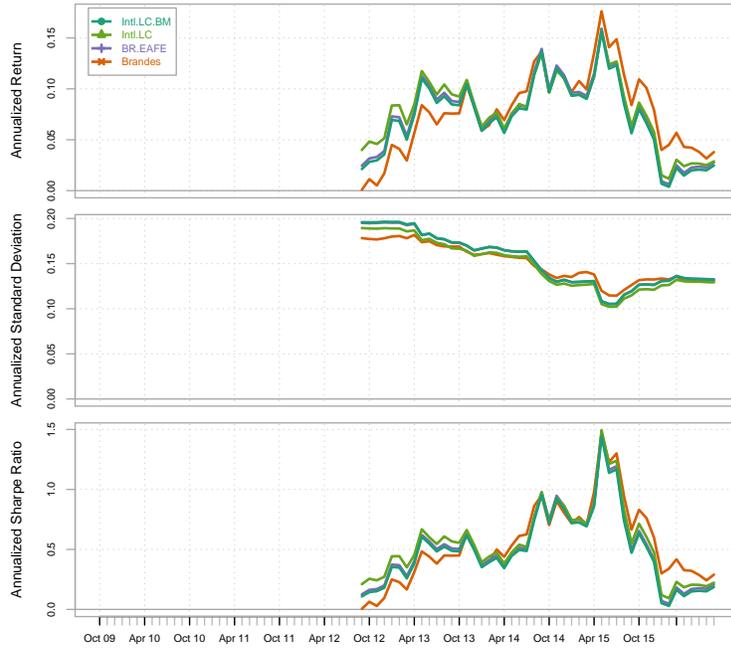
Trailing 3 Year Performance vs Sharpe Ratios (1,2,3)



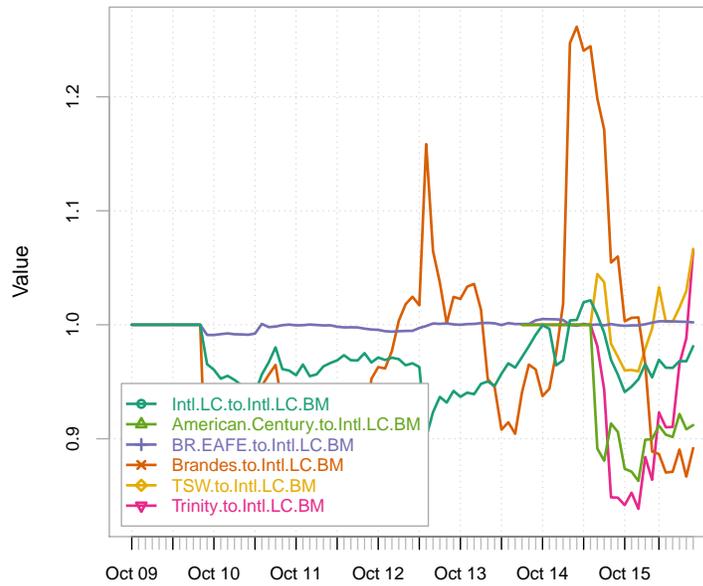
Trailing 5 Year Performance vs Sharpe Ratios (1,2,3)



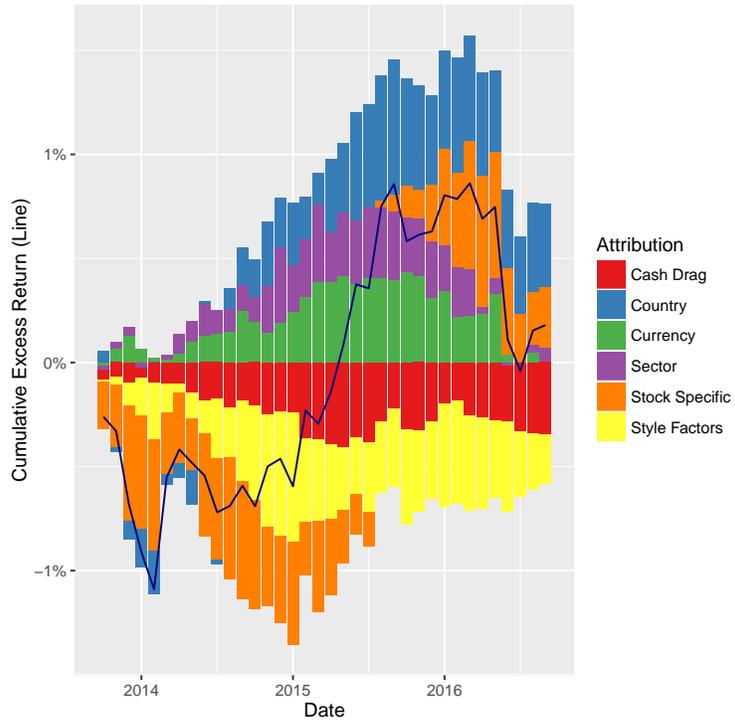
Intl Developed Large Cap Rolling 3 Year Performance



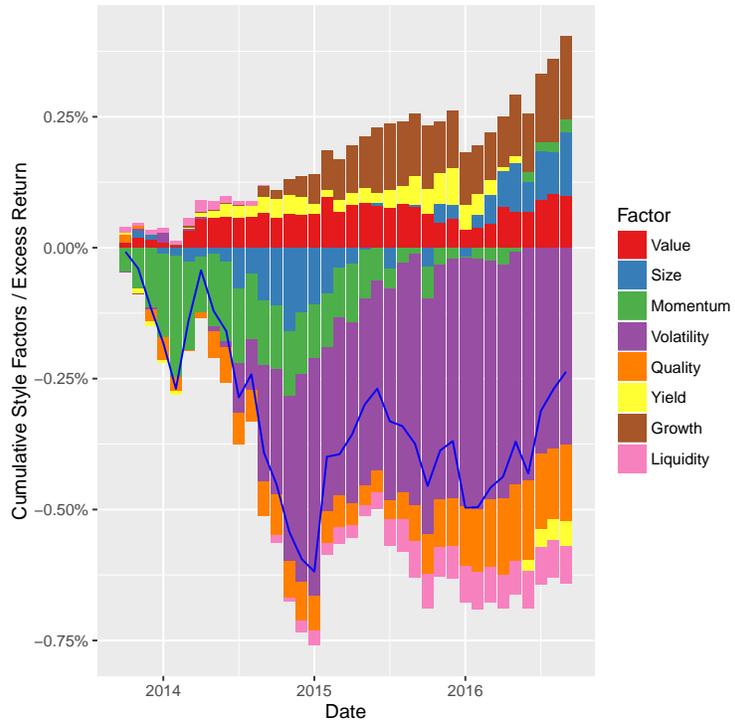
Intl Developed Large Cap Rolling 12 Month Beta



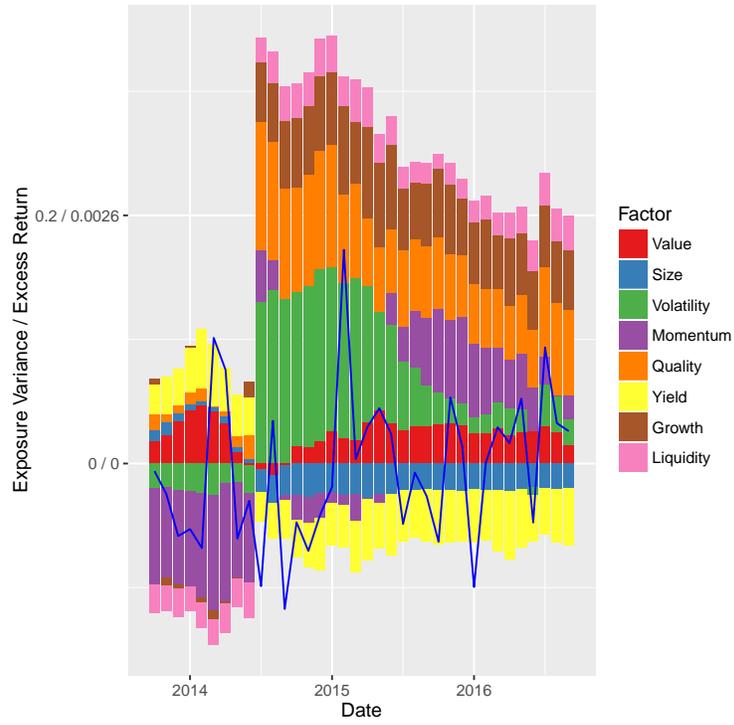
Intl Developed Large Cap Style Factor Attribution



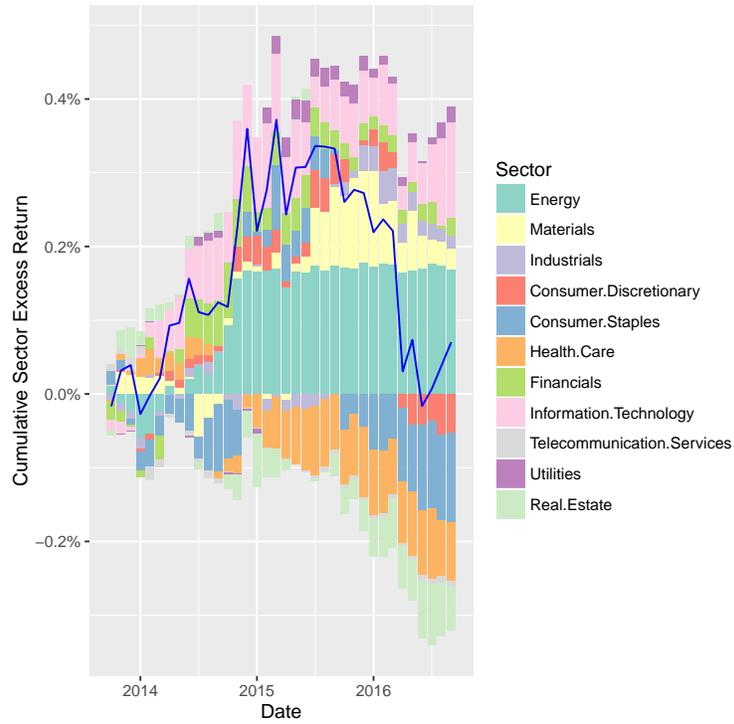
Intl Developed Large Cap Style Factor Breakout



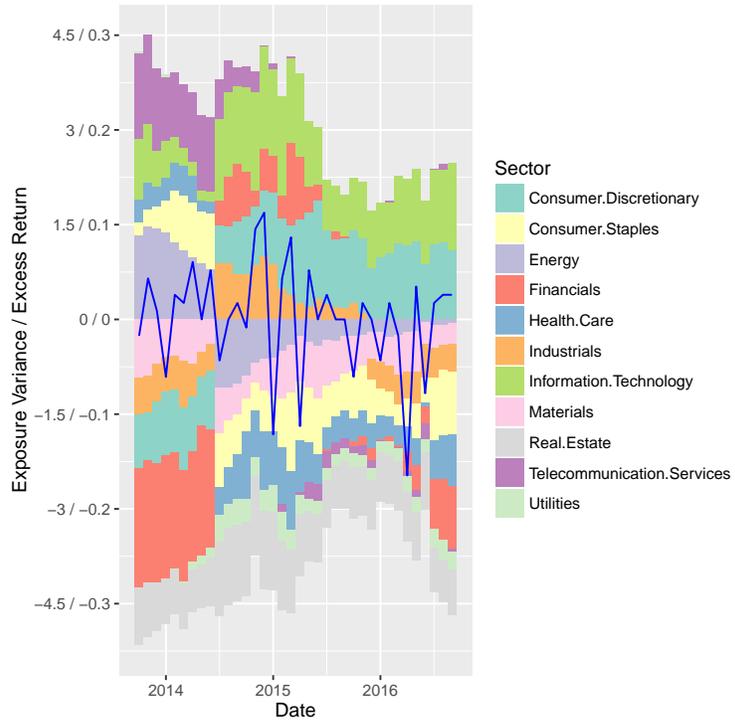
Intl Developed Large Cap Monthly Style Factors Active Exposure



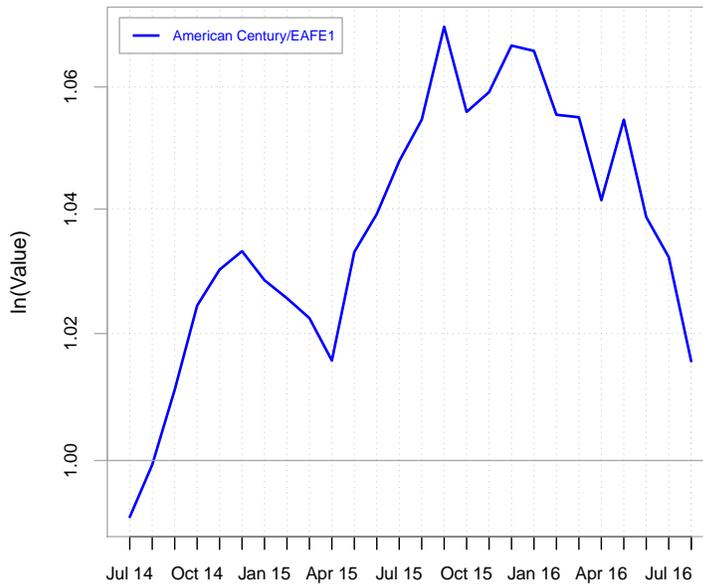
Intl Developed Large Cap Monthly GICS Sector Return



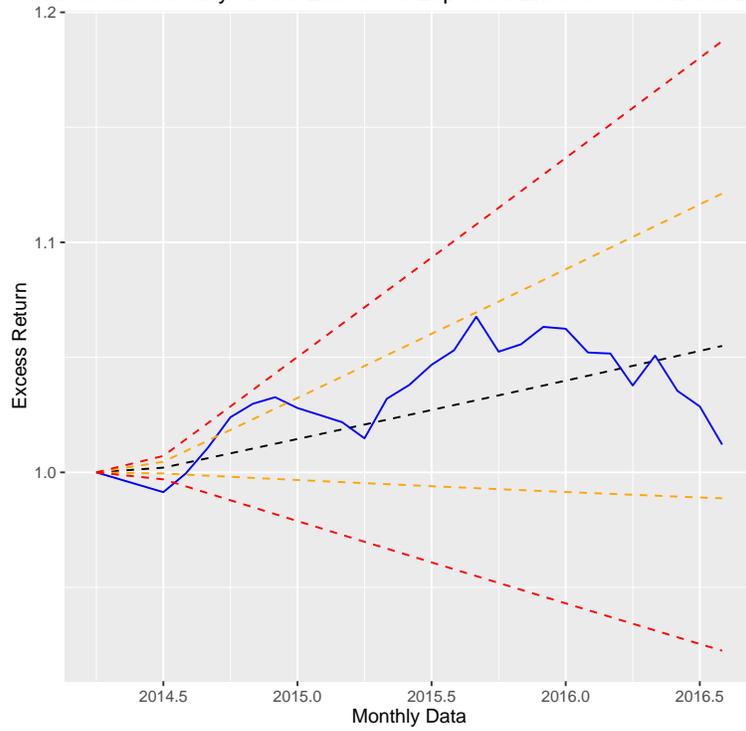
**Intl Developed Large Cap GICS Sector Active Exposure**



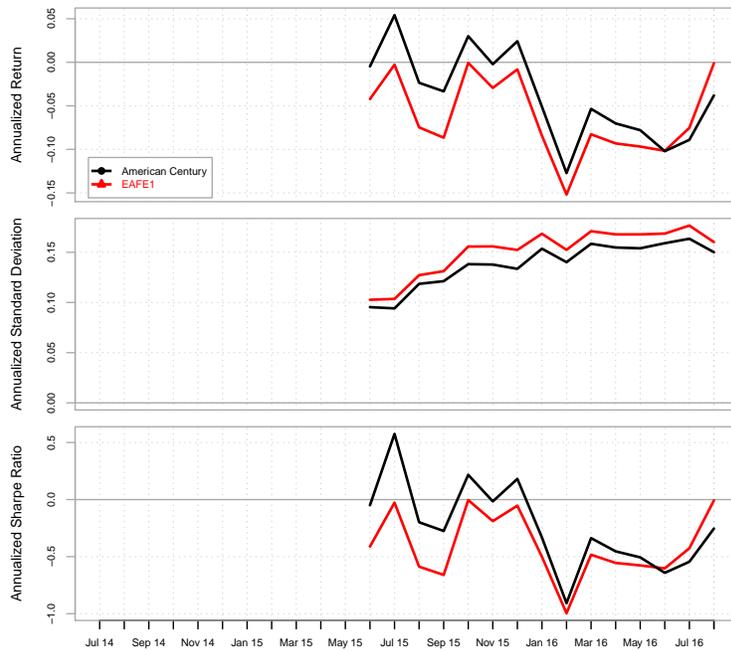
**American Century Cumulative Relative Performance**



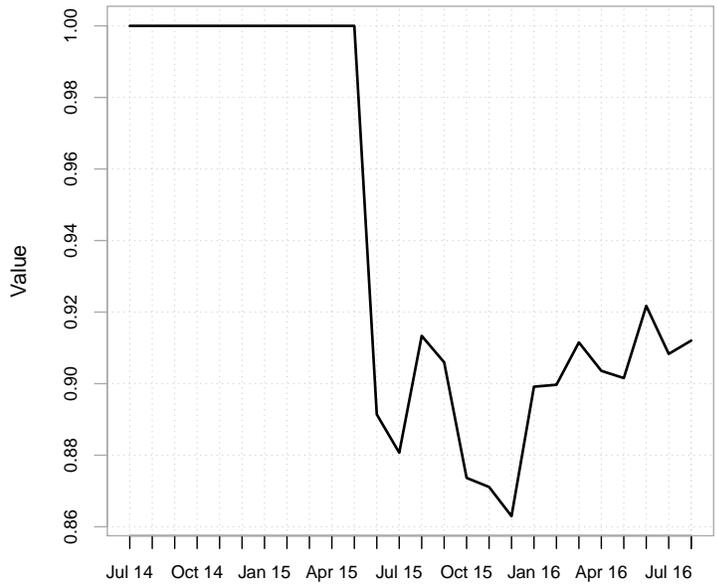
American Century Actual Excess vs Expected Excess +/- 1 & 2 Std De



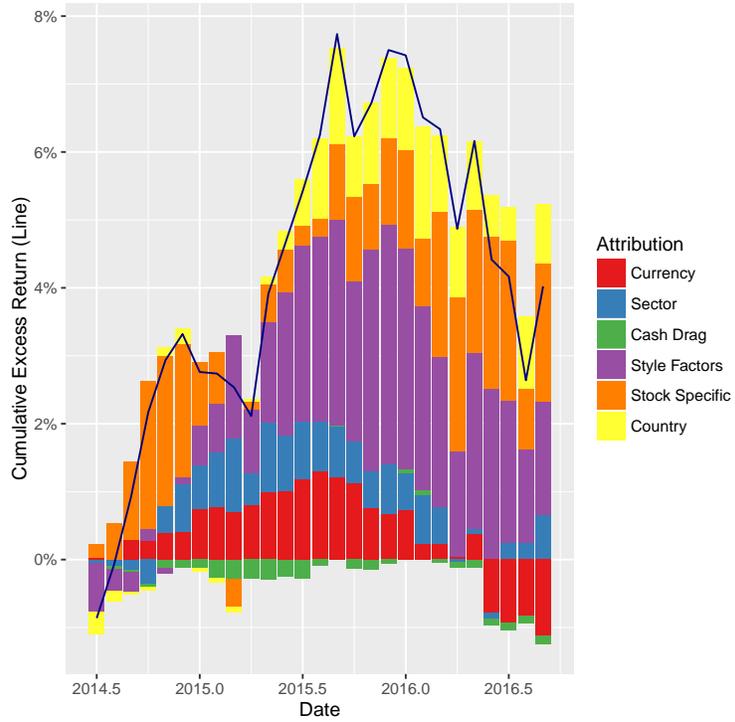
American Century Rolling 1 year Performance



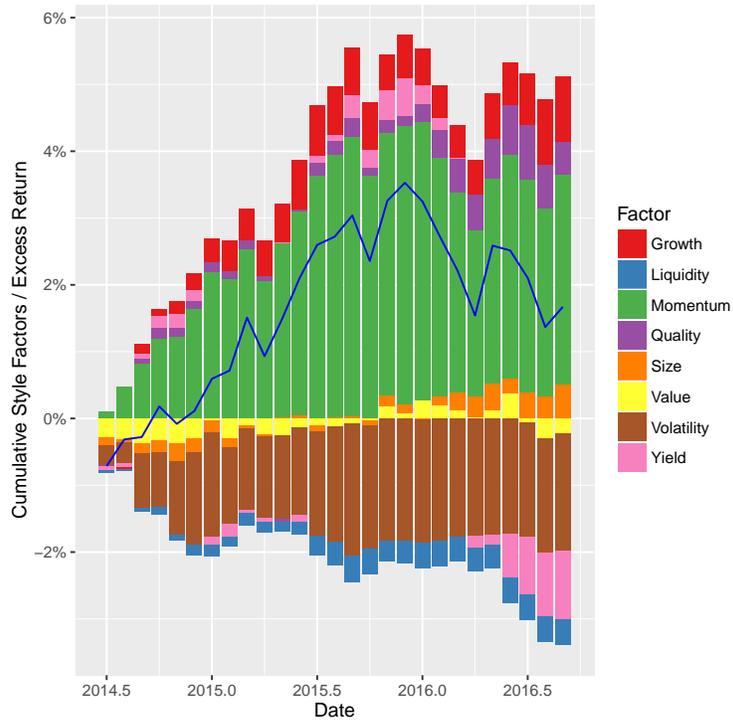
American Century Rolling 12 Month Beta



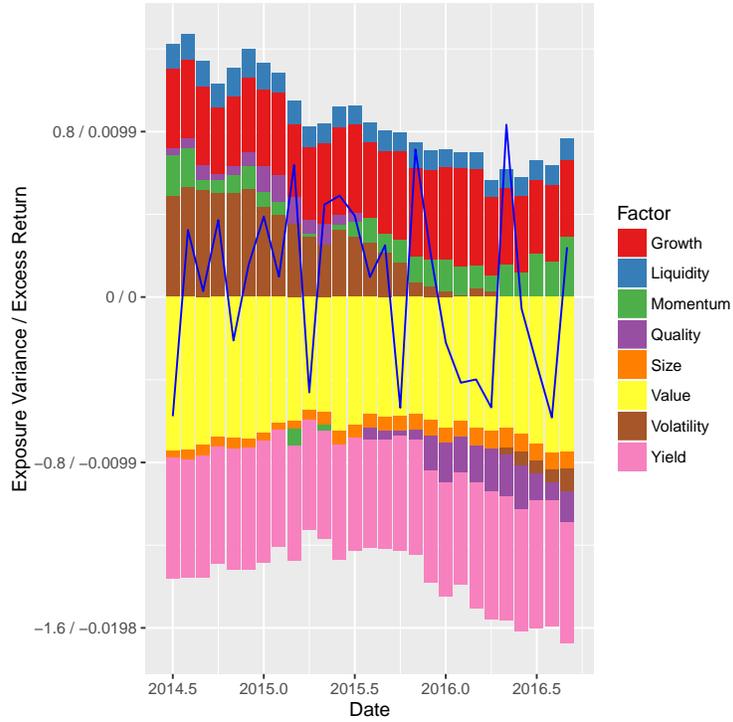
American Century Style Factor Attribution



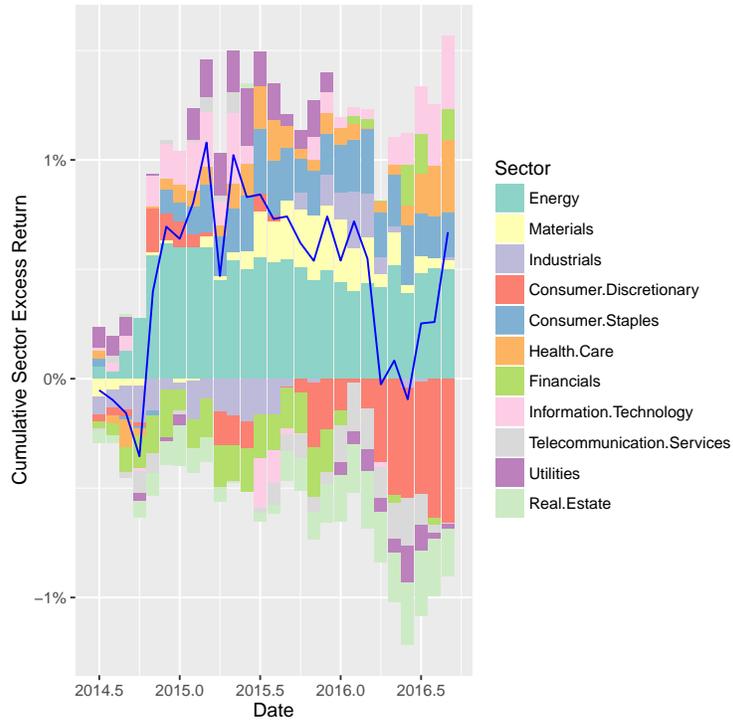
American Century Style Factor Breakout



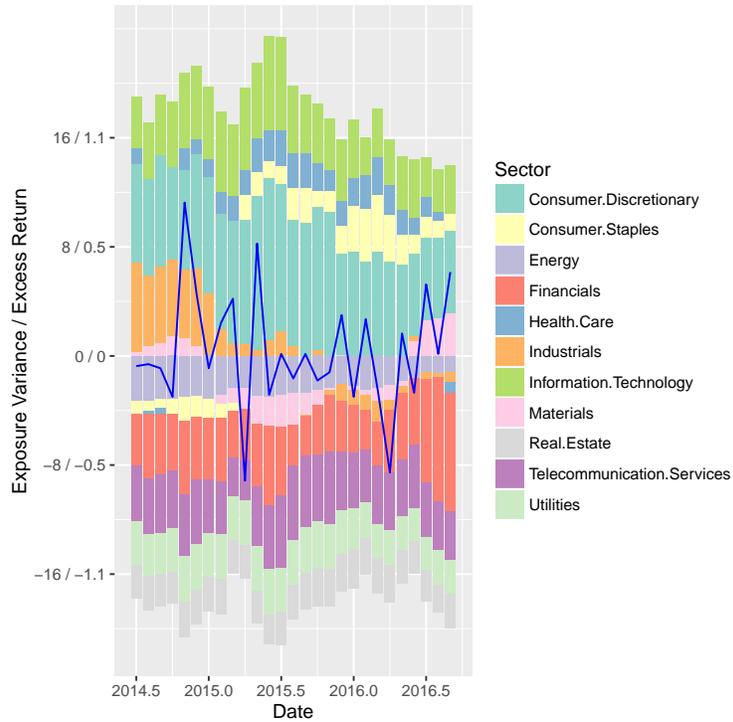
American Century Monthly Style Factors Active Exposure

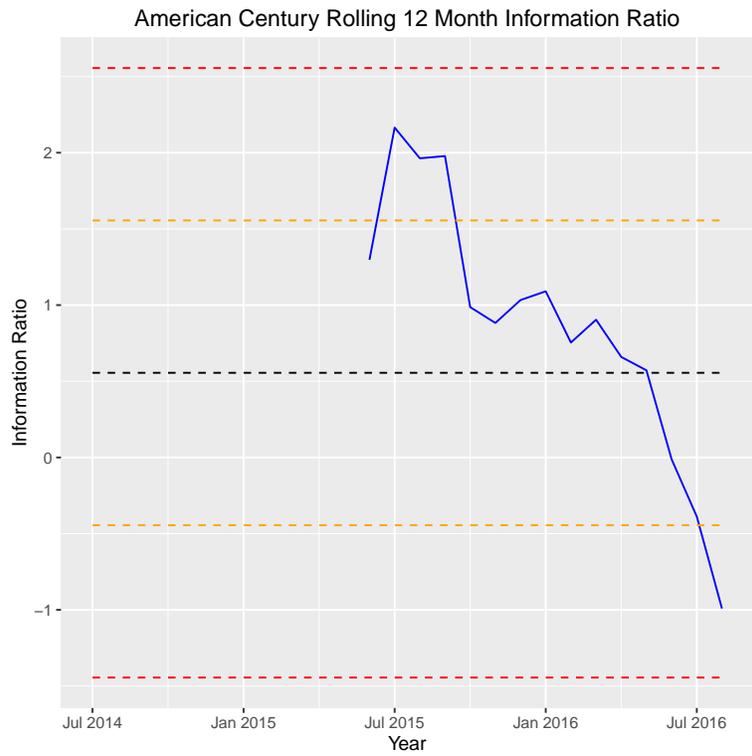
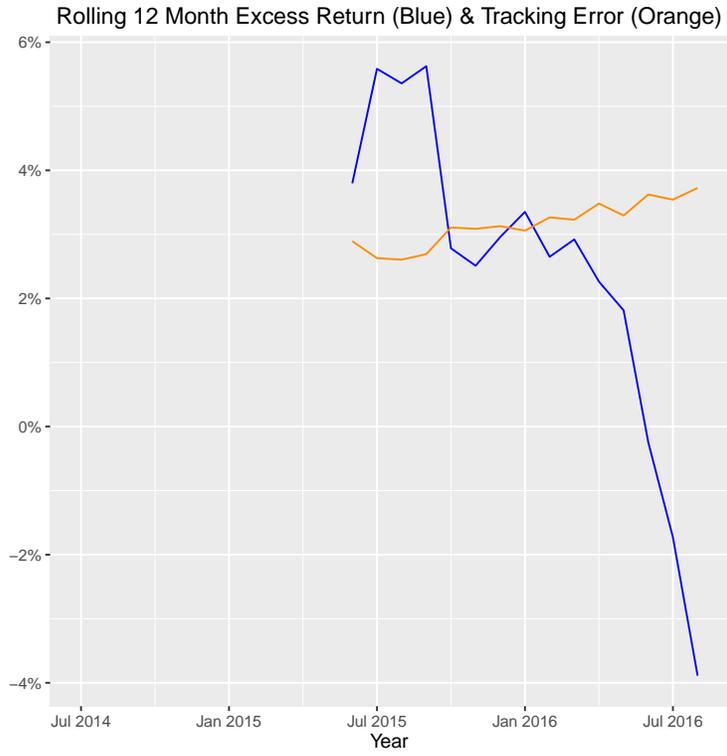


American Century Monthly GICS Sector Return

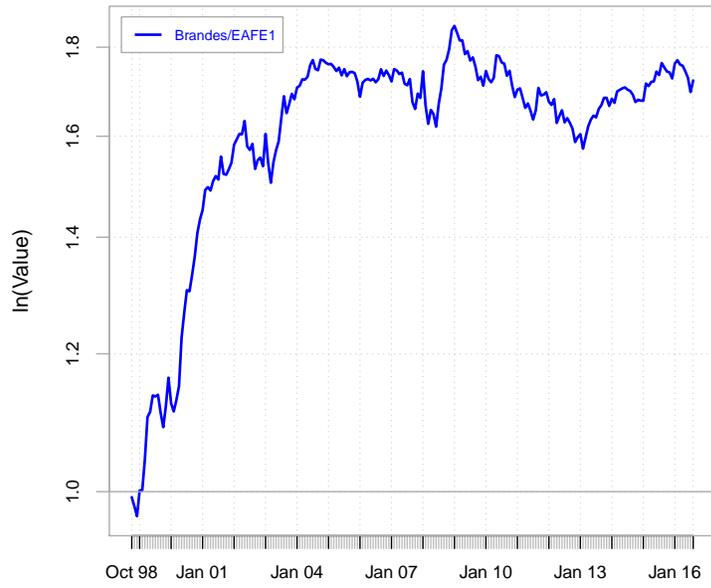


American Century GICS Sector Active Exposure

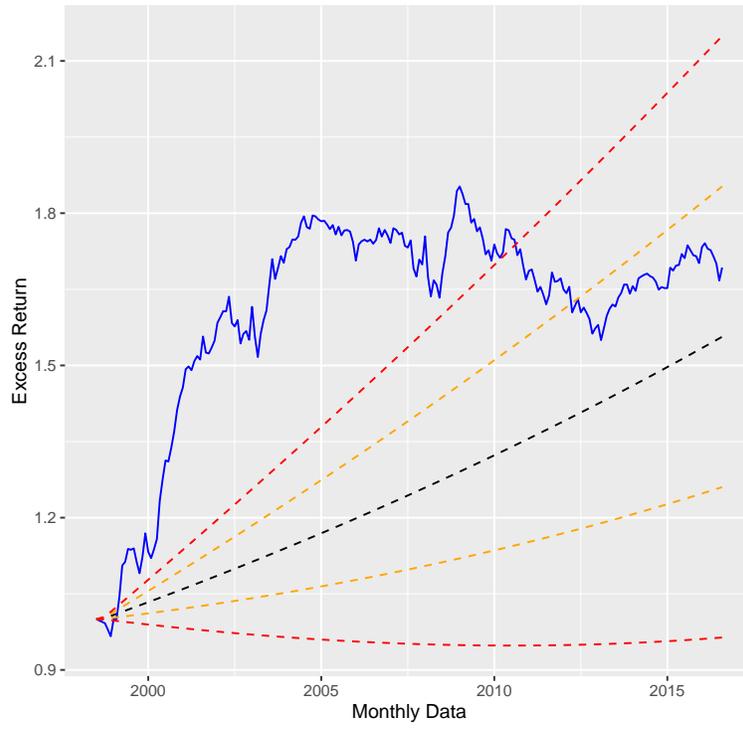




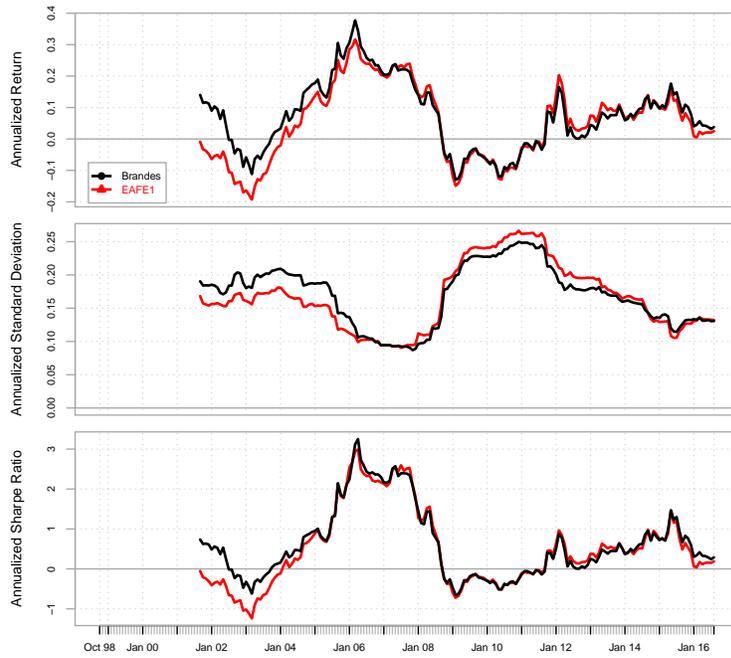
Brandes Cumulative Relative Performance



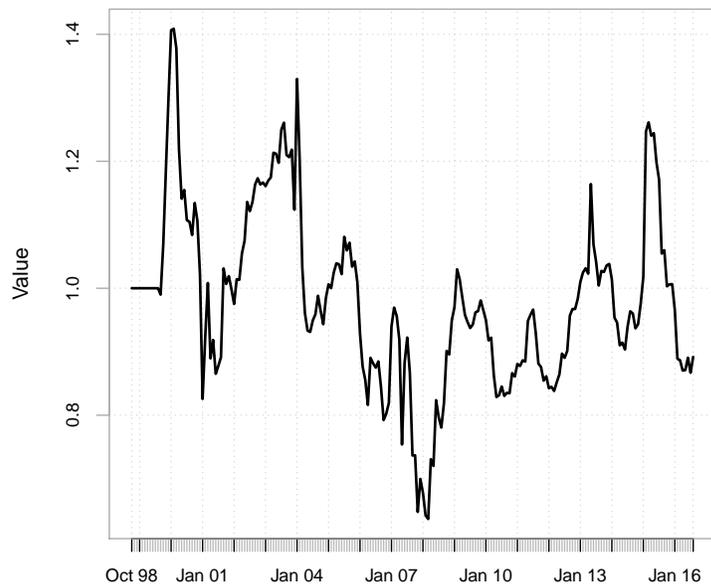
Brandes Actual Excess vs Expected Excess +/- 1 & 2 Std Dev



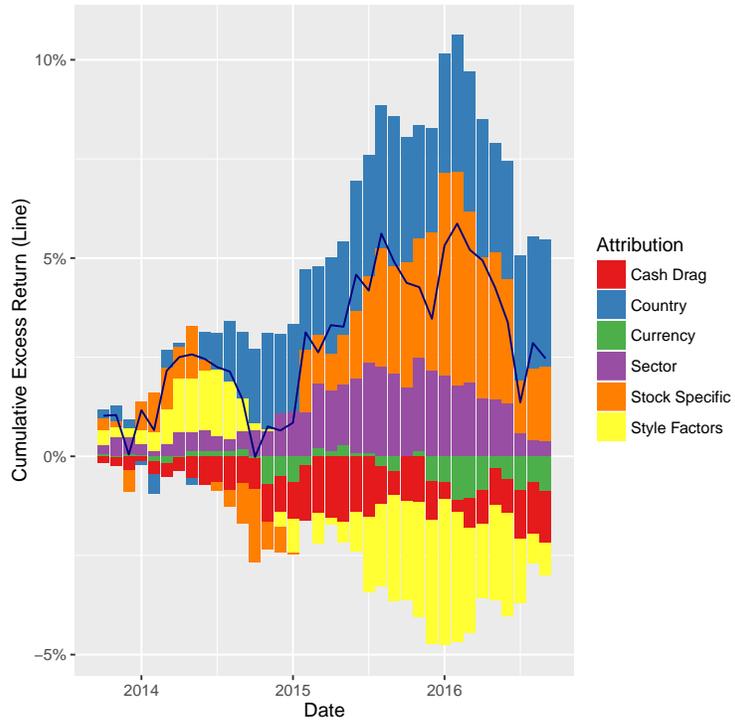
Brandes Rolling 3 year Performance



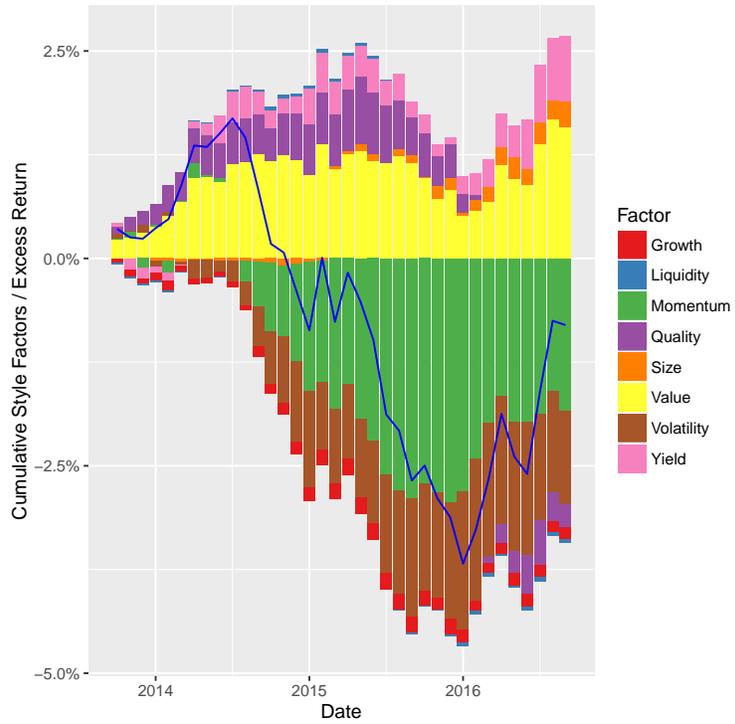
Brandes Rolling 12 Month Beta



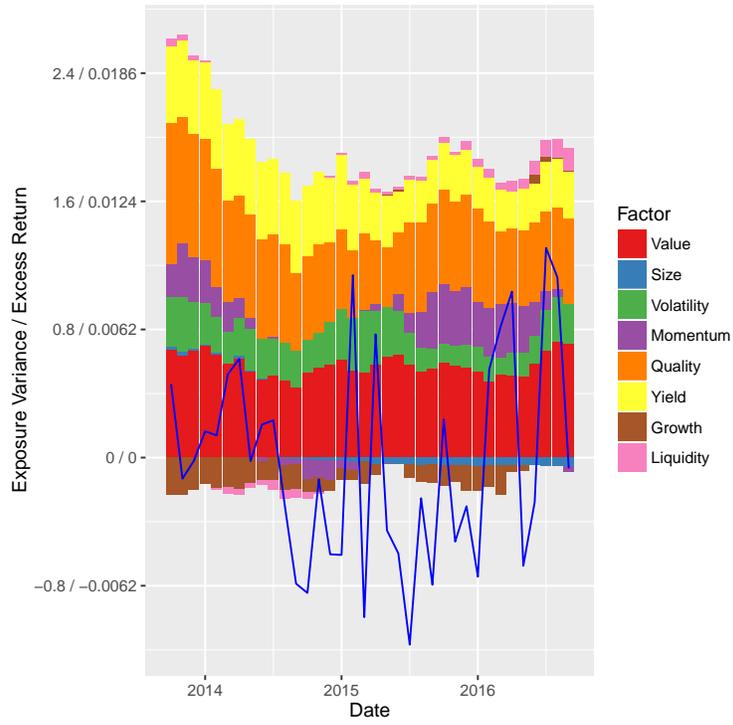
Brandes Style Factor Attribution



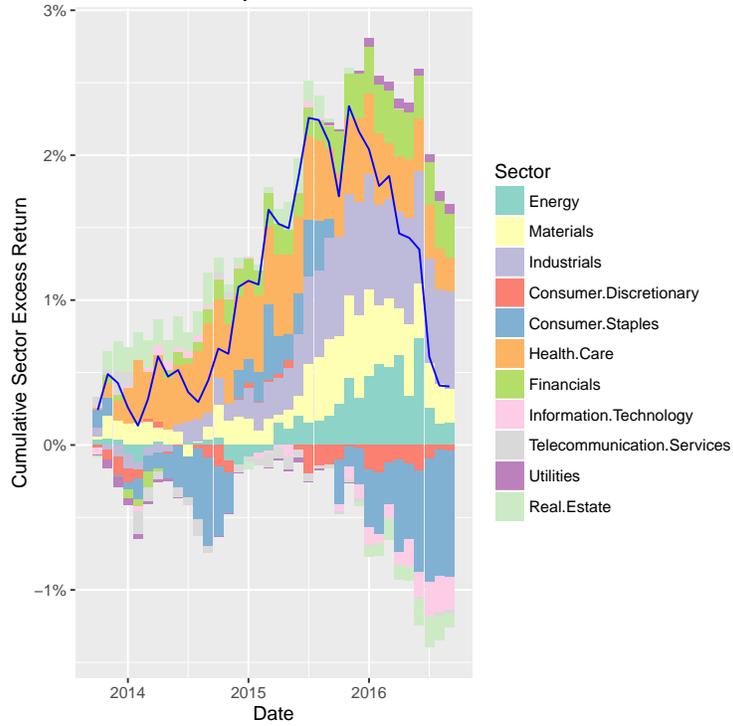
Brandes Style Factor Breakout



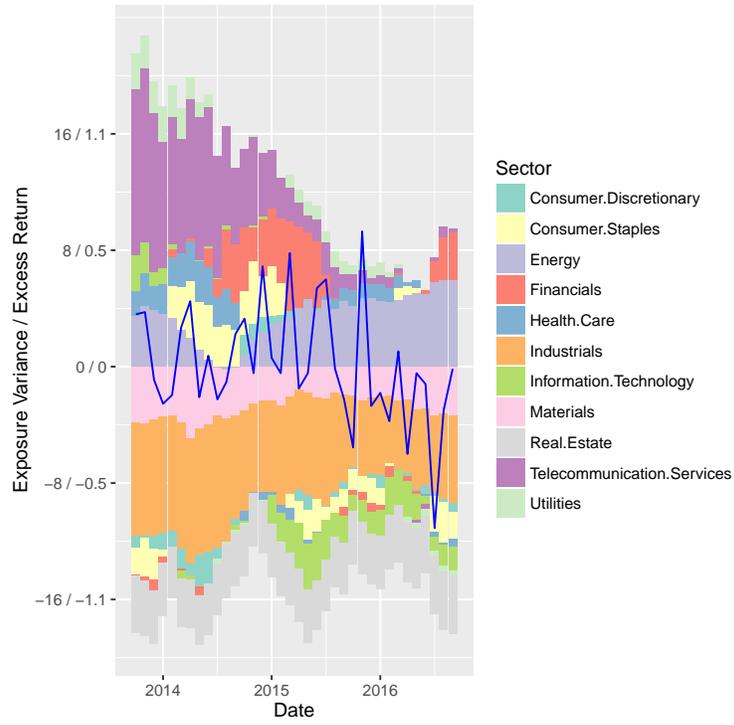
Brandes Monthly Style Factors Active Exposure



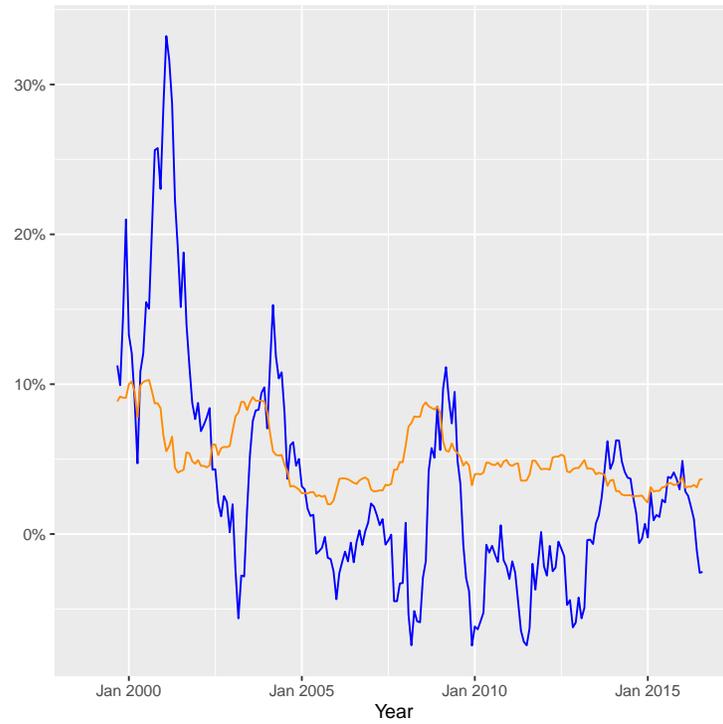
Brandes Monthly GICS Sector Return



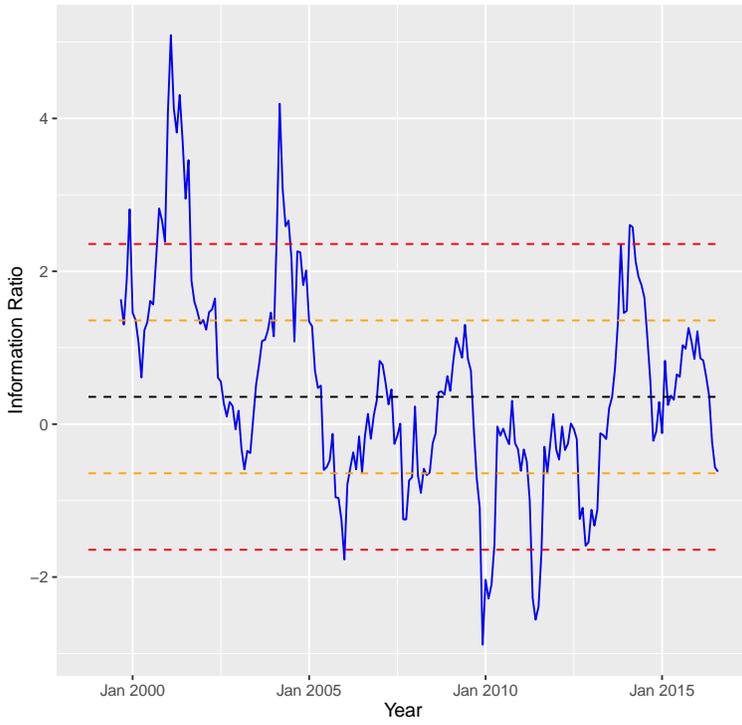
Brandes GICS Sector Active Exposure



Rolling 12 Month Excess Return (Blue) & Tracking Error (Orange)



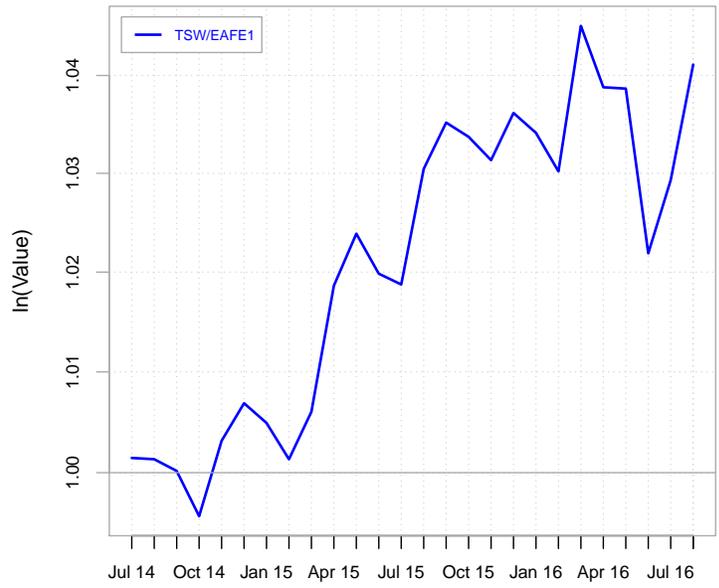
Brandes Rolling 12 Month Information Ratio



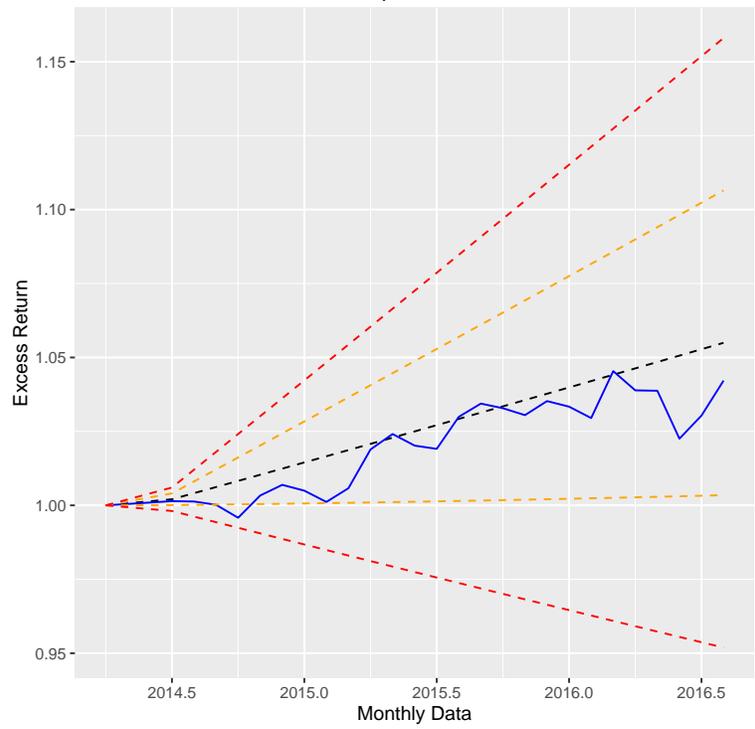
Brandes Rolling 36 Month Information Ratio



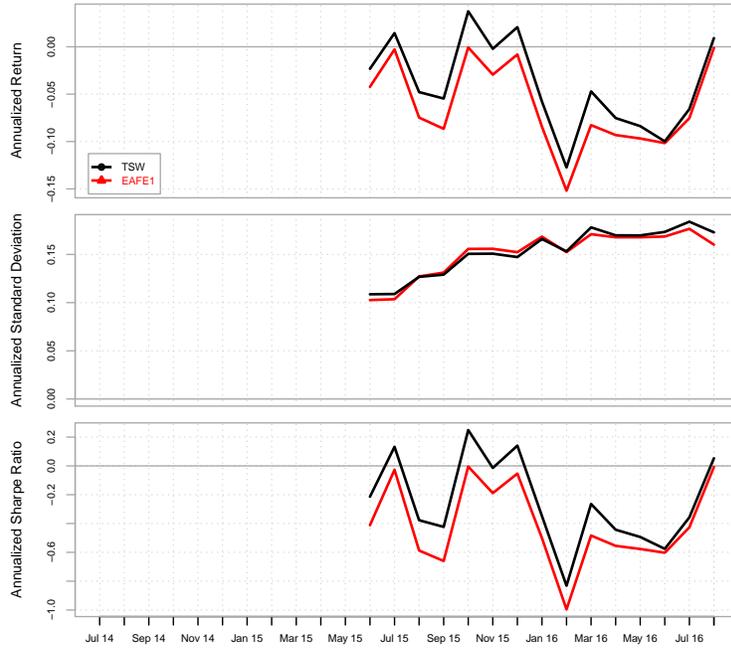
TSW Cumulative Relative Performance



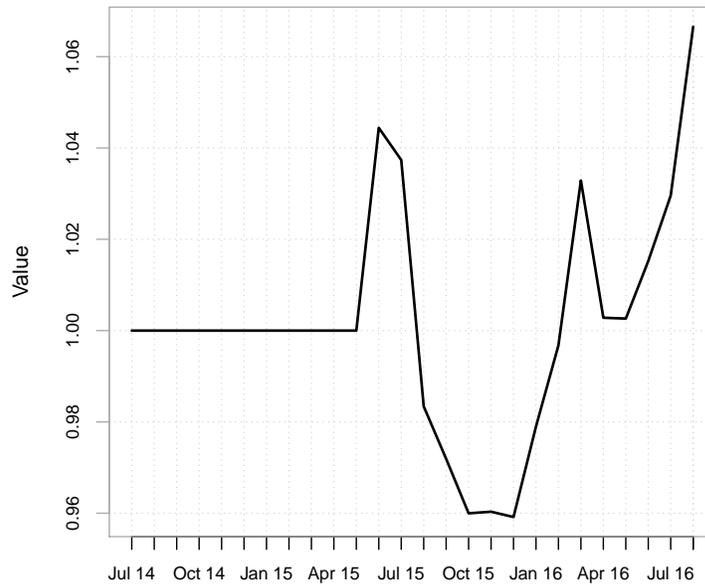
TSW Actual Excess vs Expected Excess +/- 1 & 2 Std Dev



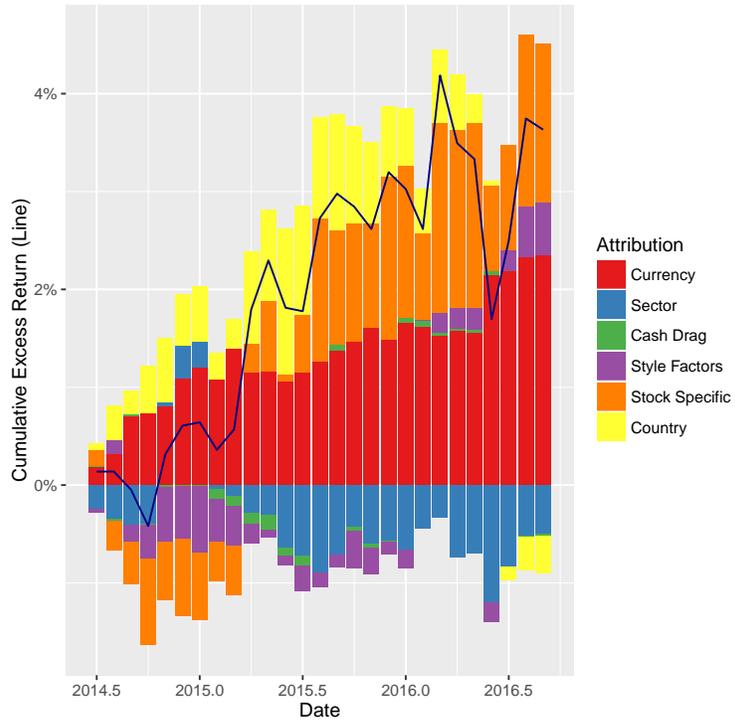
TSW Rolling 1 year Performance



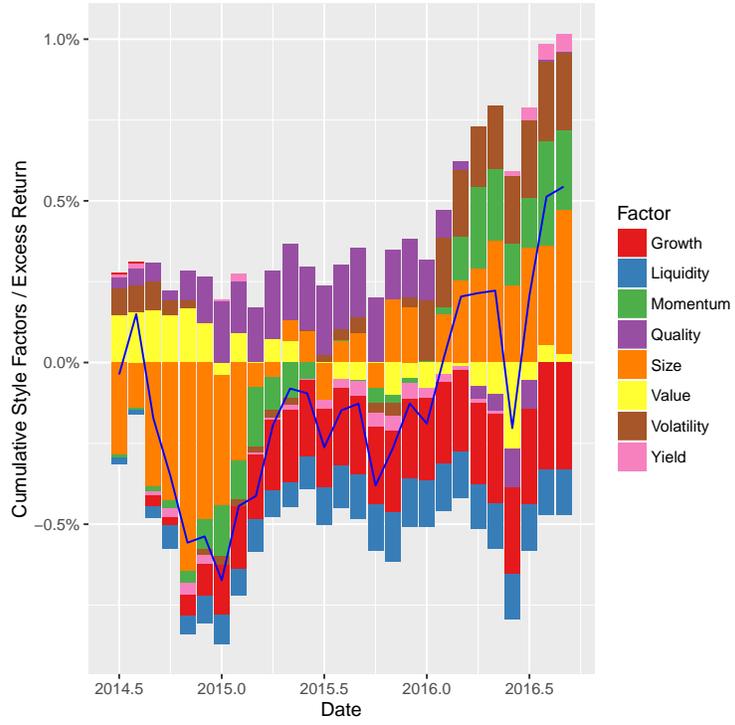
TSW Rolling 12 Month Beta



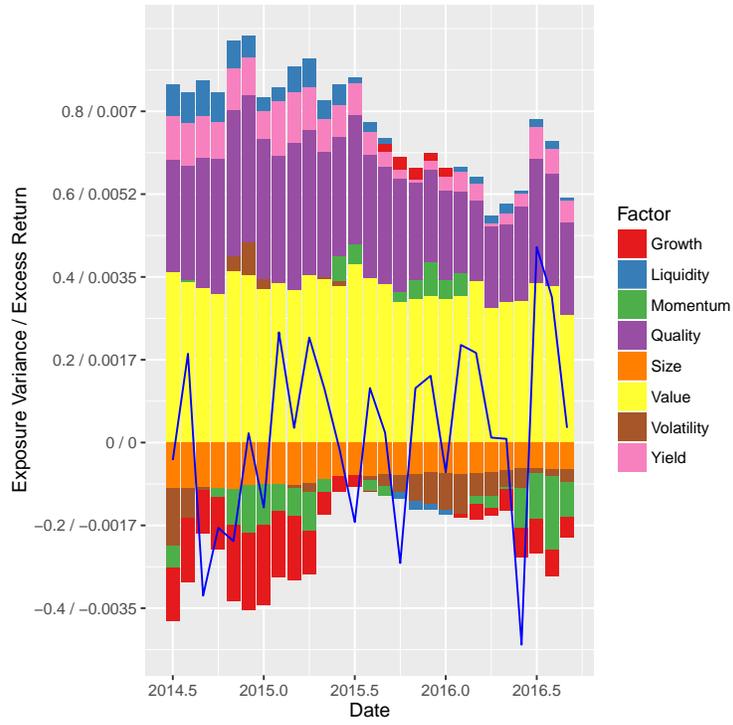
TSW Style Factor Attribution



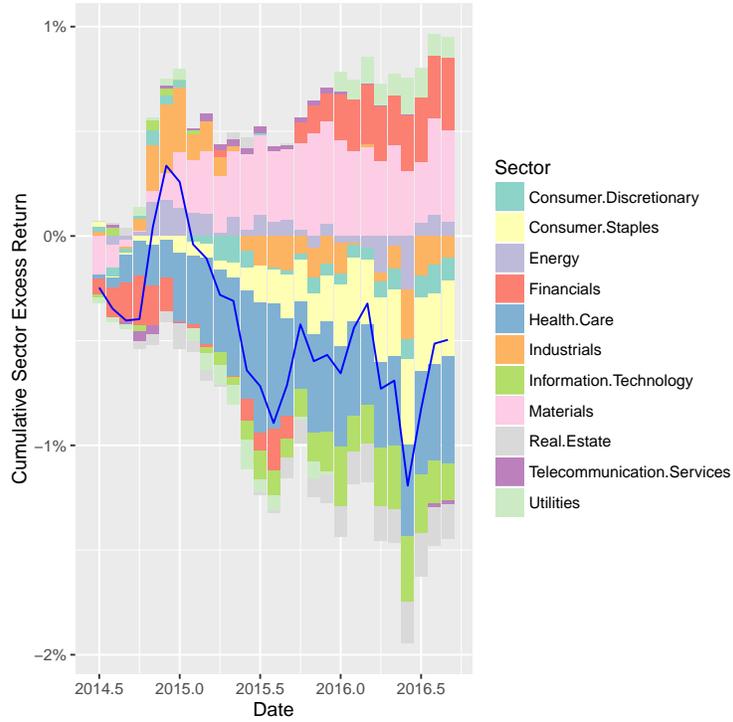
TSW Style Factor Breakout



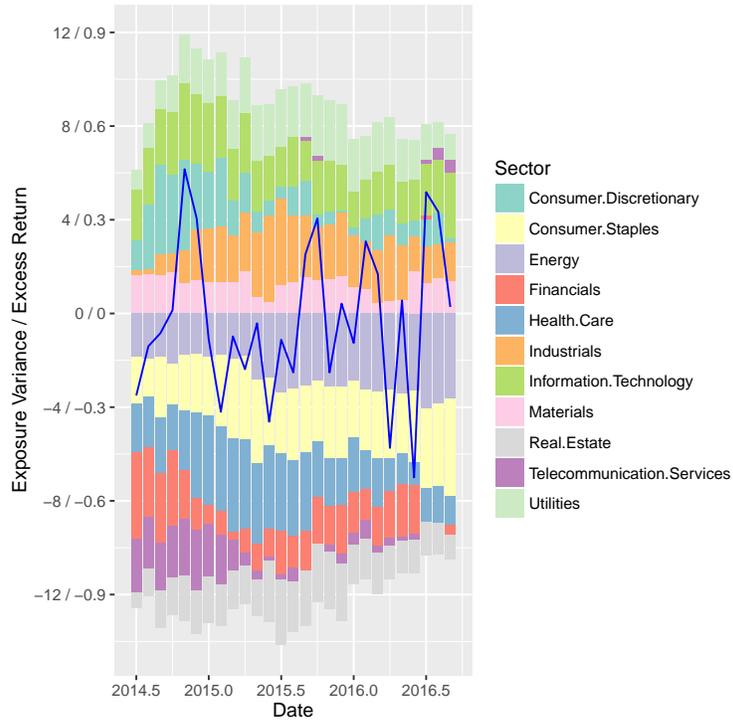
TSW Monthly Style Factors Active Exposure



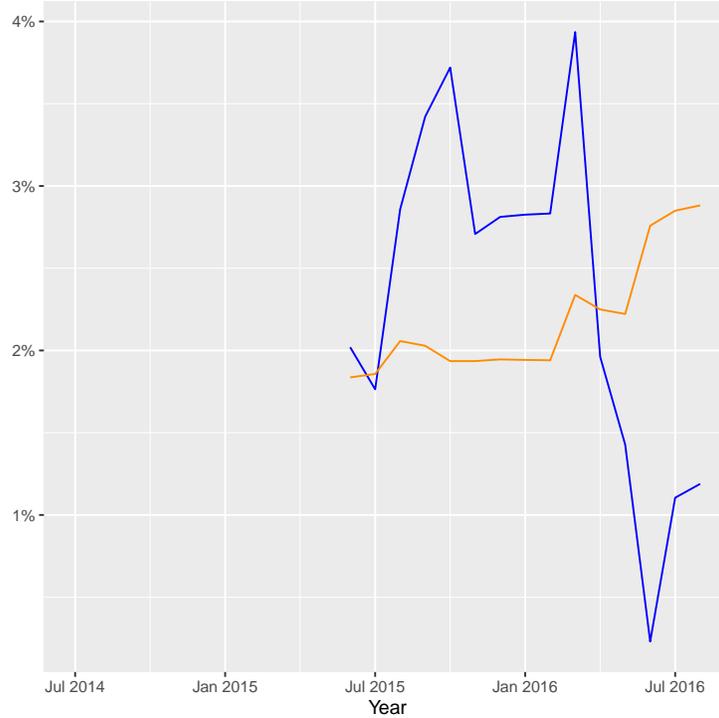
TSW Monthly GICS Sector Return



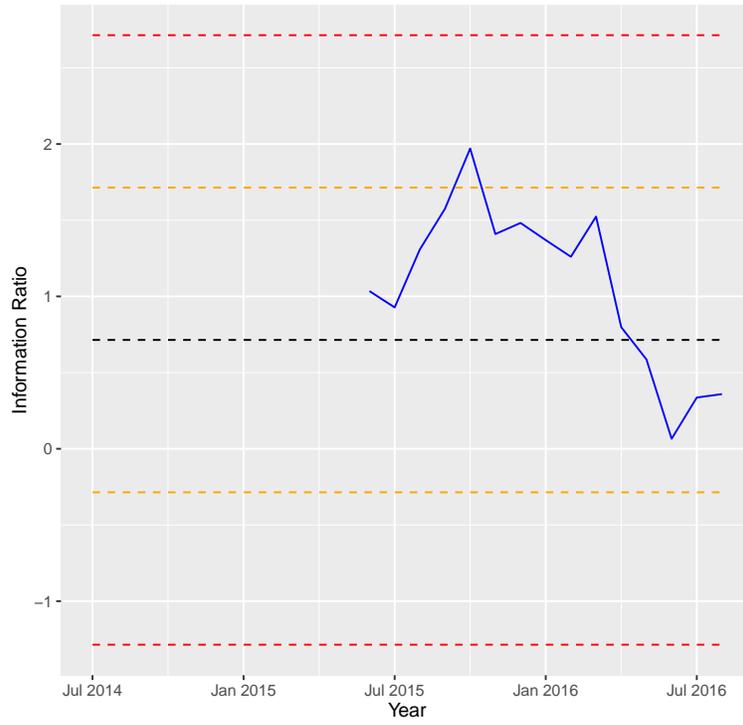
TSW GICS Sector Active Exposure



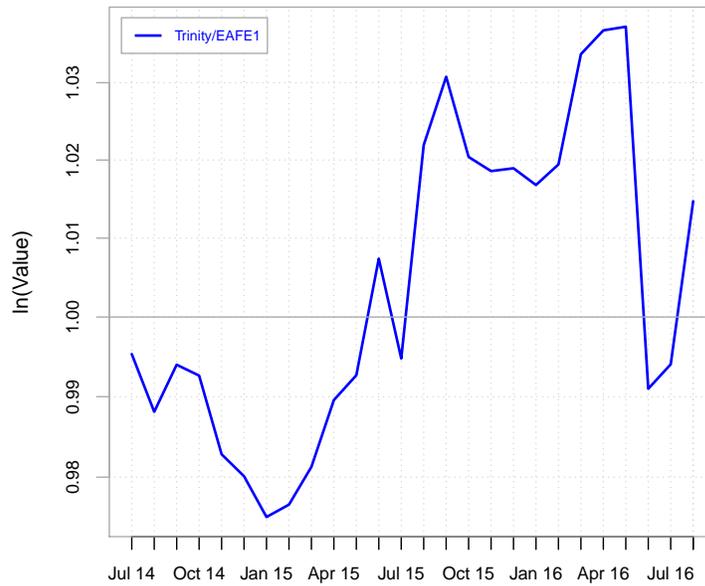
Rolling 12 Month Excess Return (Blue) & Tracking Error (Orange)



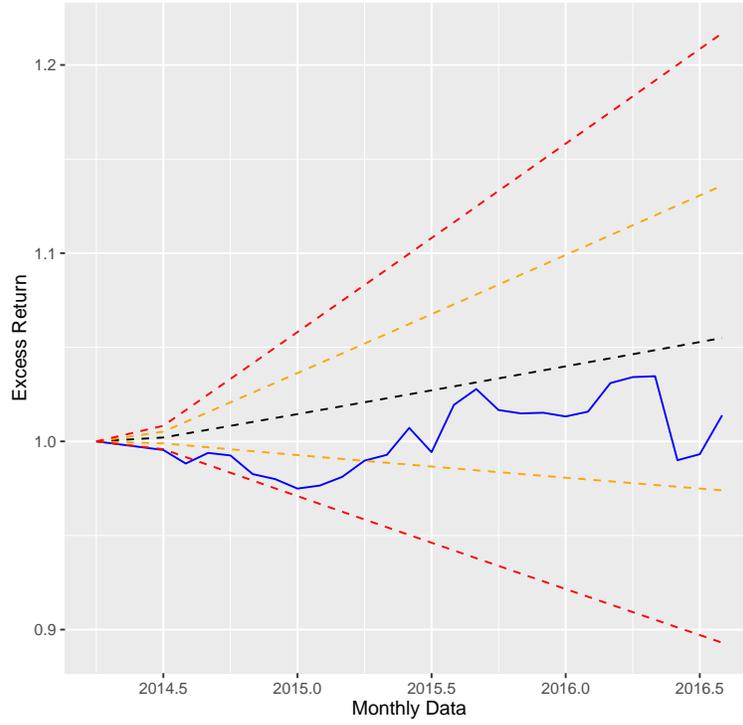
TSW Rolling 12 Month Information Ratio



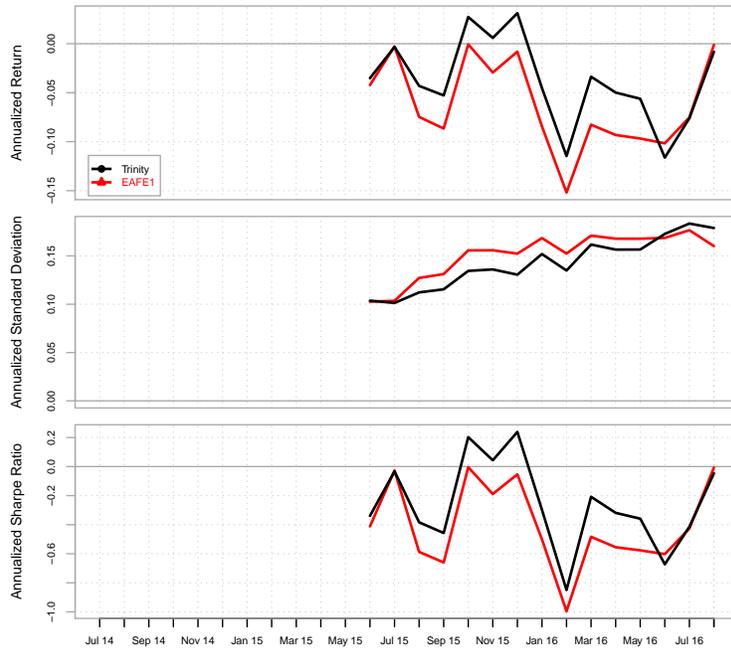
Trinity Cumulative Relative Performance



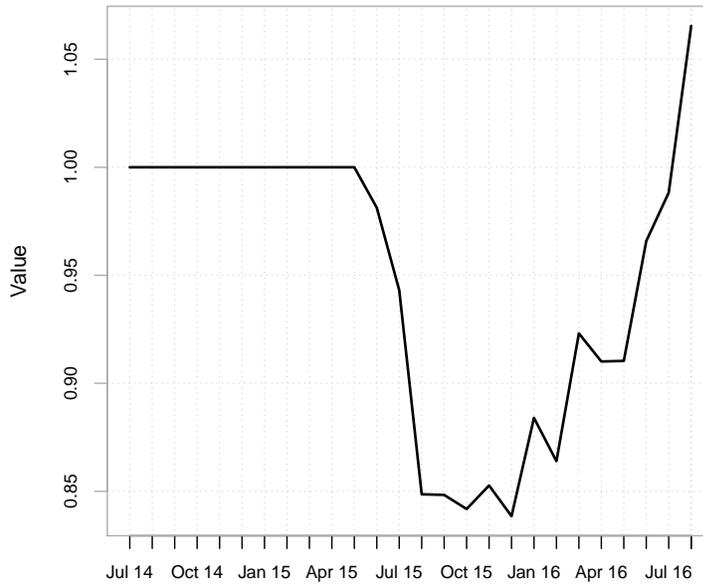
Trinity Actual Excess vs Expected Excess +/- 2 Std Dev



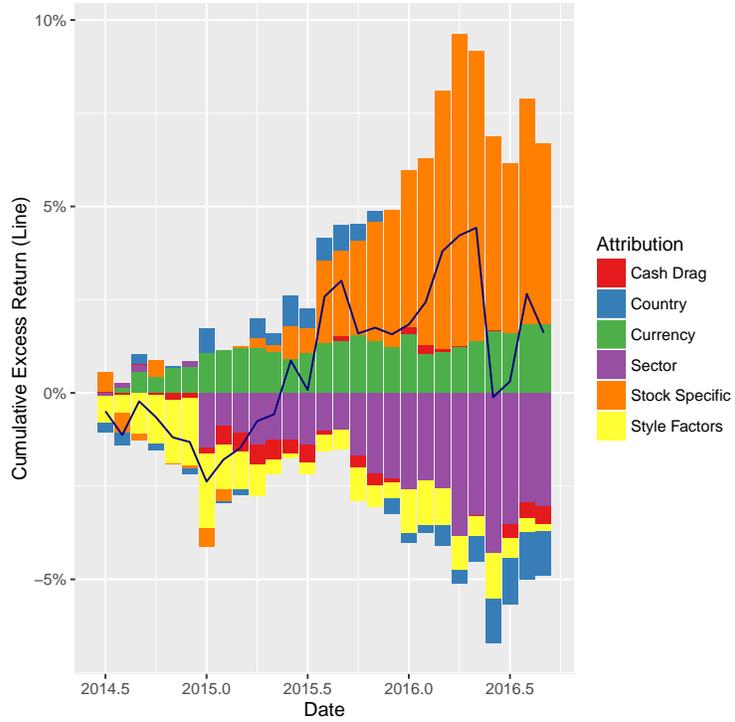
Trinity Rolling 1 year Performance



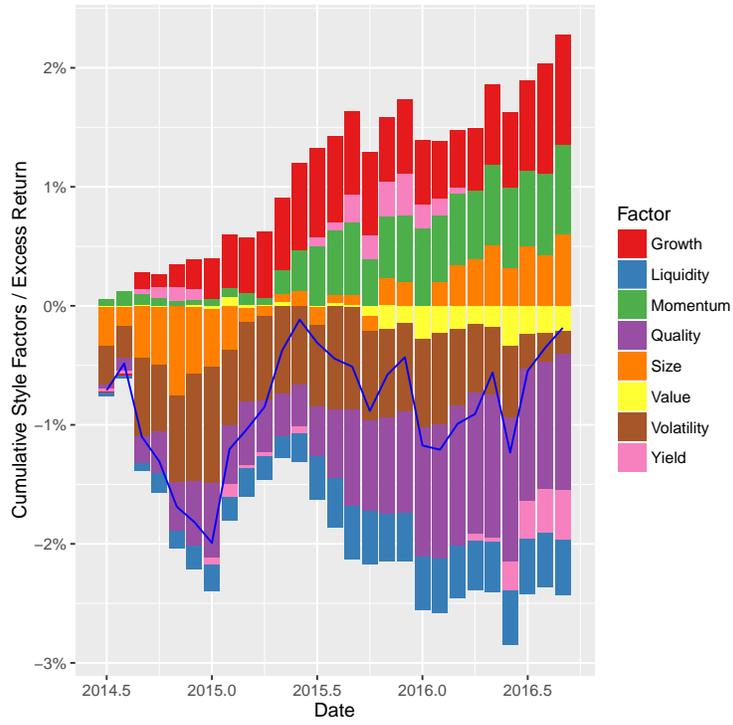
Trinity Rolling 12 Month Beta



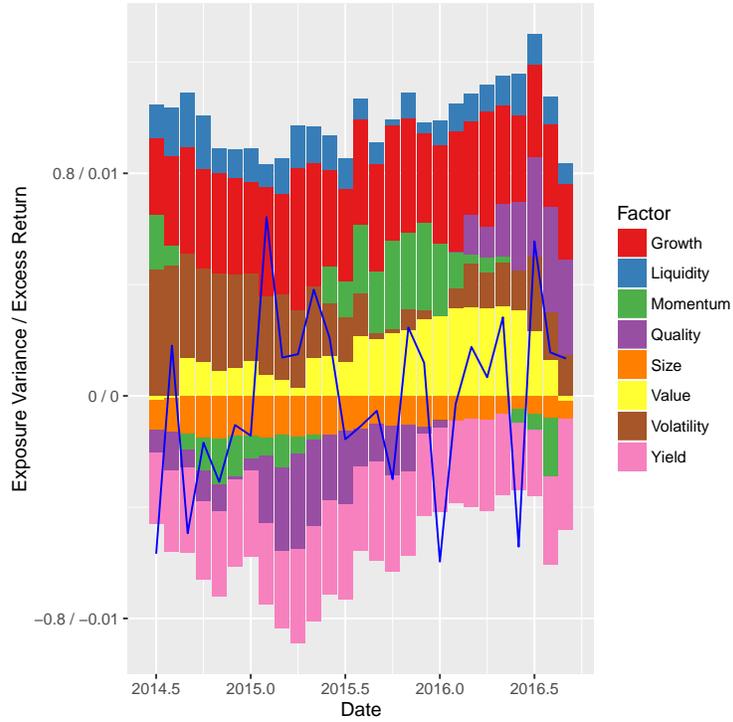
Trinity Style Factor Attribution



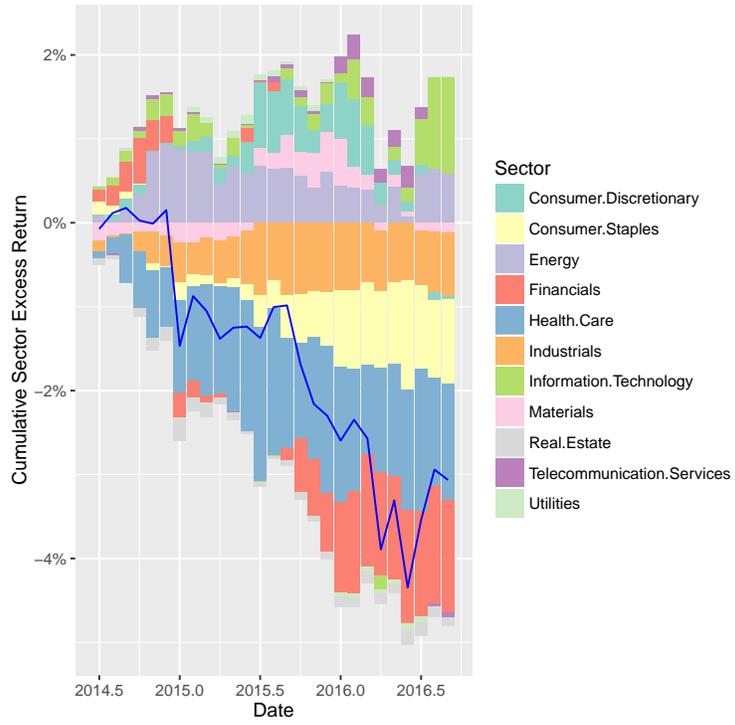
Trinity Style Factor Breakout



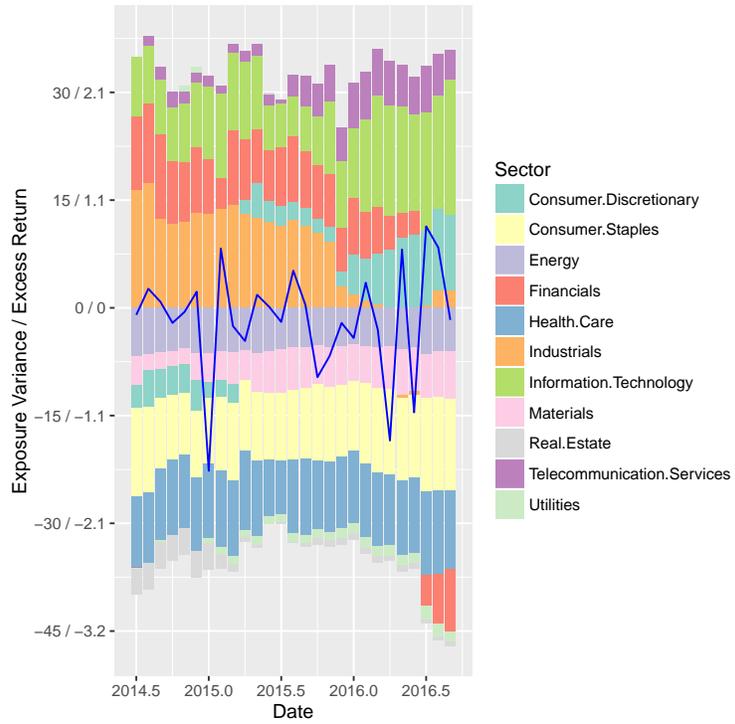
Trinity Monthly Style Factors Active Exposure

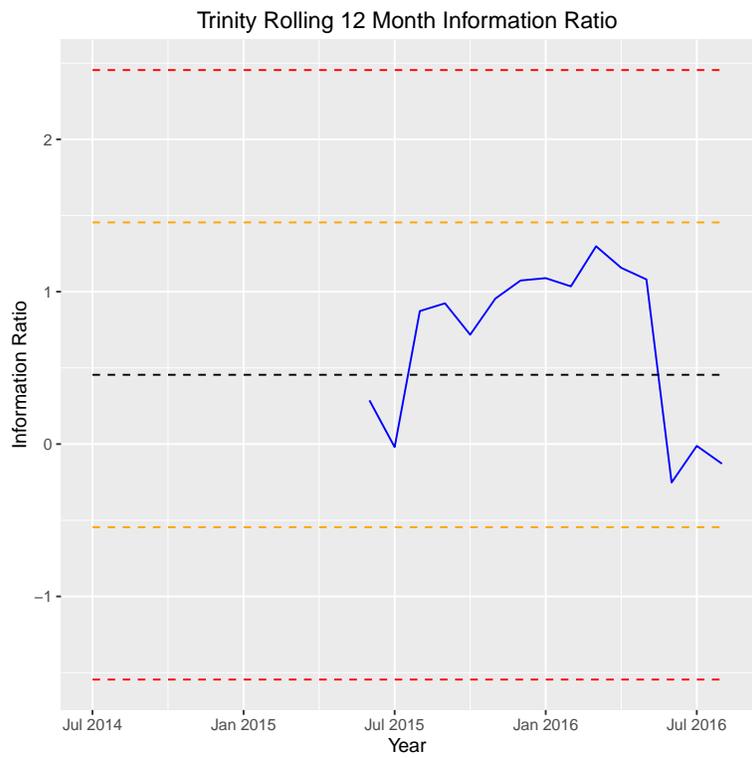
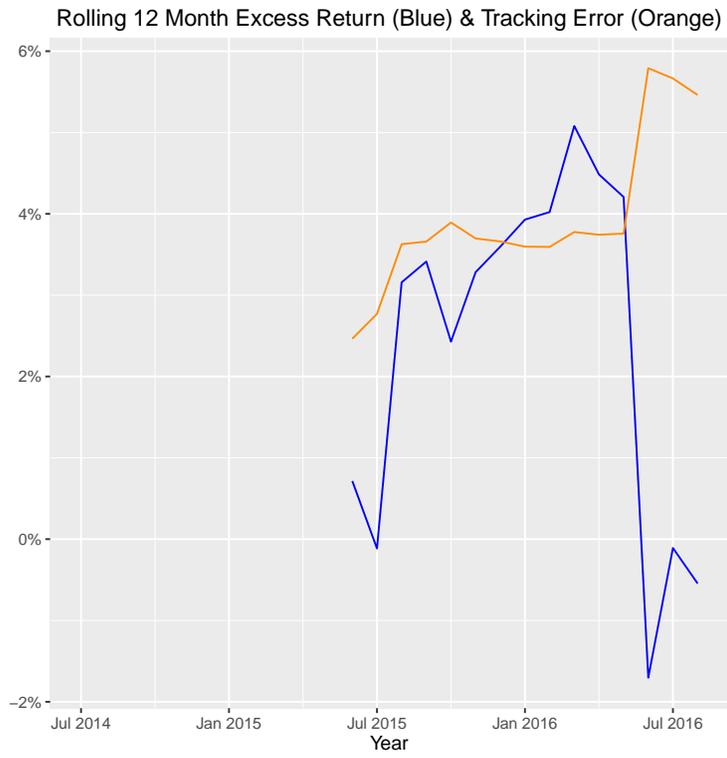


Trinity Monthly GICS Sector Return



Trinity GICS Sector Active Exposure

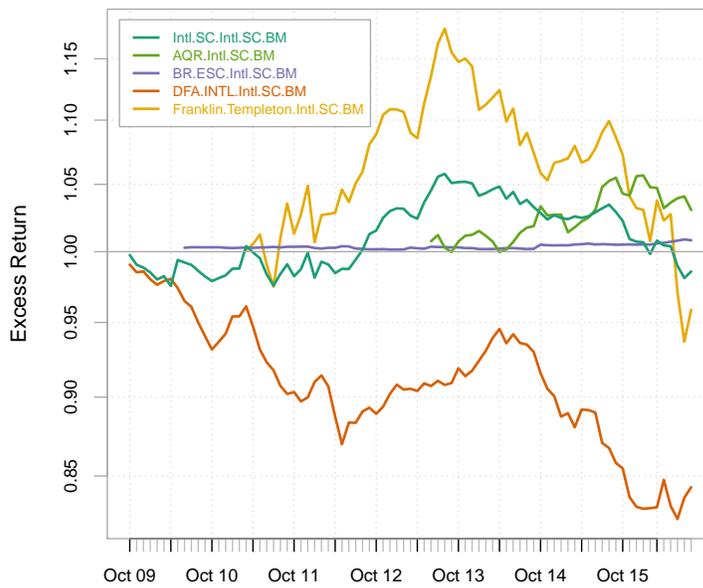




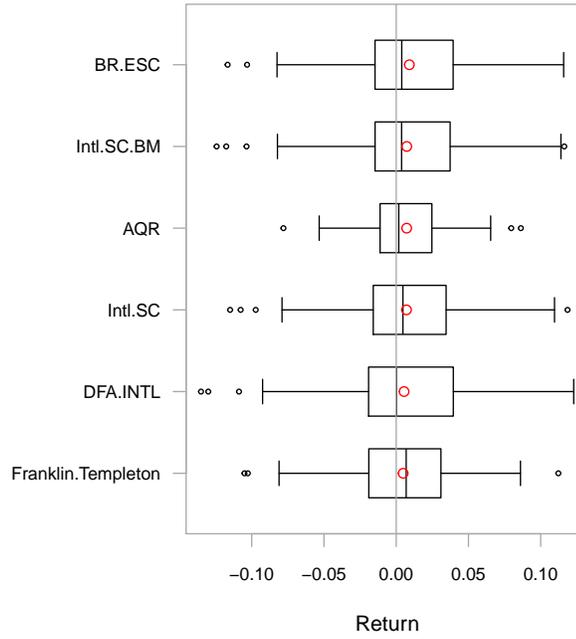
**Intl Developed Small Cap Performance Summary**



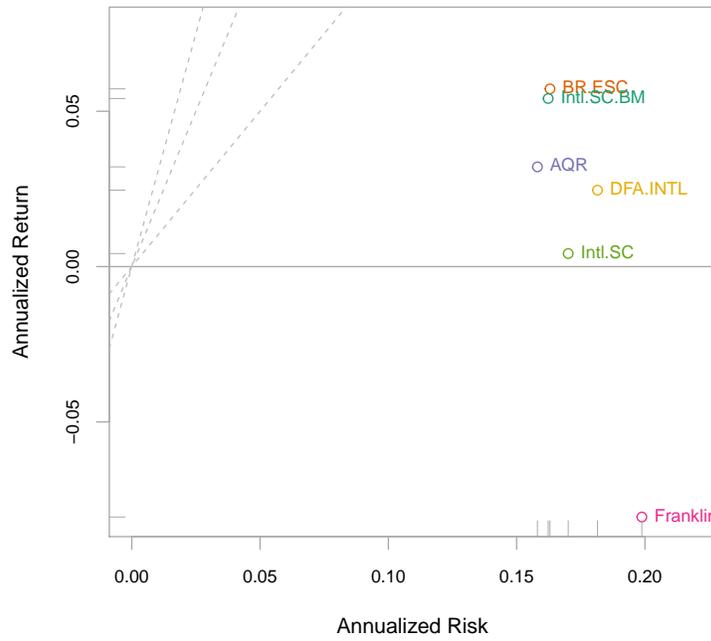
**Intl Developed Small Cap Cumulative Relative Performance**



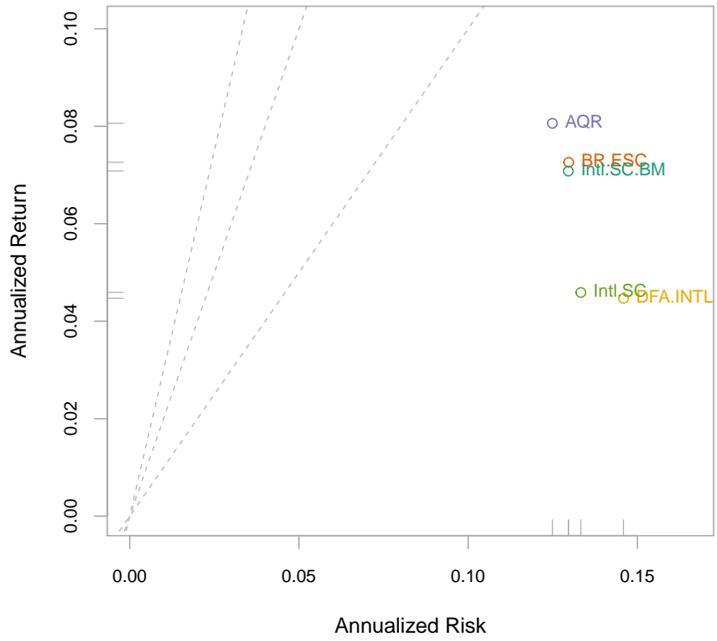
### Return Distribution Comparison



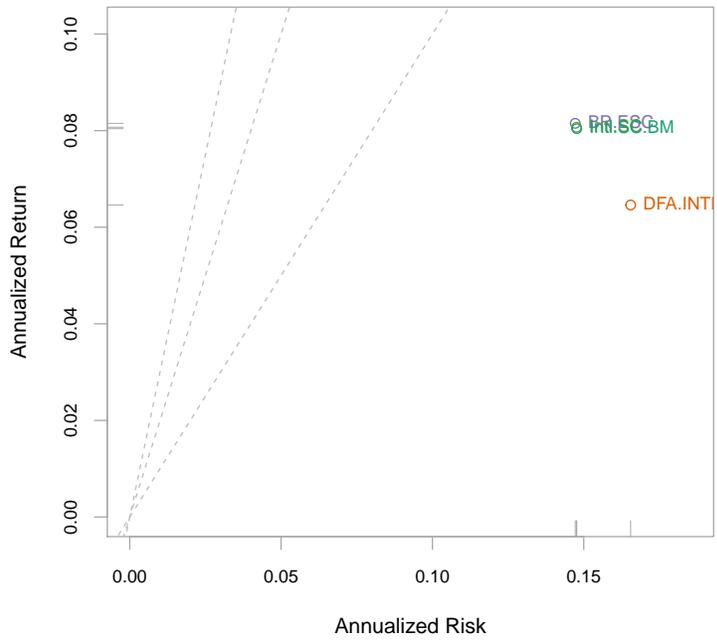
### Intl Developed Small Cap Trailing 1 Year Performance vs Sharpe Ratios (1,;



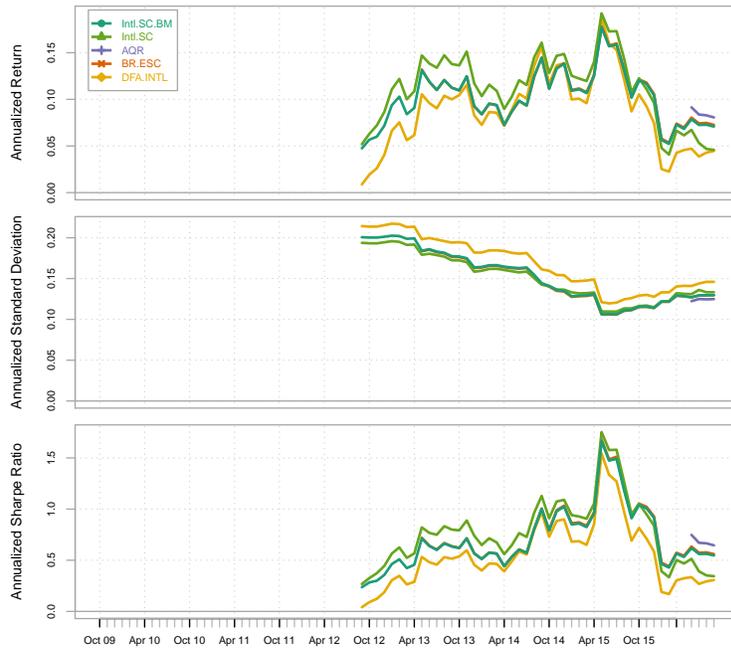
Trailing 3 Year Performance vs Sharpe Ratios (1,2,3)



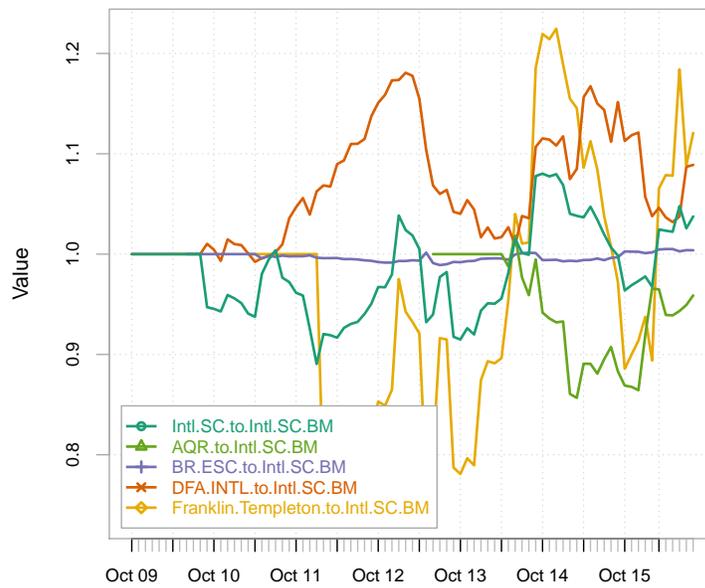
Trailing 5 Year Performance vs Sharpe Ratios (1,2,3)



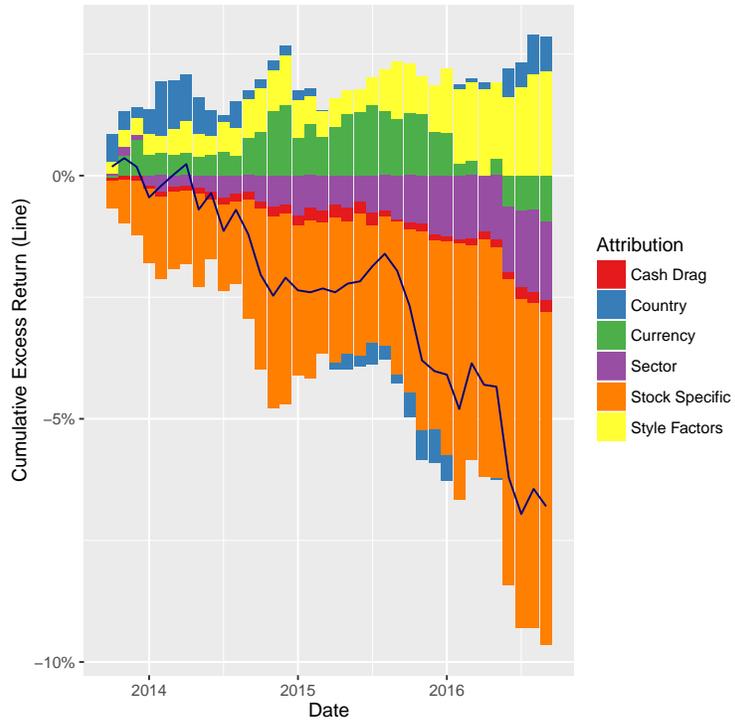
Intl Developed Small Cap Rolling 3 Year Performance



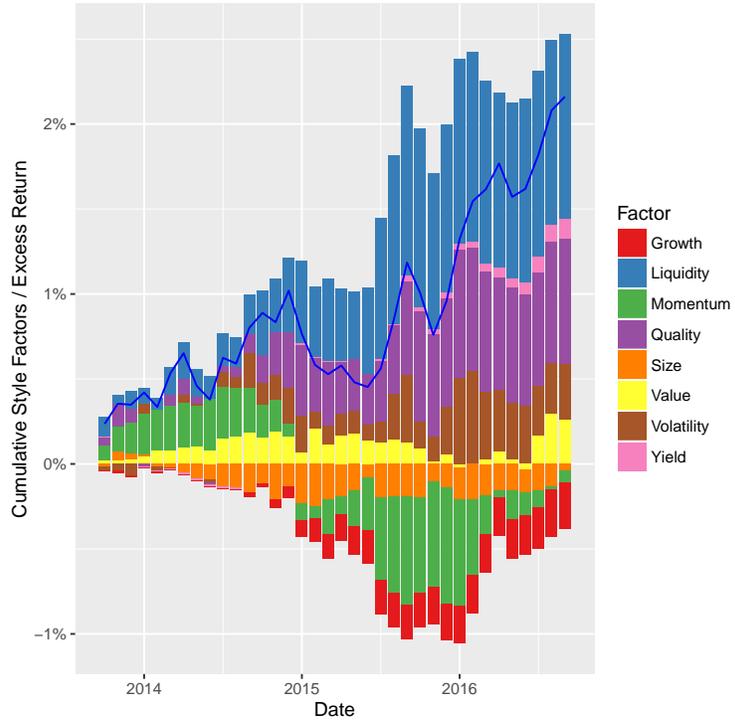
Intl Developed Small Cap Rolling 12 Month Beta



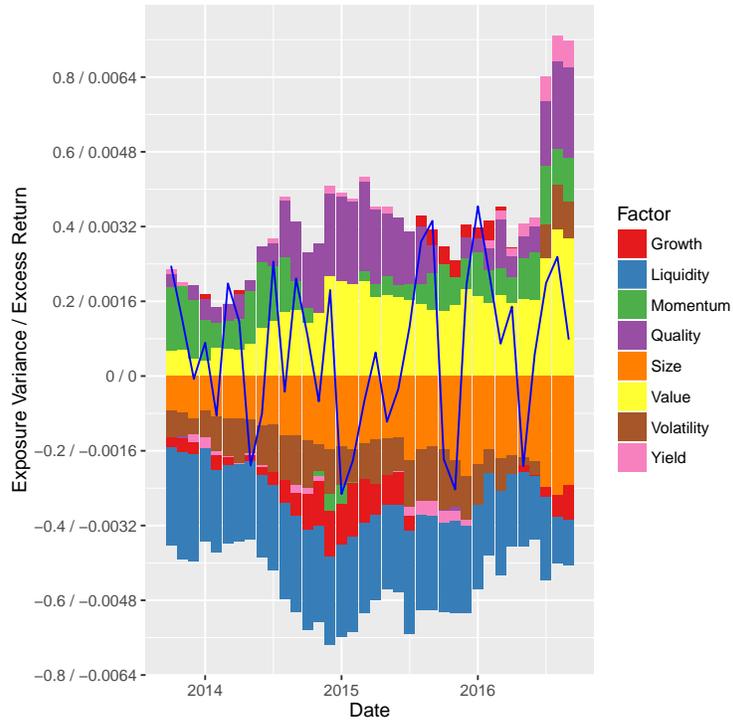
Intl Developed Small Cap Style Factor Attribution



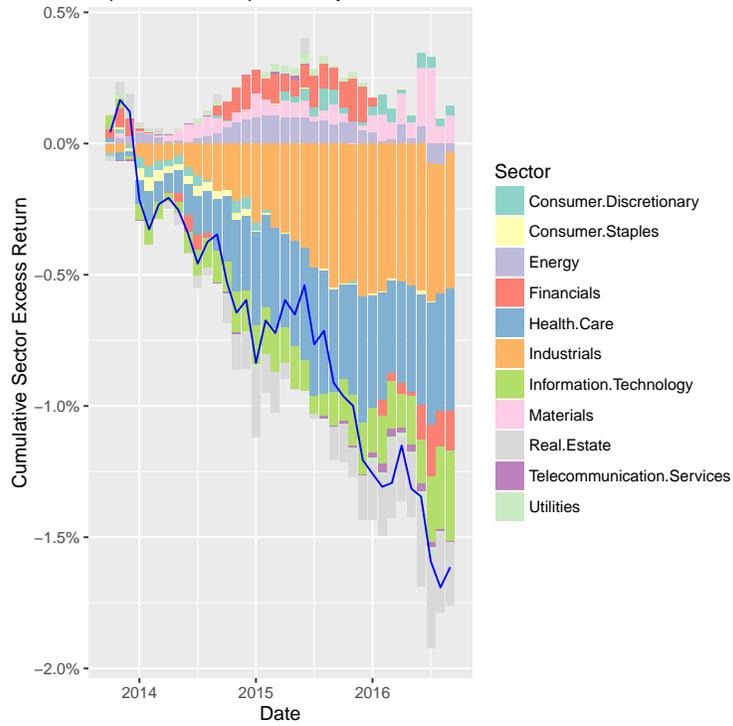
Intl Developed Small Cap Style Factor Breakout



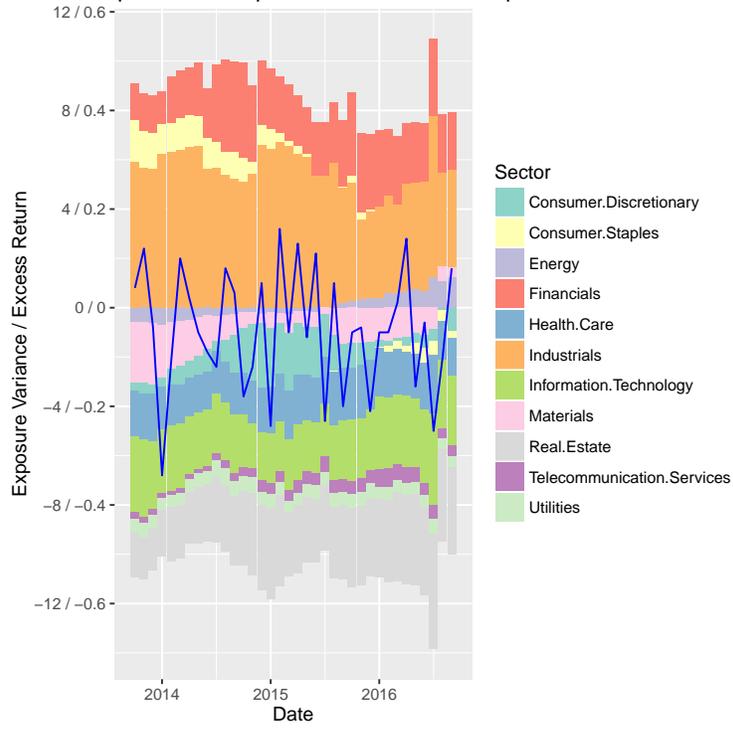
Intl Developed Small Cap Monthly Style Factors Active Exposure



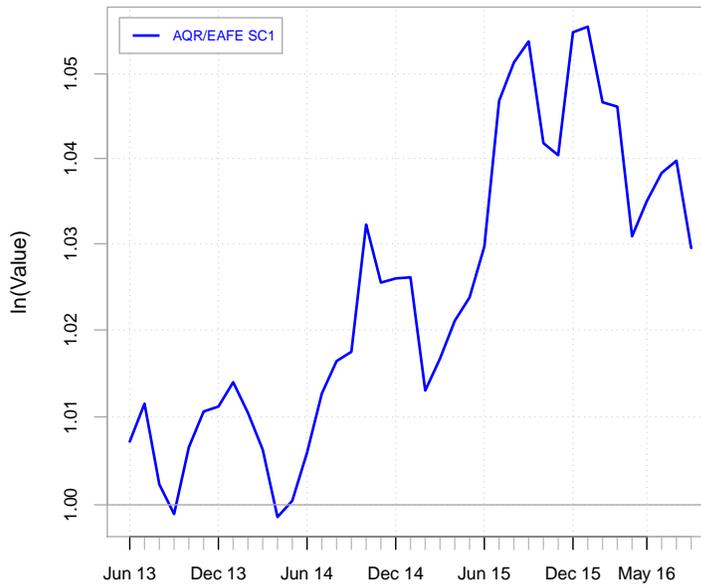
Intl Developed Small Cap Monthly GICS Sector Return



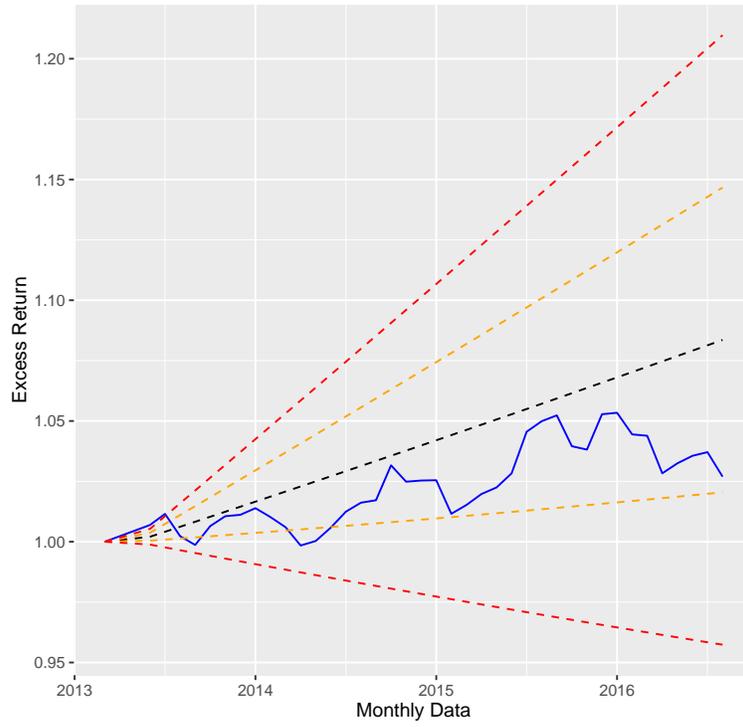
### Intl Developed Small Cap GICS Sector Active Exposure



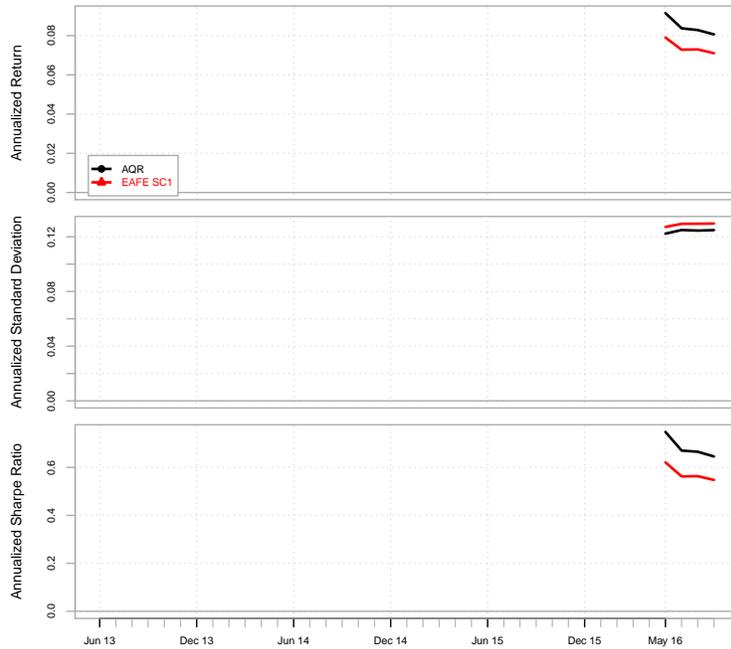
### AQR Cumulative Relative Performance



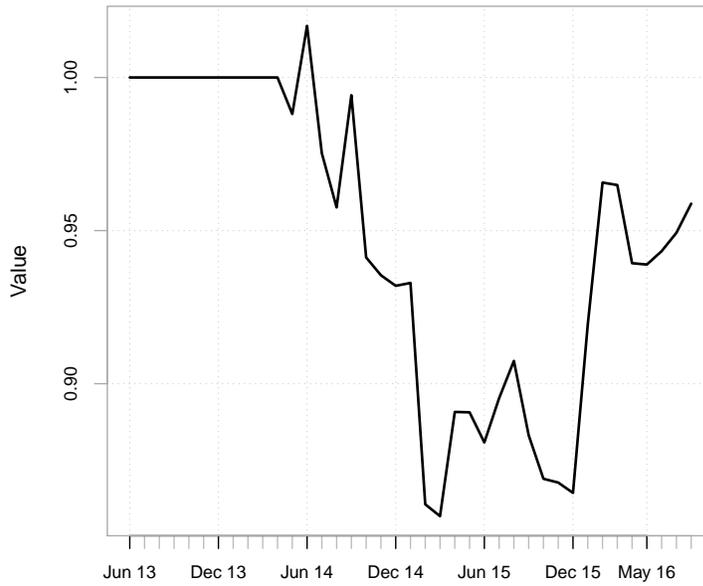
AQR Actual Excess vs Expected Excess +/- 1 & 2 Std Dev



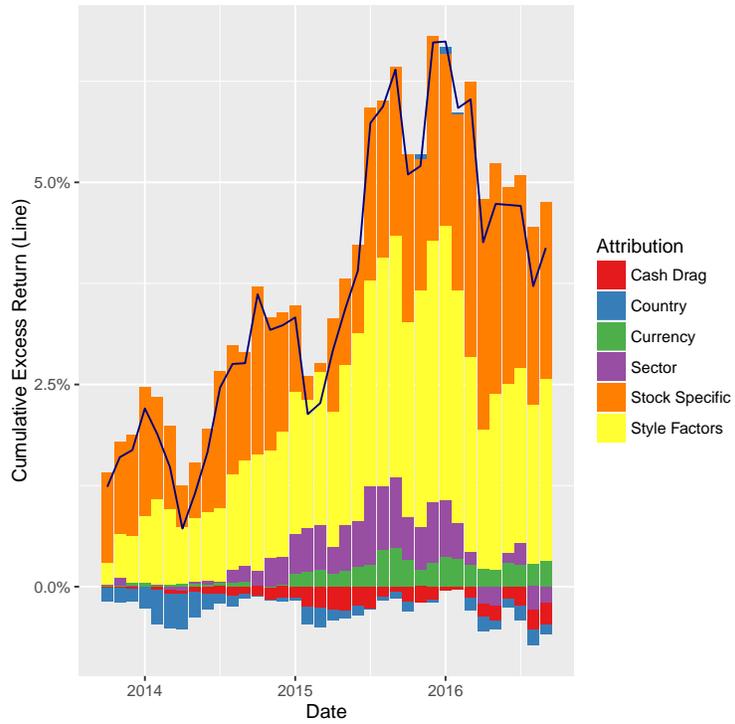
AQR Rolling 3 year Performance



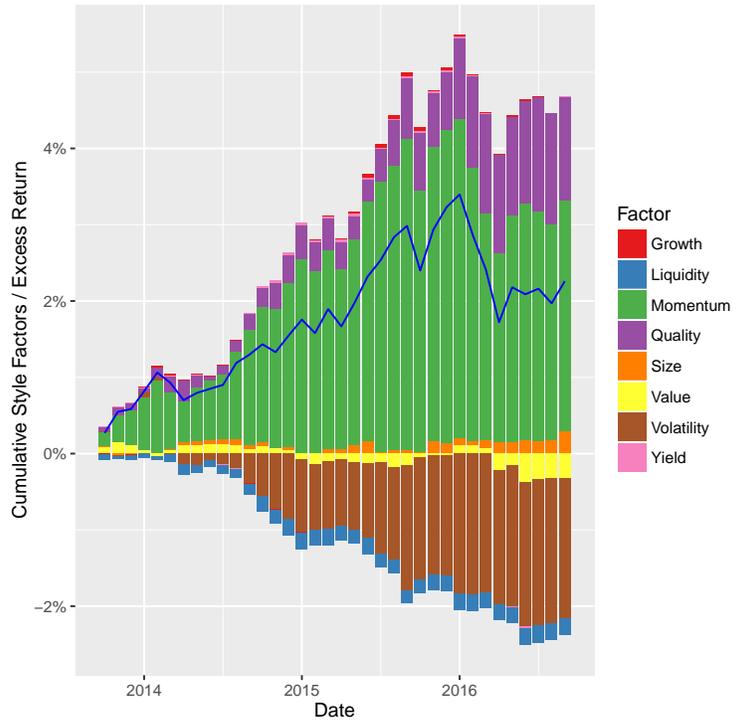
AQR Rolling 12 Month Beta



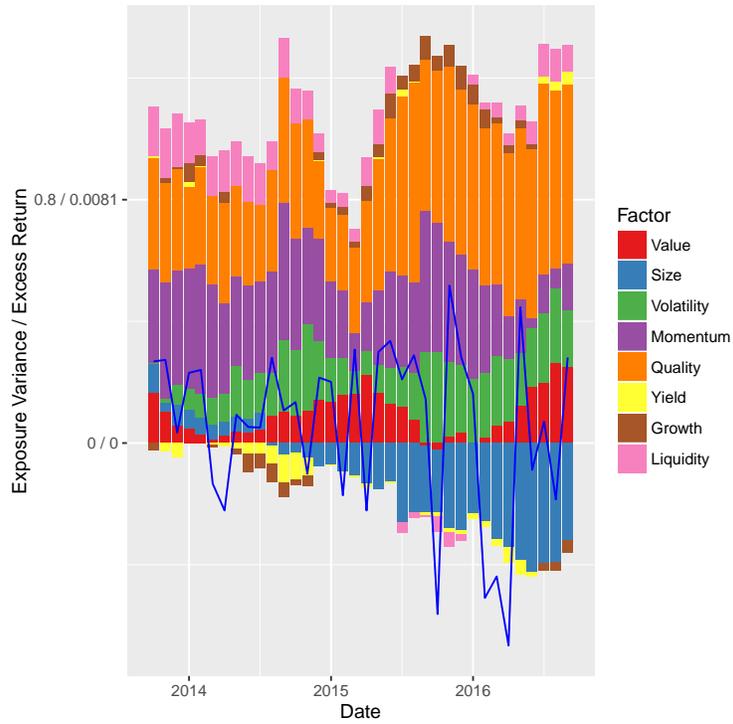
AQR Style Factor Attribution



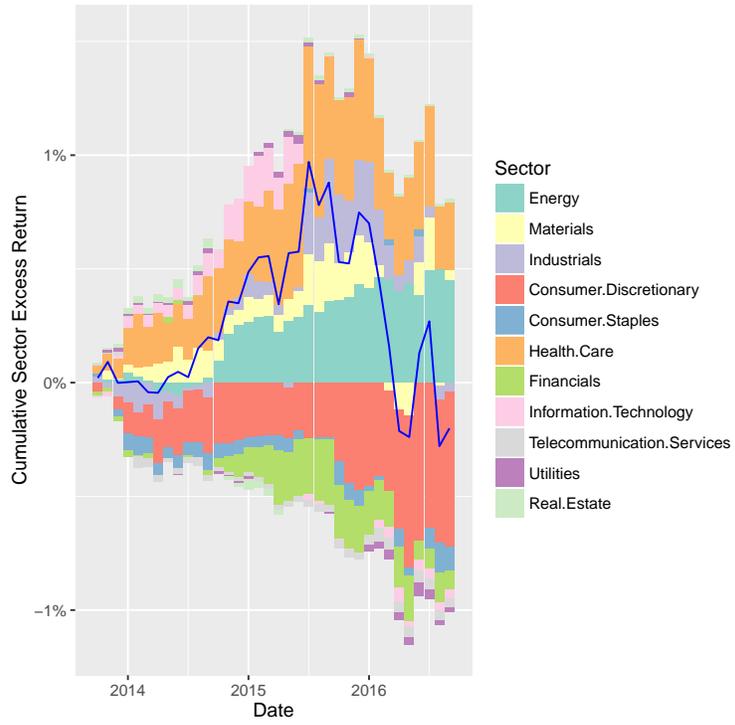
AQR Style Factor Breakout



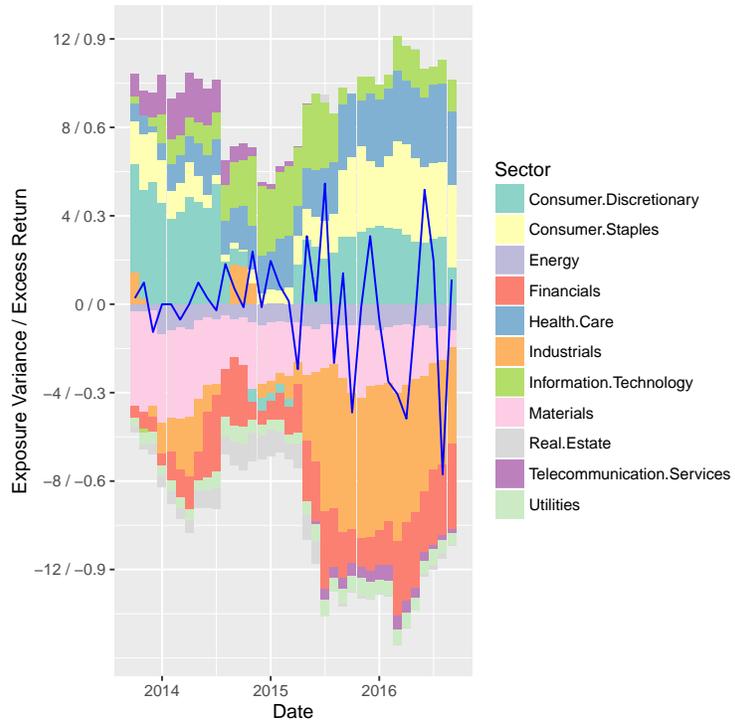
AQR Monthly Style Factors Active Exposure



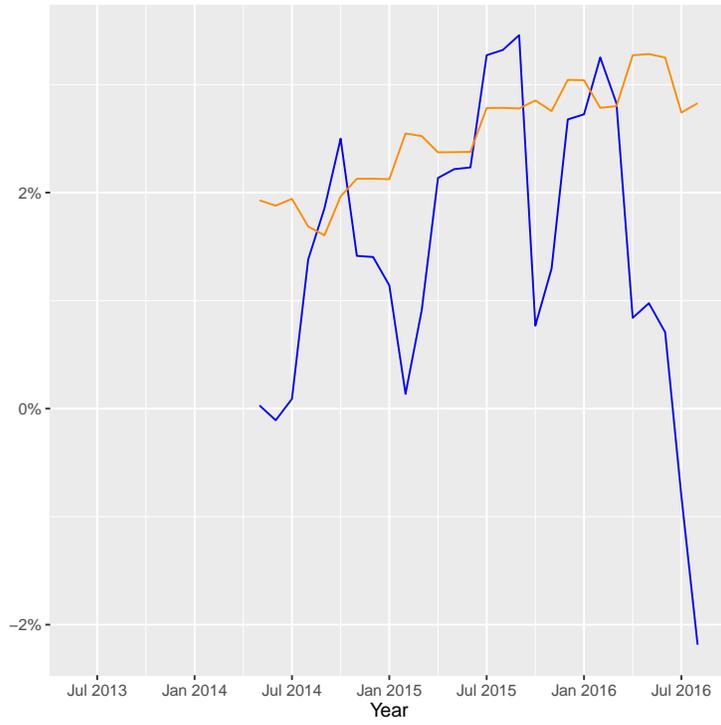
AQR Monthly GICS Sector Return



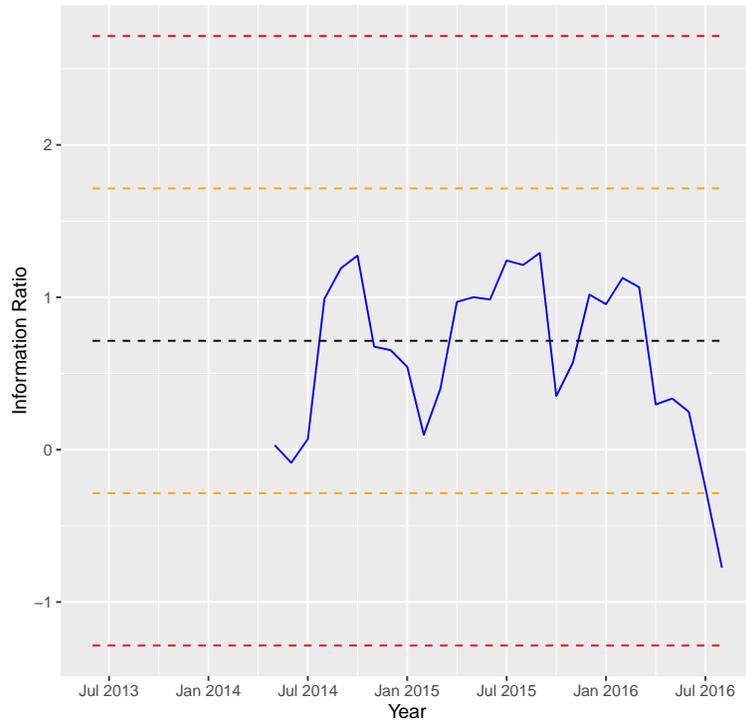
AQR GICS Sector Active Exposure



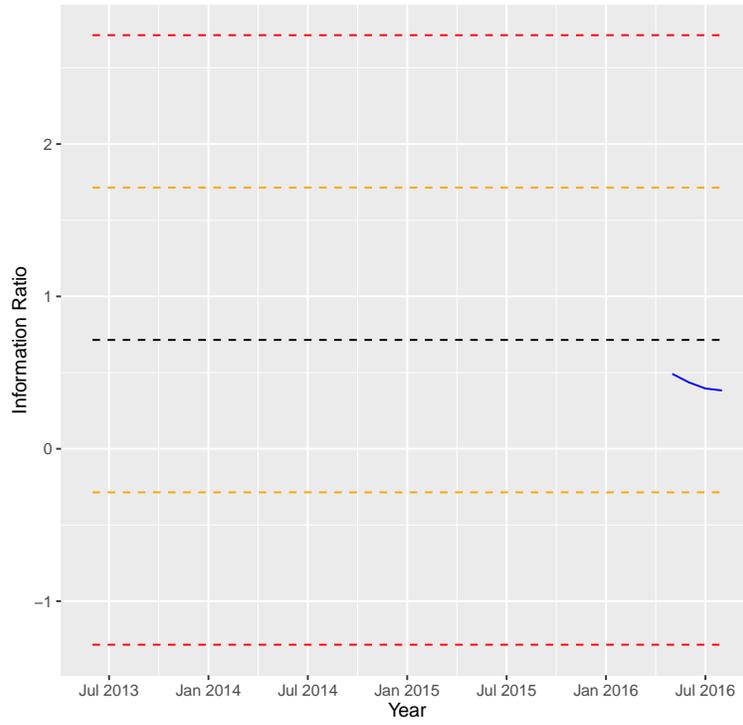
Rolling 12 Month Excess Return (Blue) & Tracking Error (Orange)



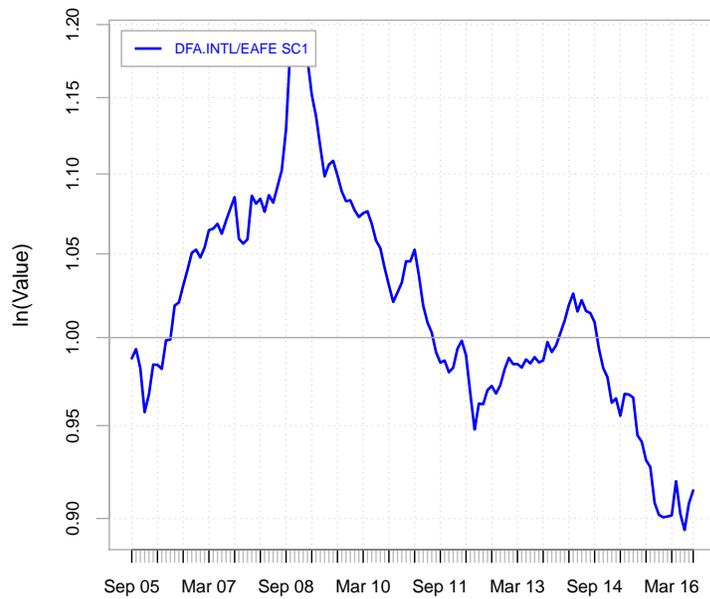
AQR Rolling 12 Month Information Ratio



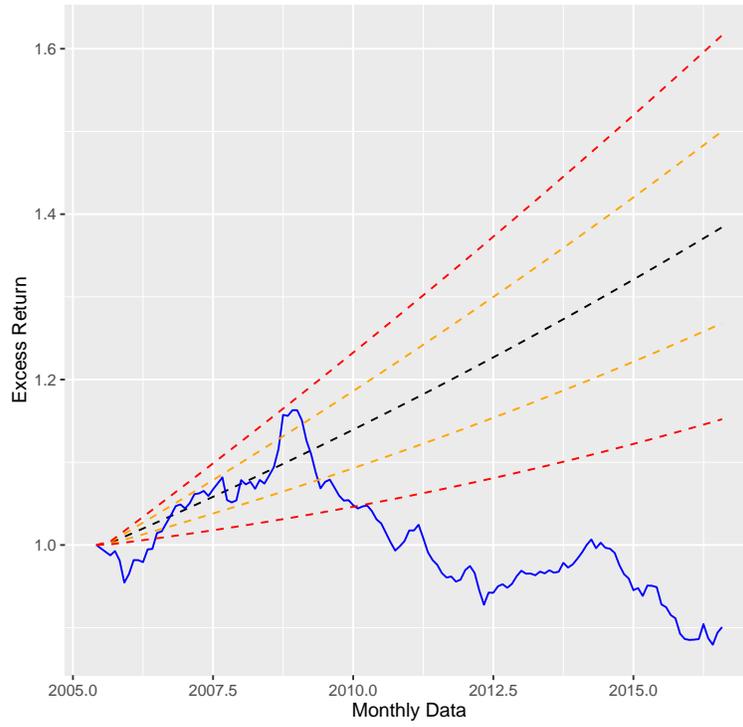
AQR Rolling 36 Month Information Ratio



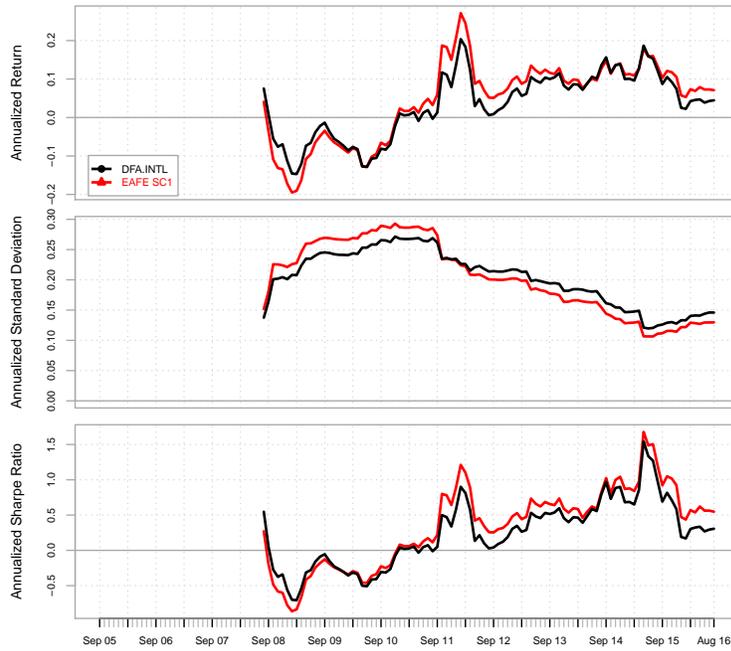
DFA.INTL Cumulative Relative Performance



DFA.INTL Actual Excess vs Expected Excess +/- 2 Std Dev



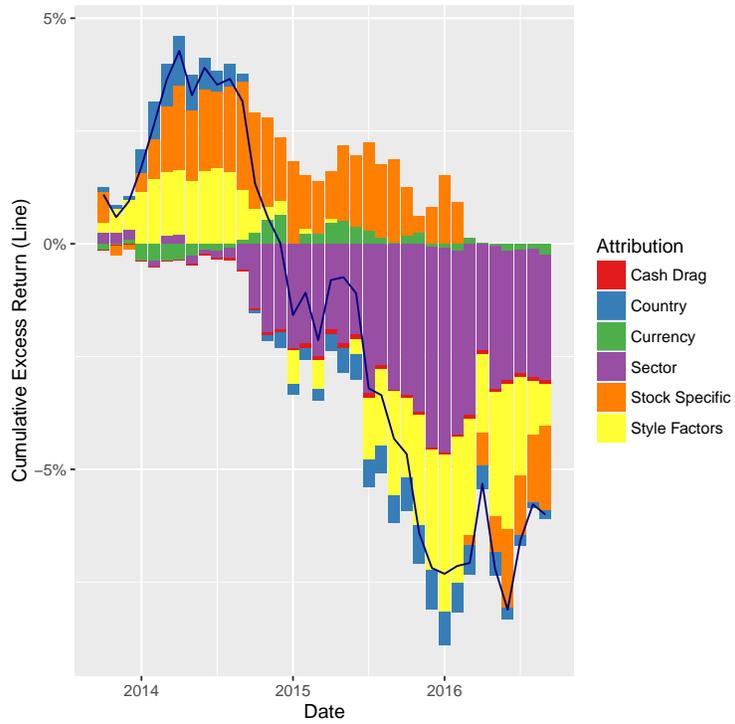
DFA.INTL Rolling 3 year Performance



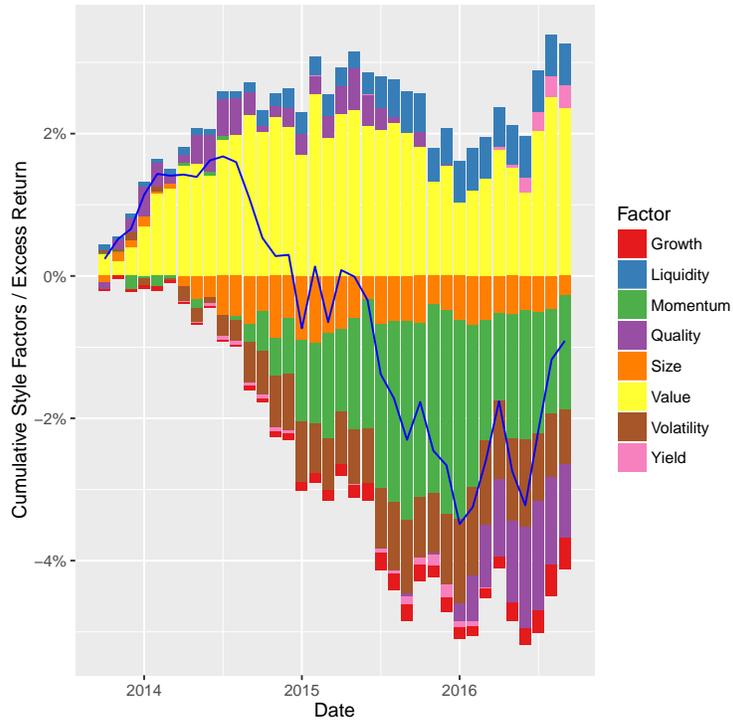
DFA.INTL Rolling 12 Month Beta



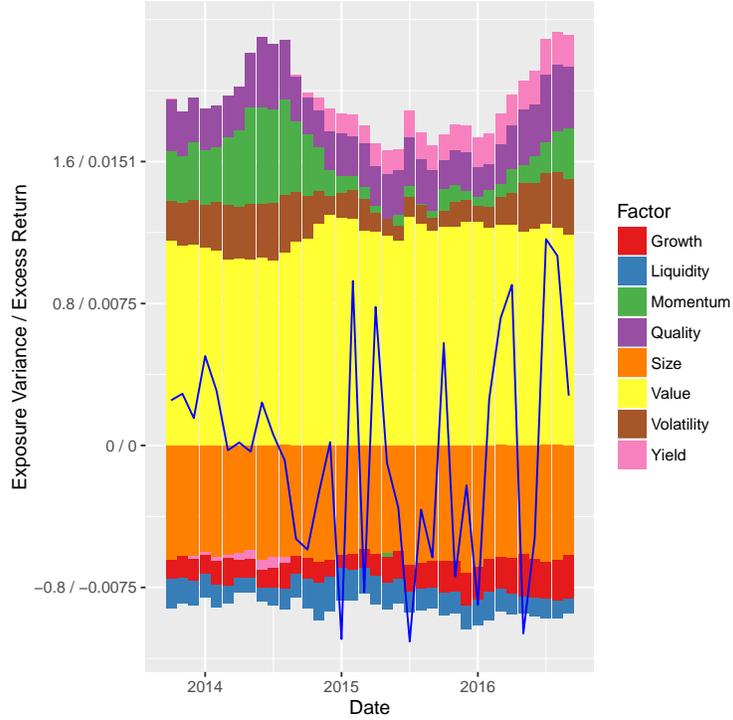
DFA.INTL Style Factor Attribution



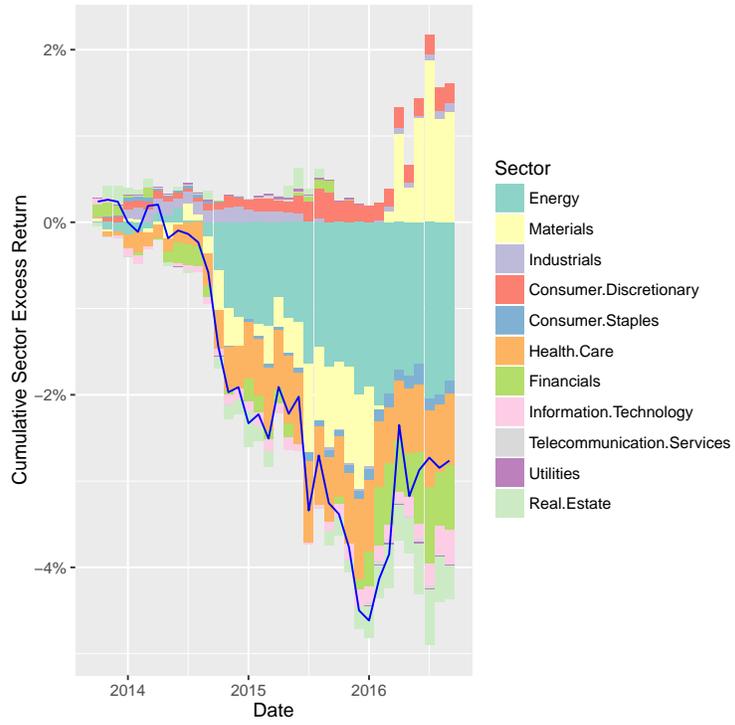
DFA.INTL Style Factor Breakout



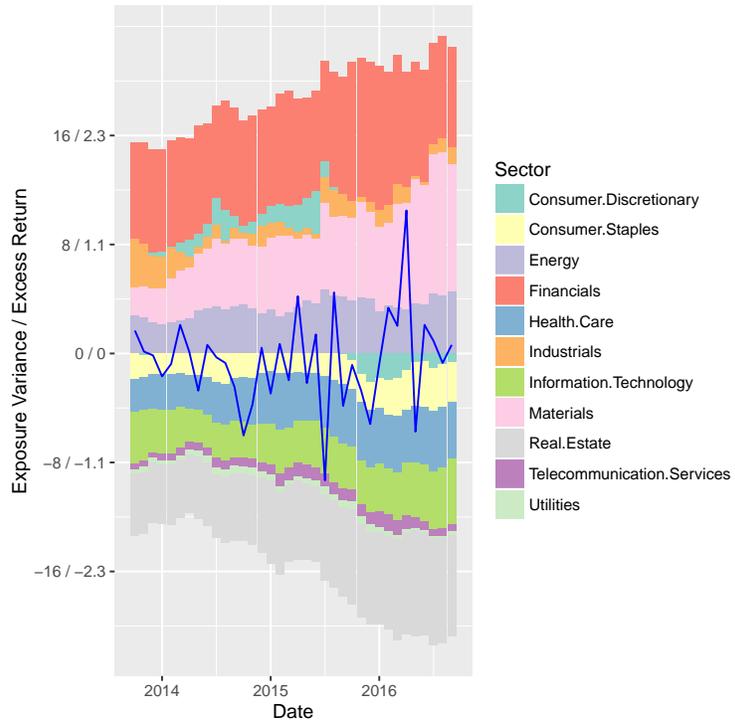
DFA.INTL Monthly Style Factors Active Exposure



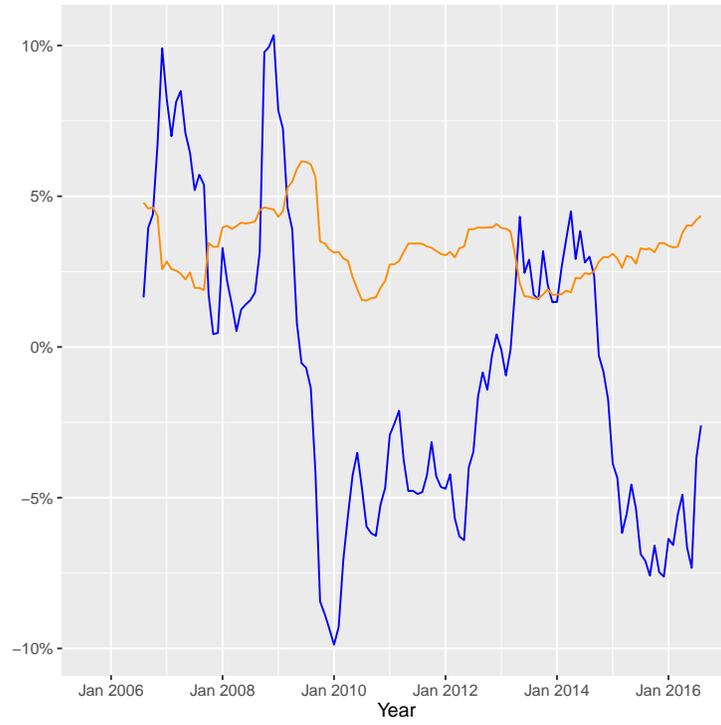
DFA.INTL Monthly GICS Sector Return



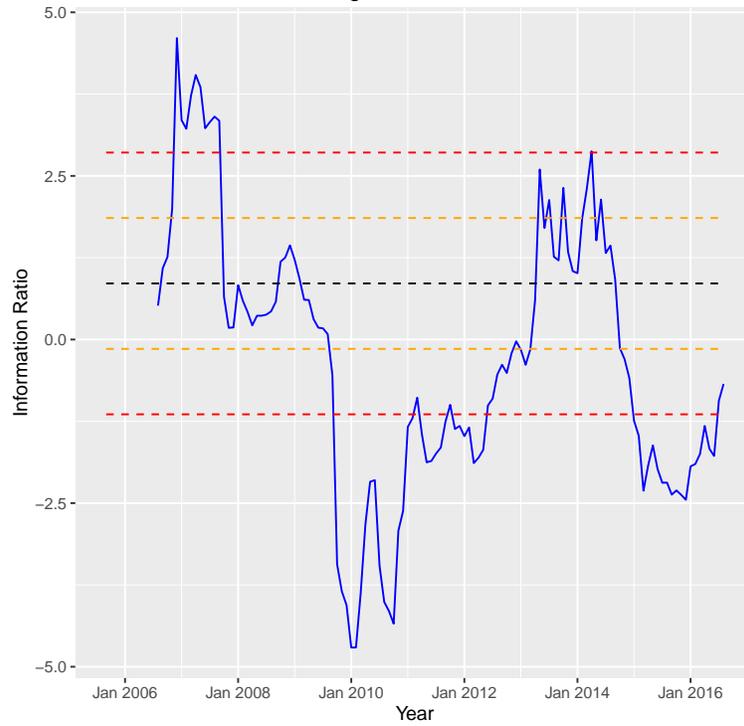
DFA.INTL GICS Sector Active Exposure



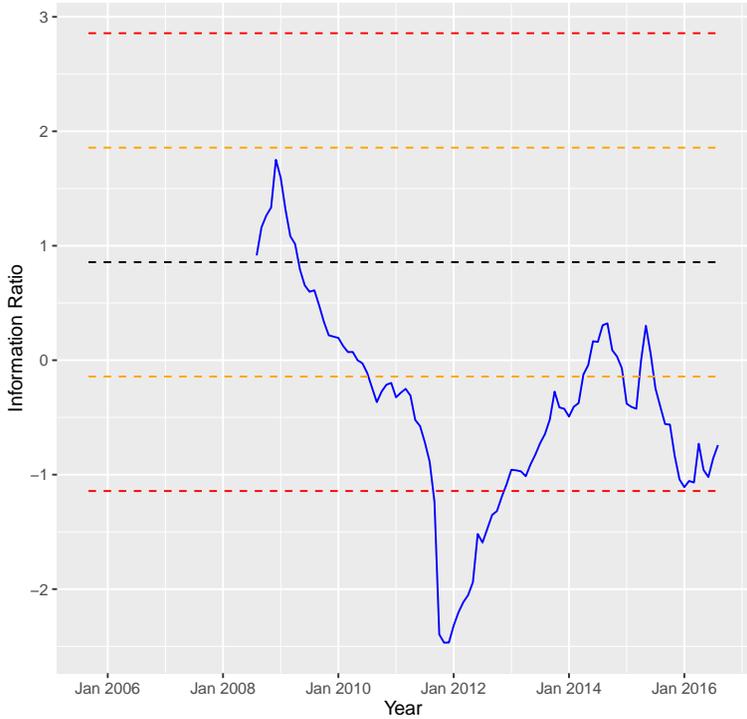
Rolling 12 Month Excess Return (Blue) & Tracking Error (Orange)



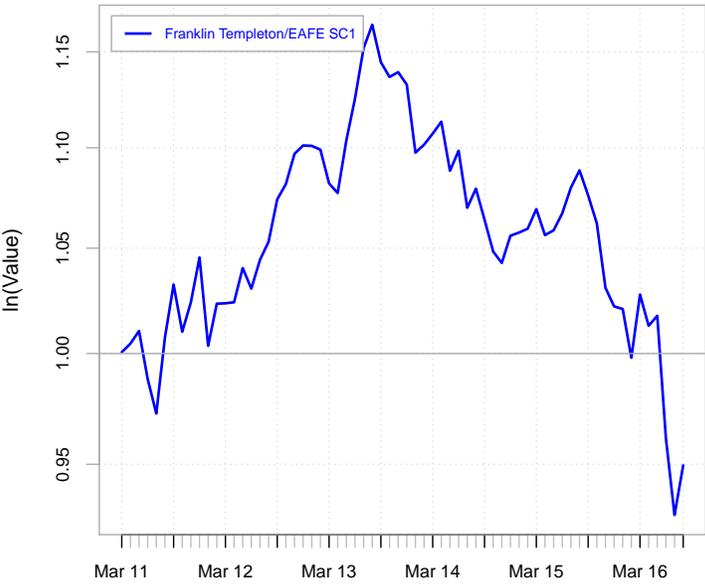
DFA.INTL Rolling 12 Month Information Ratio



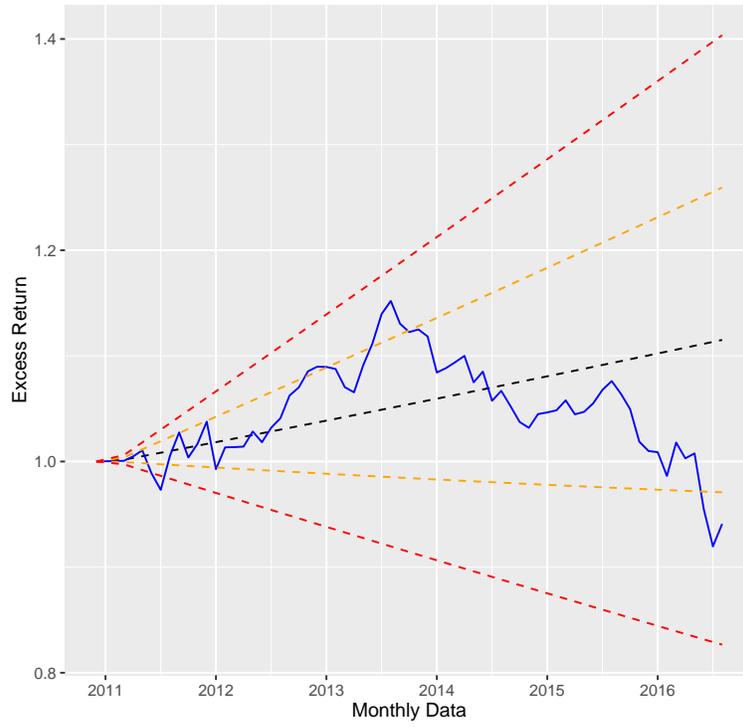
DFA.INTL Rolling 36 Month Information Ratio



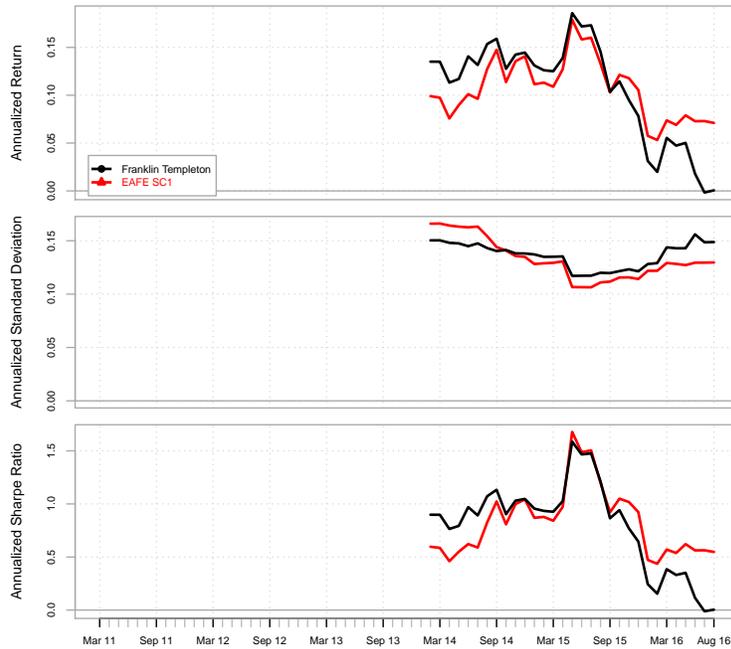
Franklin Templeton Cumulative Relative Performance



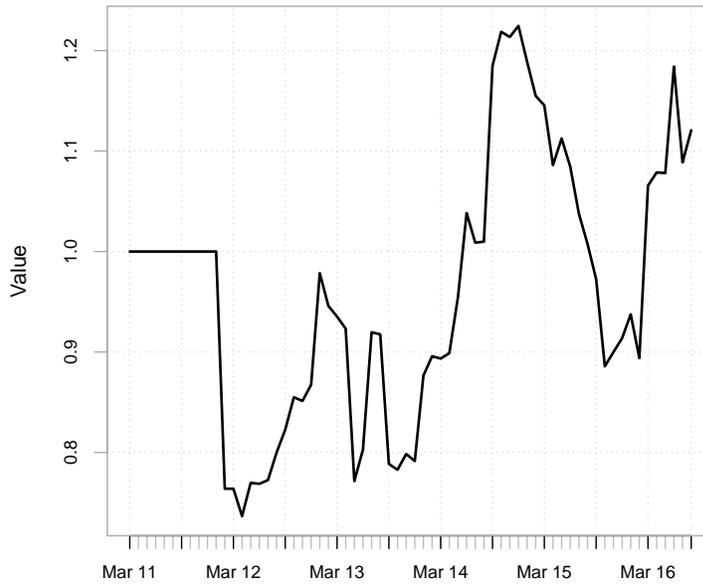
Franklin Templeton Actual Excess vs Expected Excess +/- 1 & 2 Std De



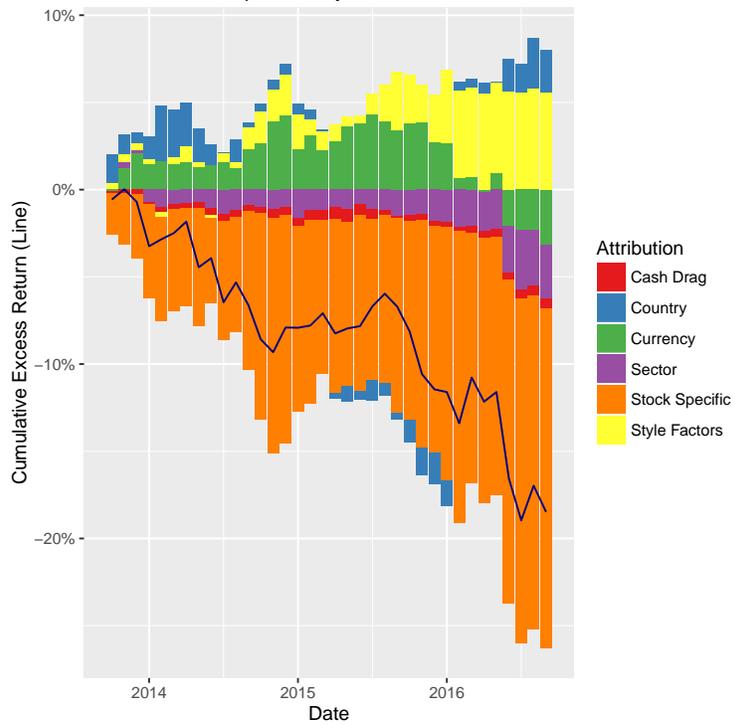
Franklin Templeton Rolling 3 year Performance



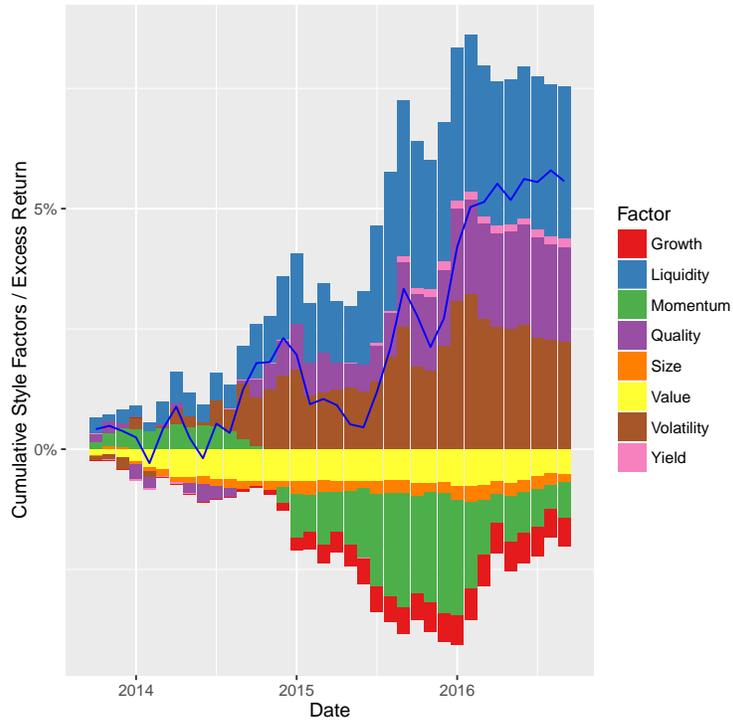
Franklin Templeton Rolling 12 Month Beta



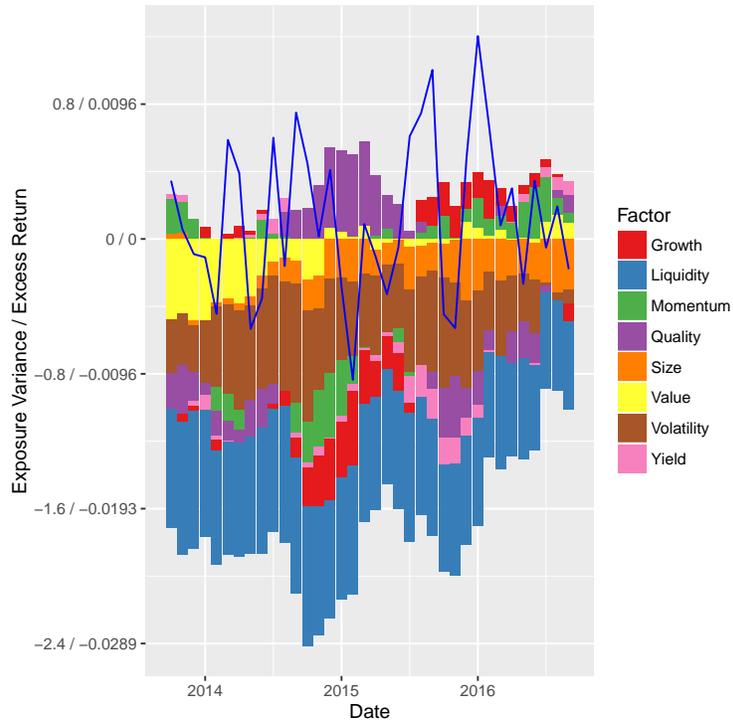
Franklin Templeton Style Factor Attribution



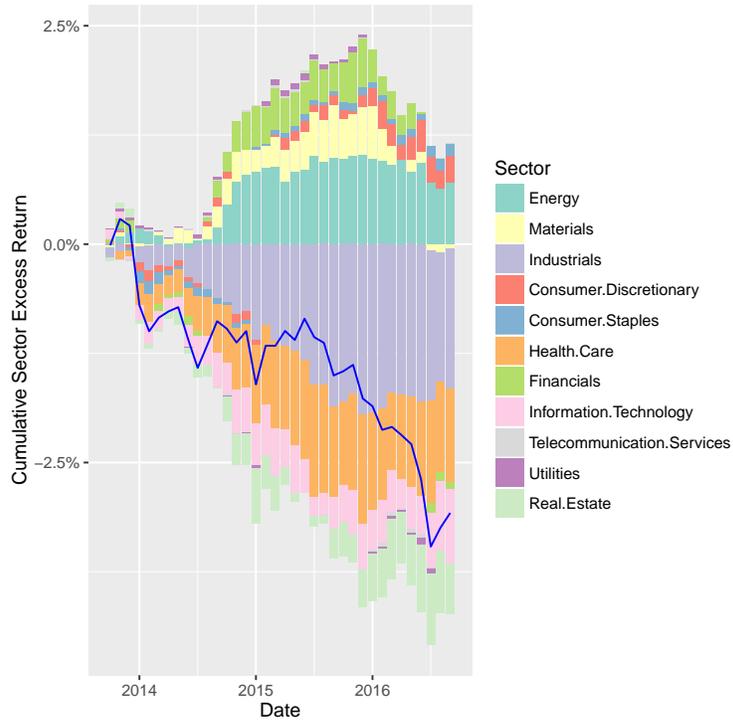
Franklin Templeton Style Factor Breakout



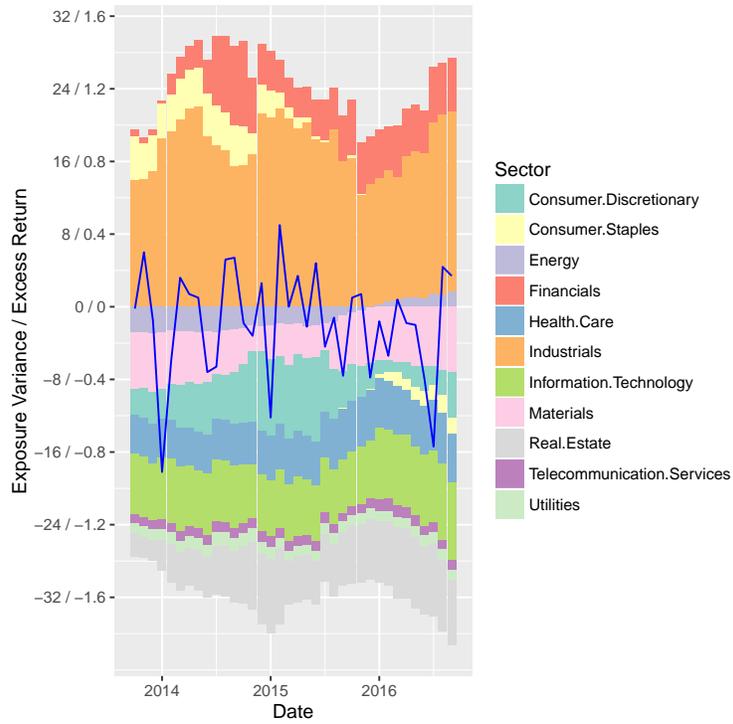
Franklin Templeton Monthly Style Factors Active Exposure



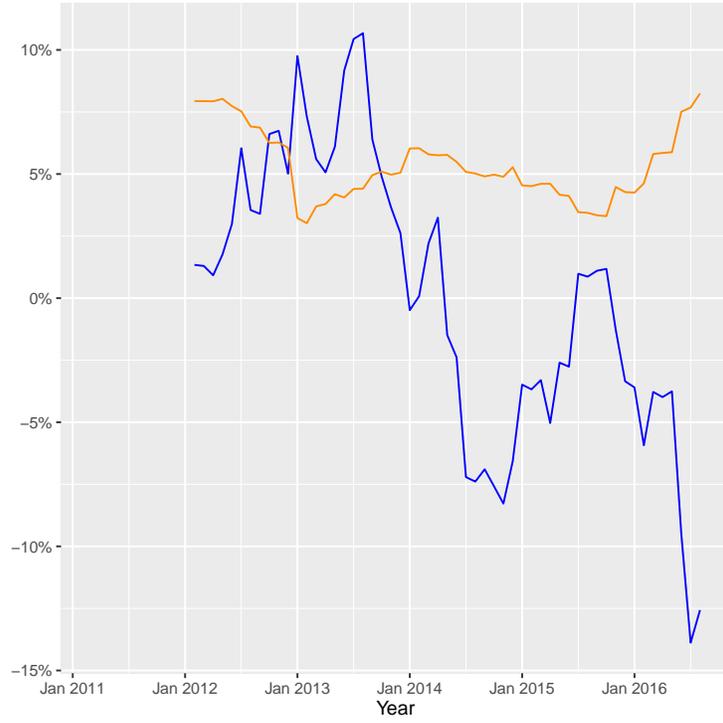
Franklin Templeton Monthly GICS Sector Return



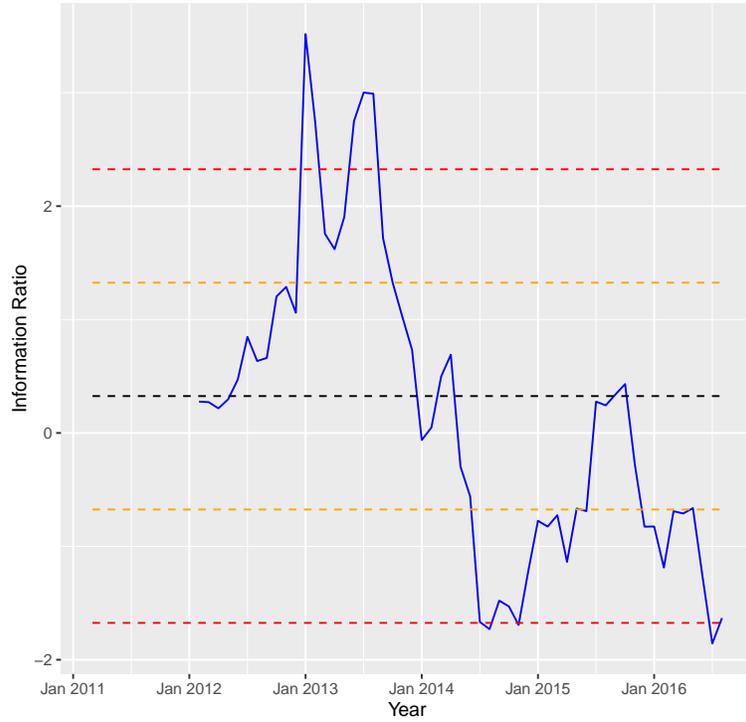
Franklin Templeton GICS Sector Active Exposure



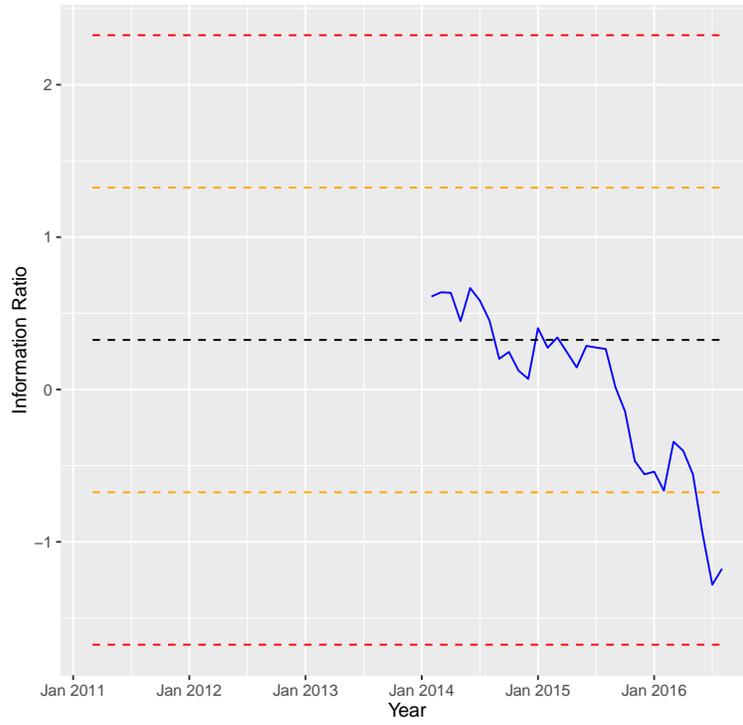
Rolling 12 Month Excess Return (Blue) & Tracking Error (Orange)



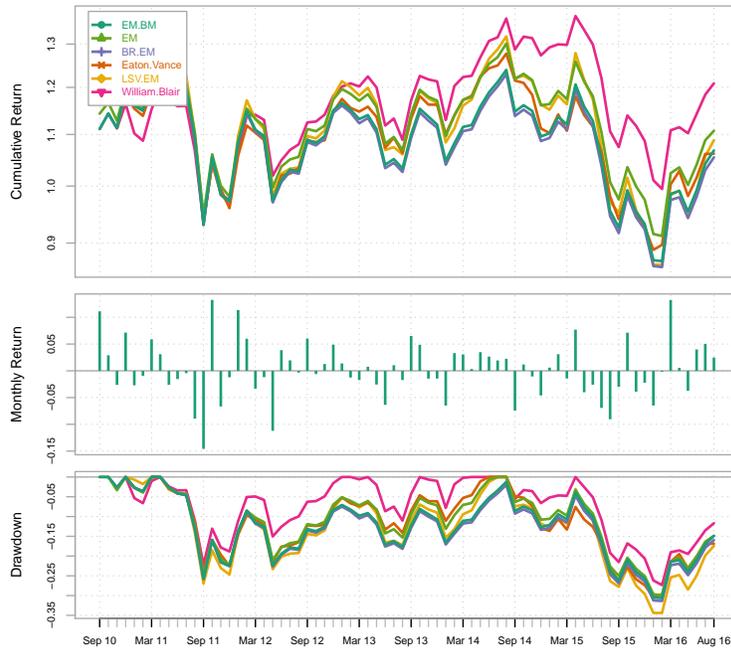
Franklin Templeton Rolling 12 Month Information Ratio



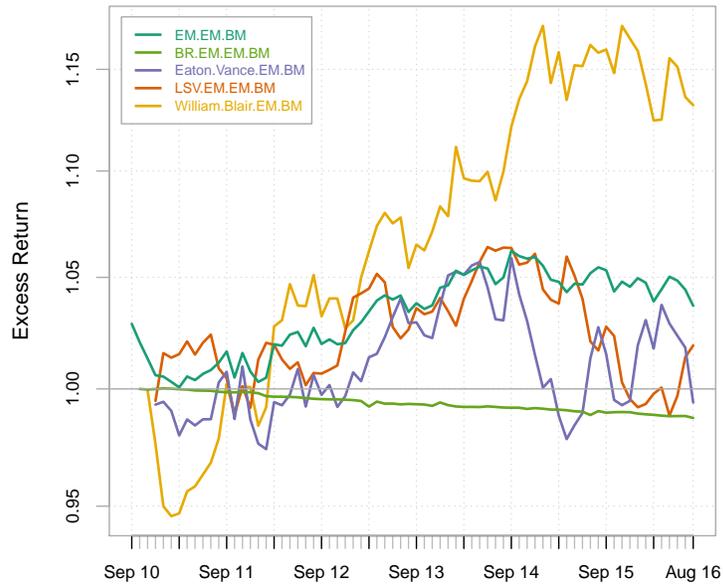
Franklin Templeton Rolling 36 Month Information Ratio



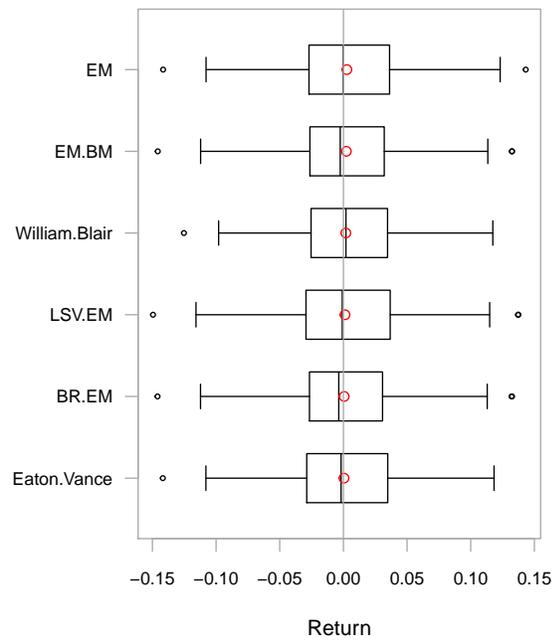
Emerging Markets Performance Summary



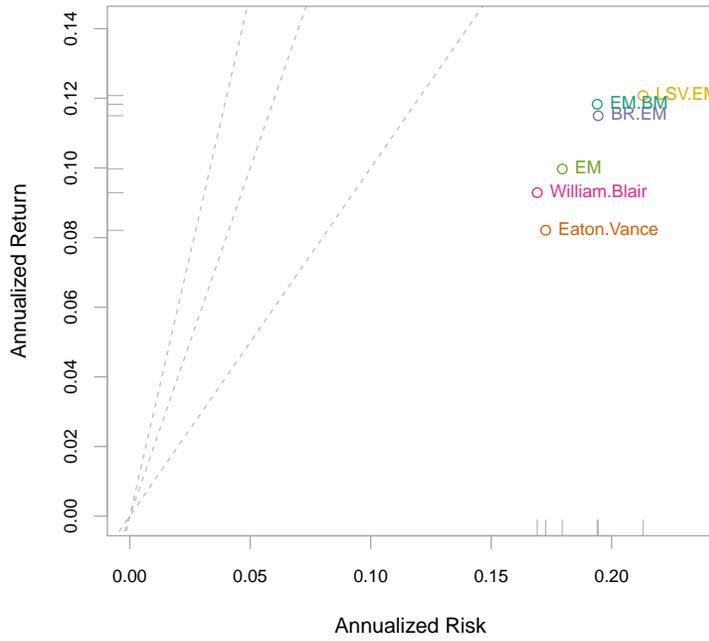
### Emerging Markets Cumulative Relative Performance



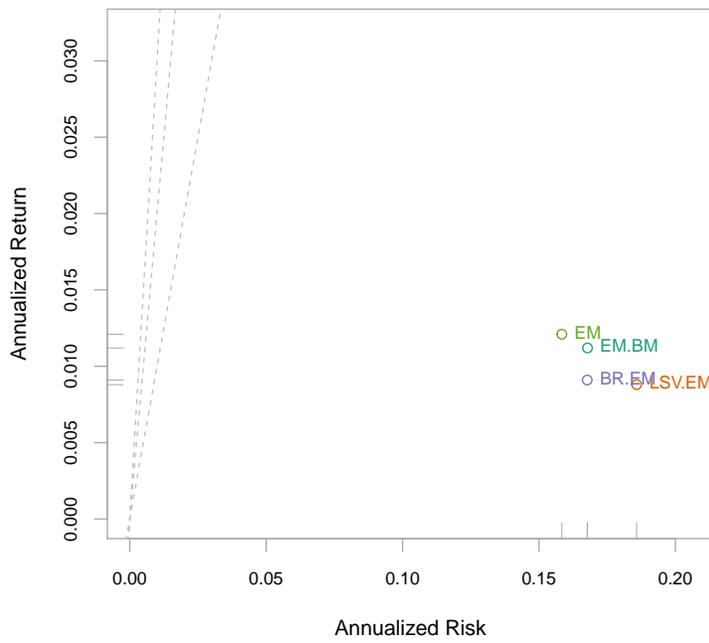
### Return Distribution Comparison



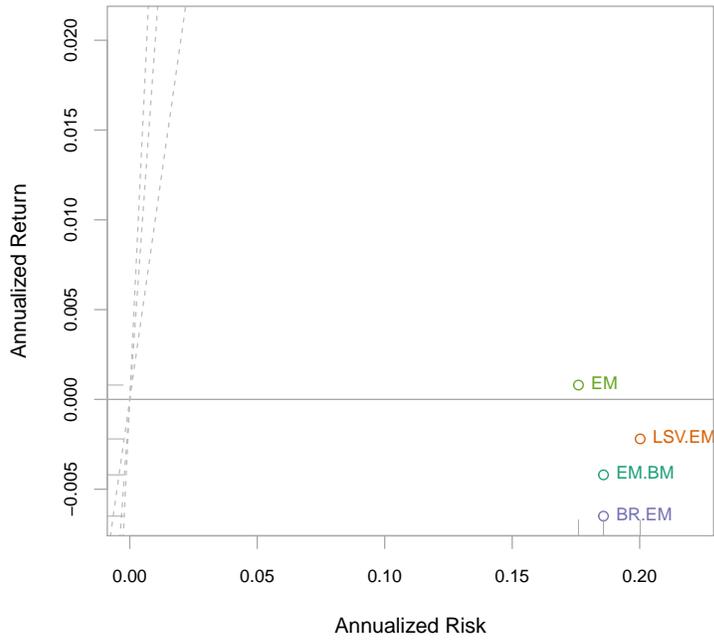
**Emerging Markets Trailing 1 Year Performance vs Sharpe Ratios (1,2,3)**



**Trailing 3 Year Performance vs Sharpe Ratios (1,2,3)**



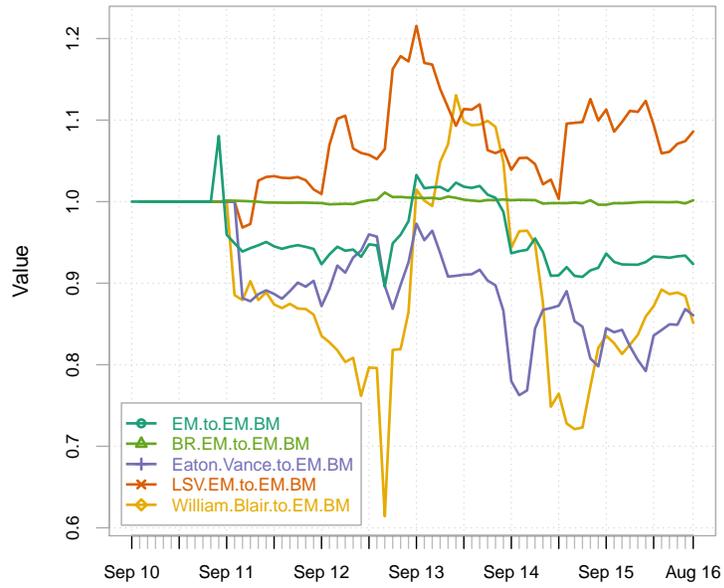
### Trailing 5 Year Performance vs Sharpe Ratios (1,2,3)



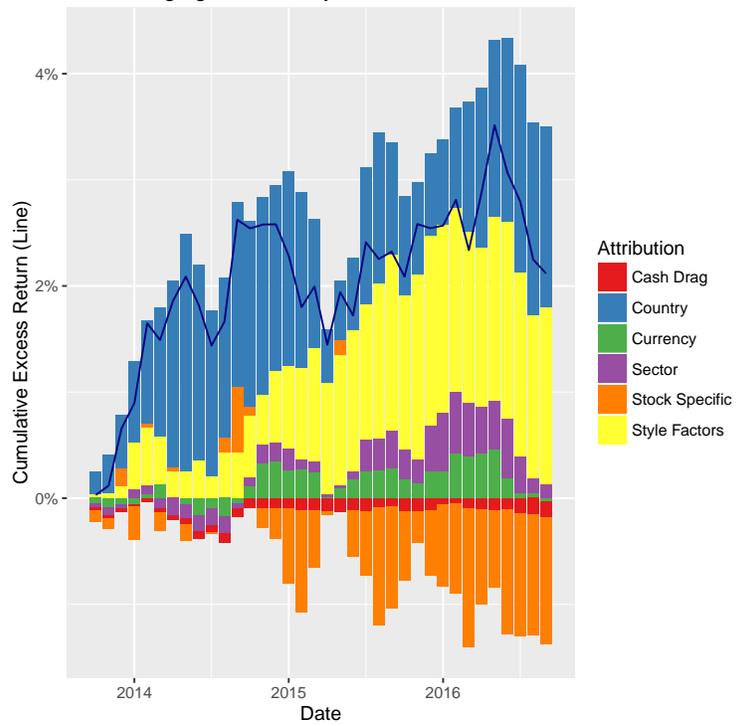
### Emerging Markets Rolling 3 Year Performance



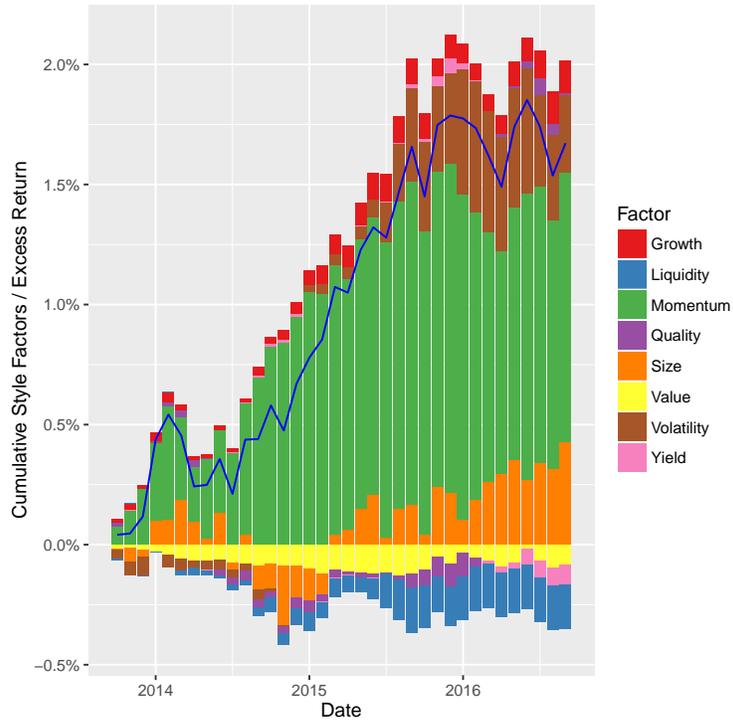
Emerging Markets Rolling 12 Month Beta



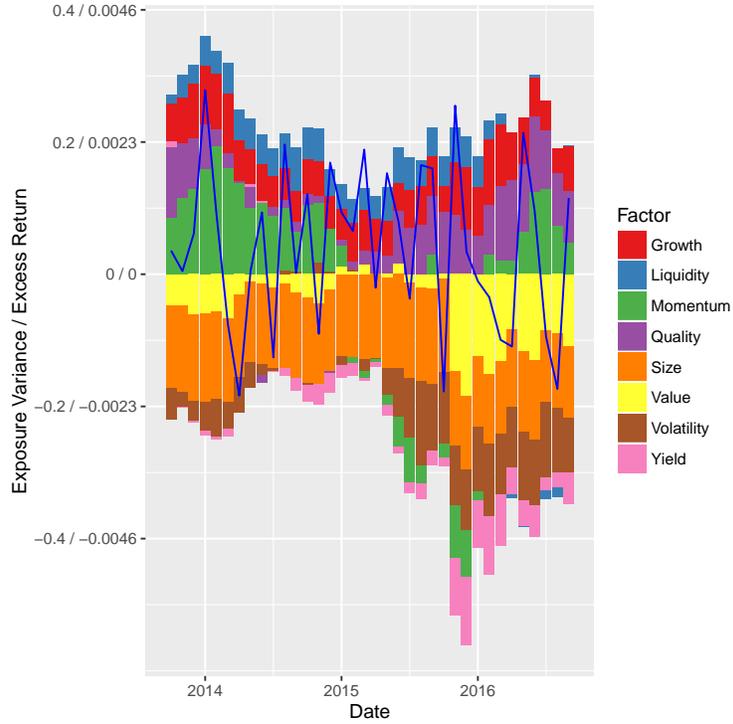
Emerging Markets Style Factor Attribution



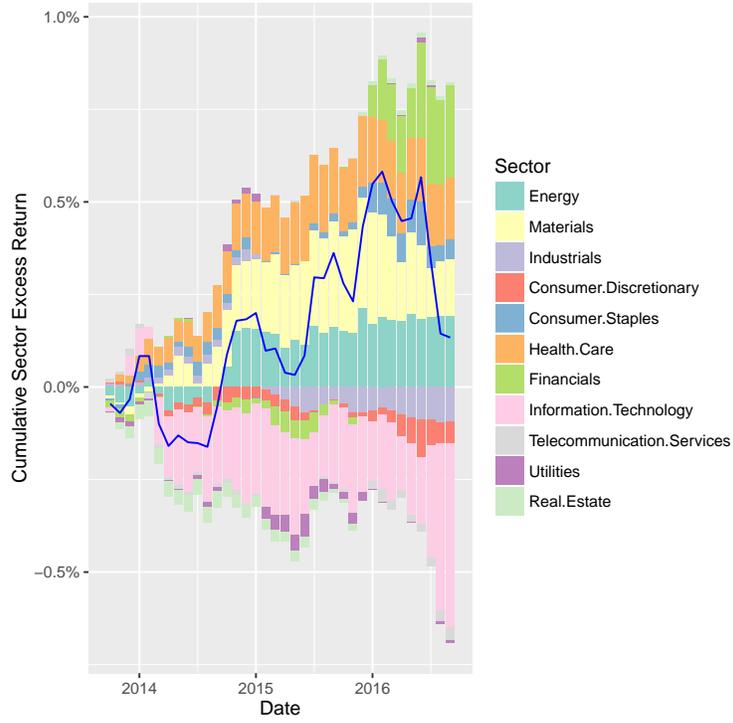
Emerging Markets Style Factor Breakout



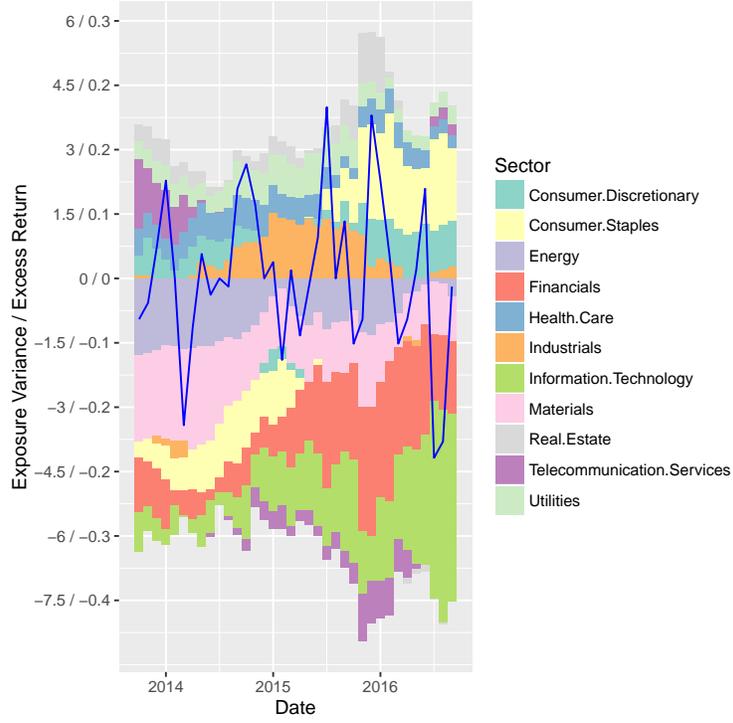
Emerging Markets Monthly Style Factors Active Exposure



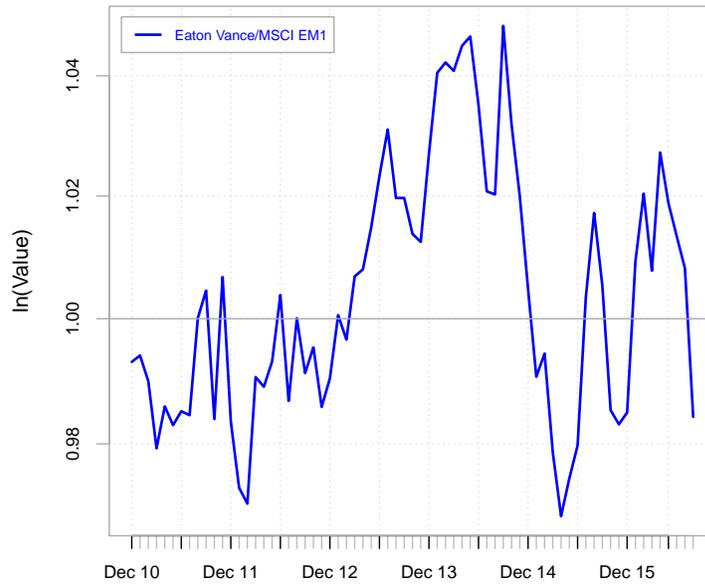
Emerging Markets Monthly GICS Sector Return



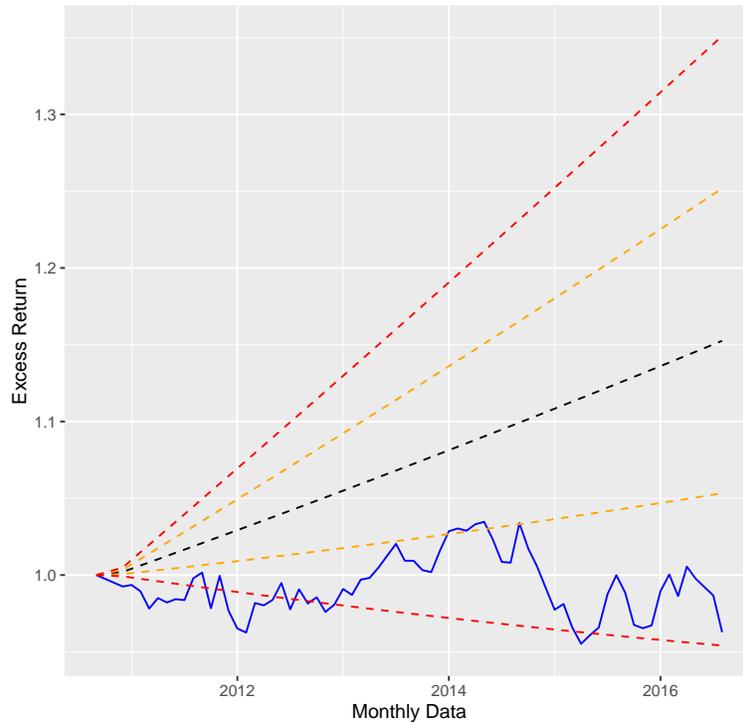
Emerging Markets GICS Sector Active Exposure



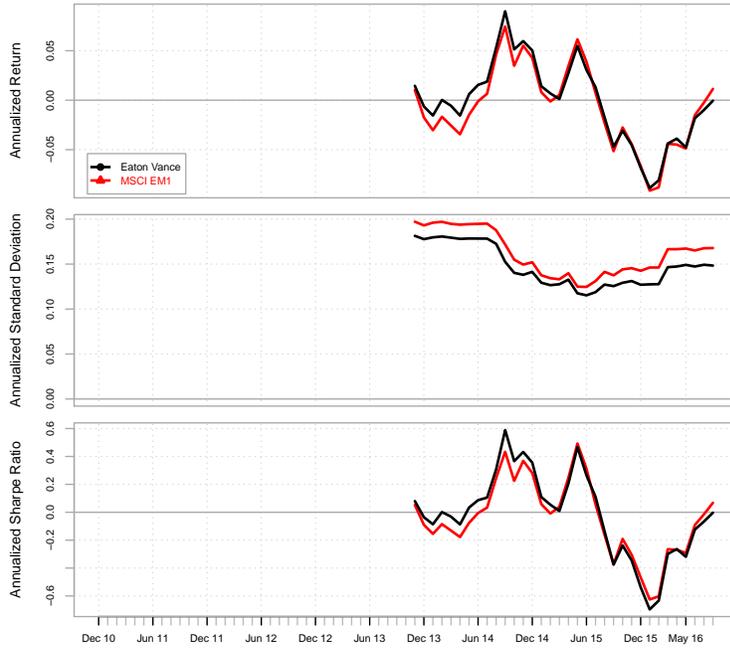
Eaton Vance Cumulative Relative Performance



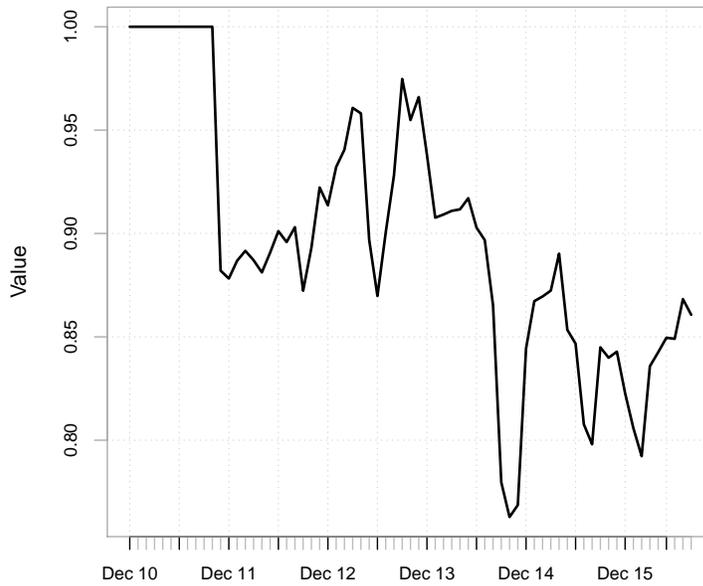
Eaton Vance Actual Excess vs Expected Excess +/- 1 & 2 Std Dev



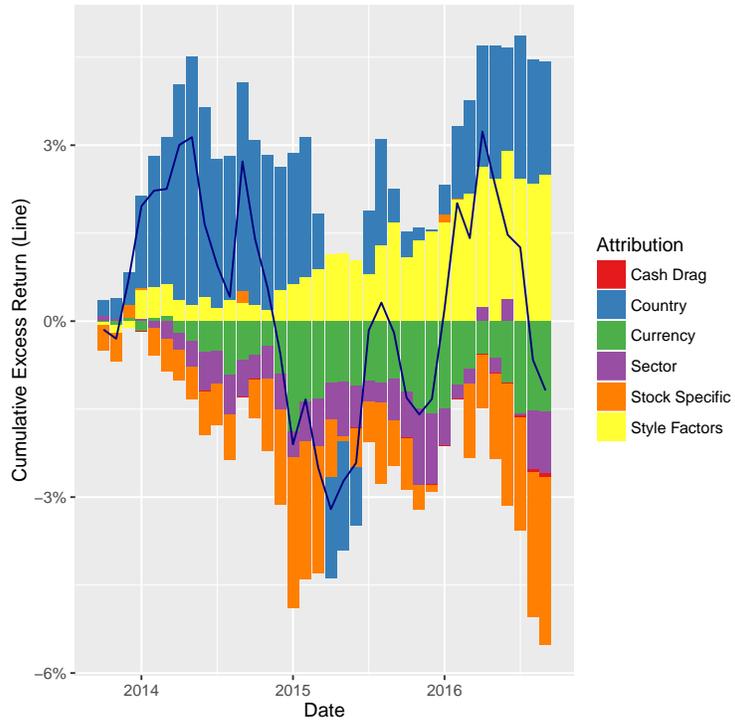
Eaton Vance Rolling 3 year Performance



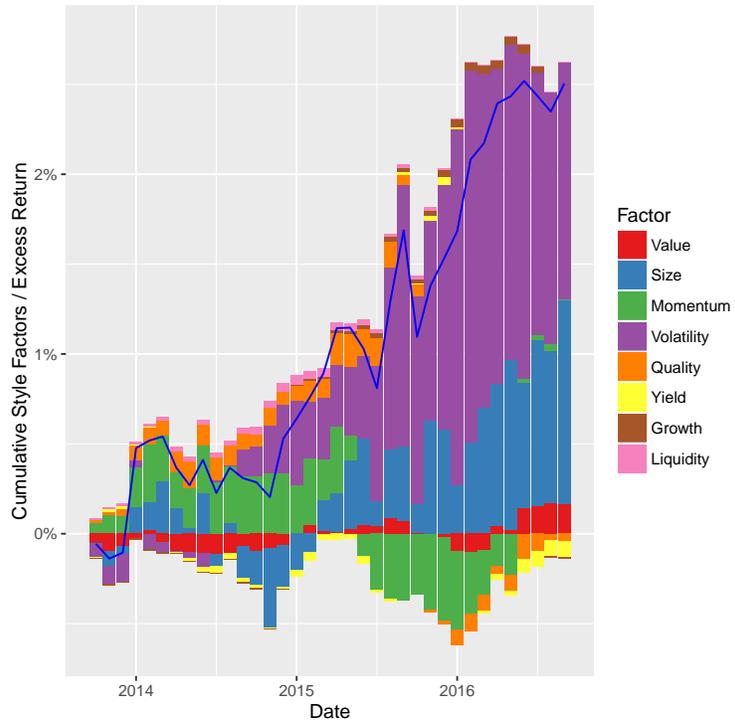
Eaton Vance Rolling 12 Month Beta



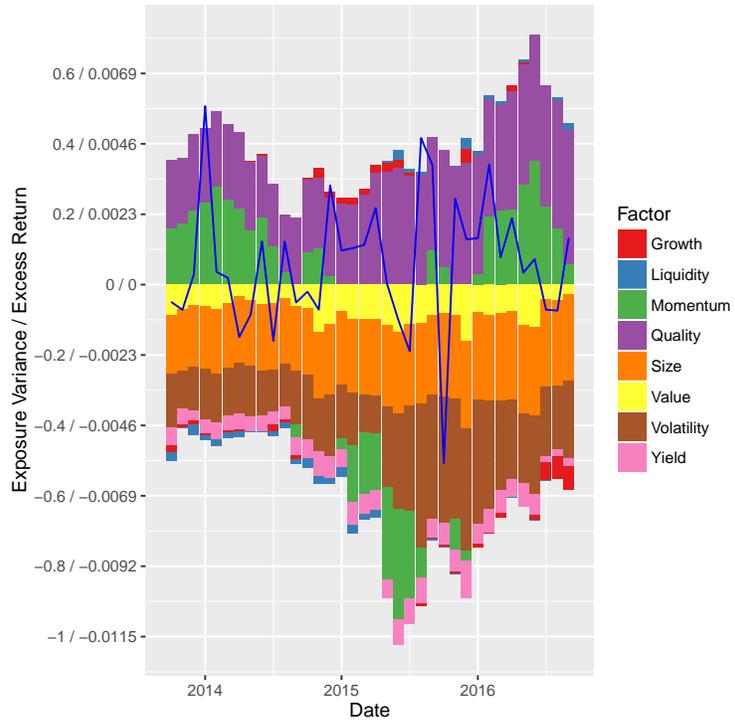
Eaton Vance Style Factor Attribution



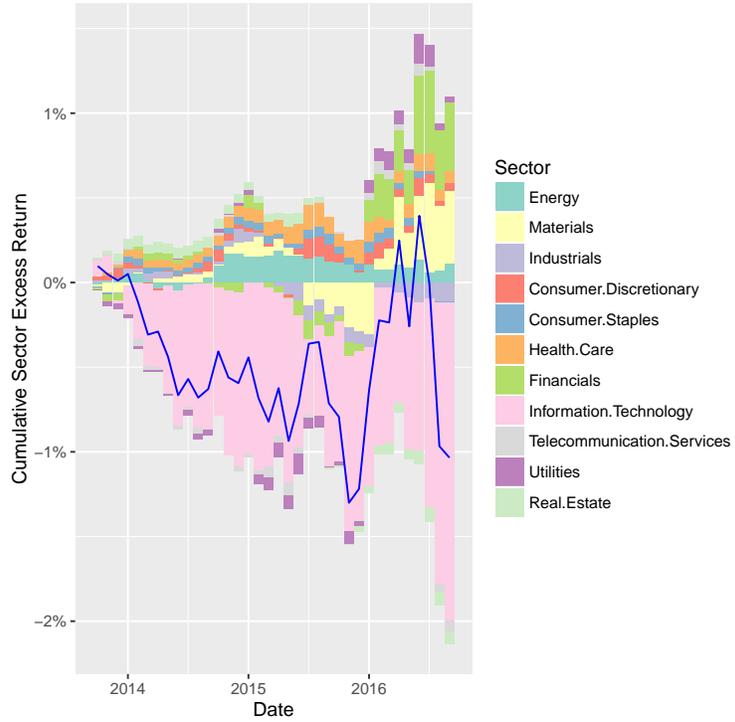
Eaton Vance Style Factor Breakout

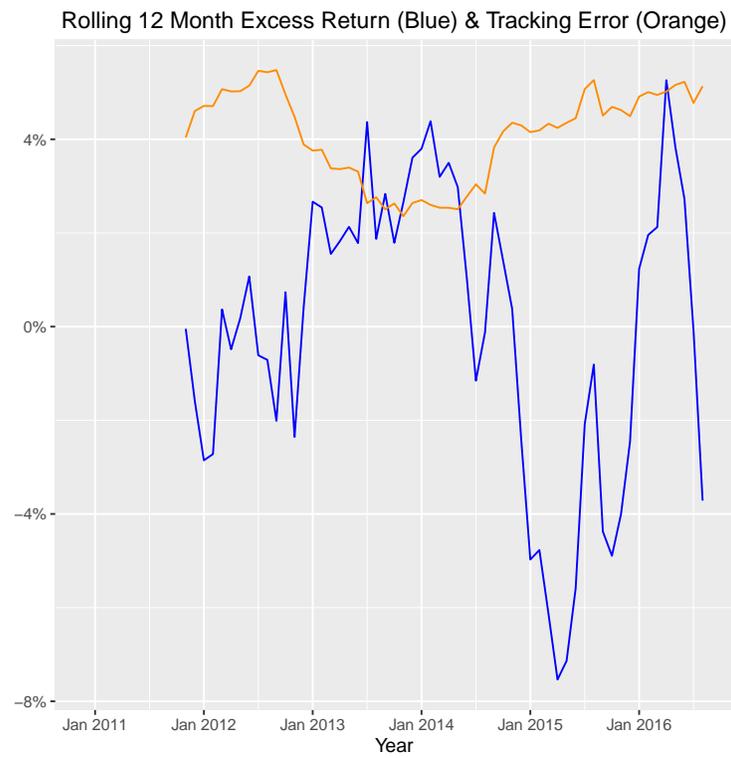
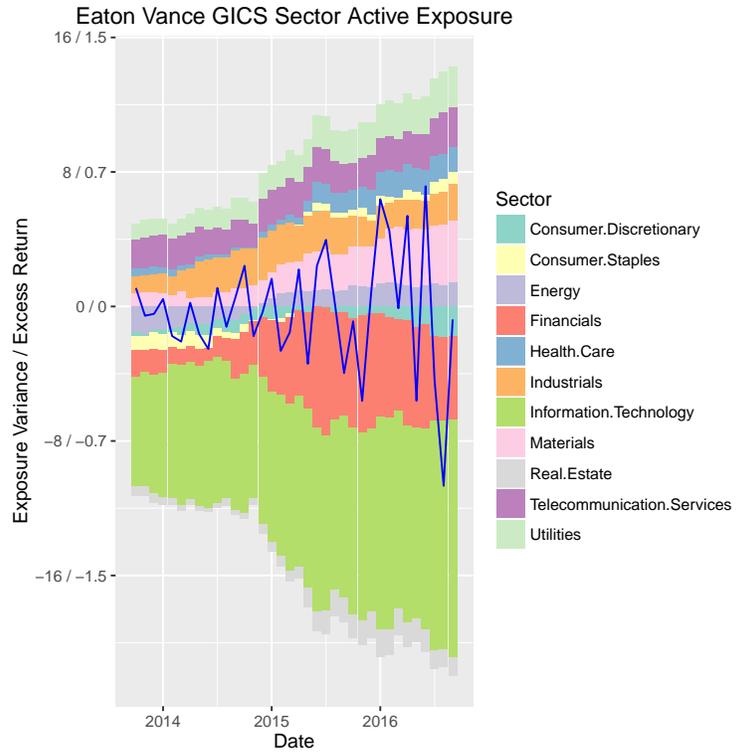


Eaton Vance Monthly Style Factors Active Exposure

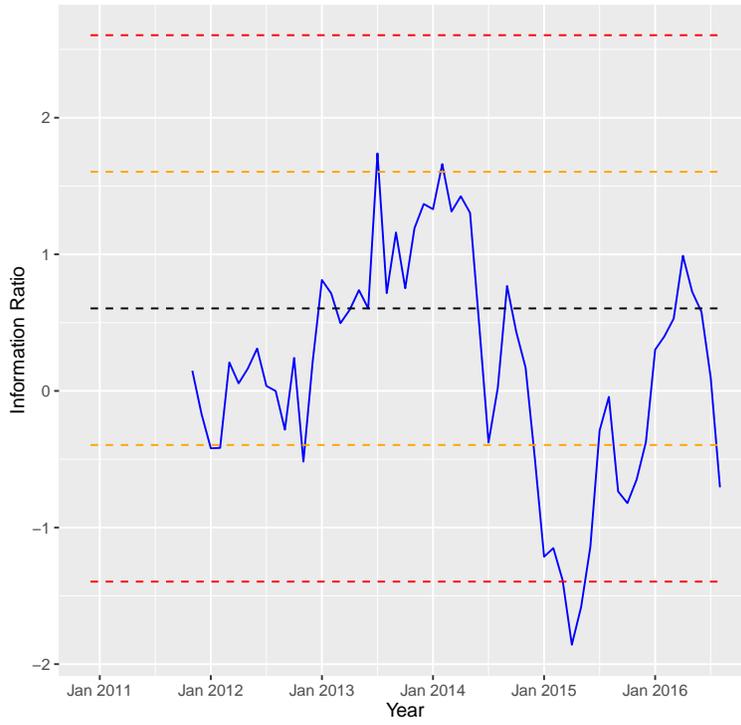


Eaton Vance Monthly GICS Sector Return

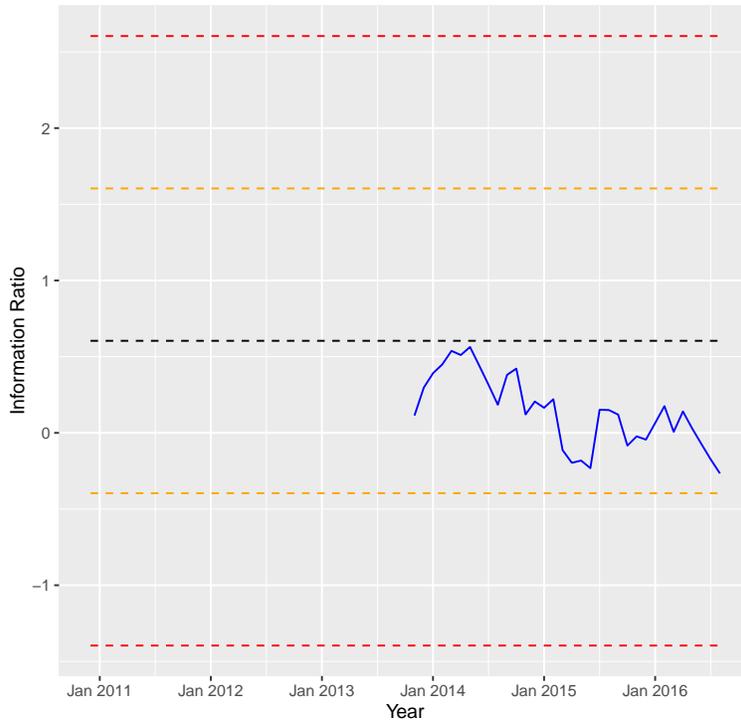




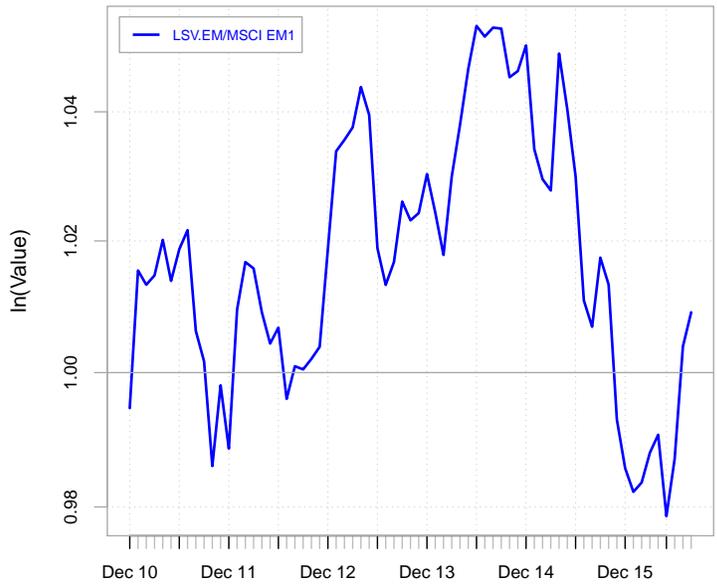
Eaton Vance Rolling 12 Month Information Ratio



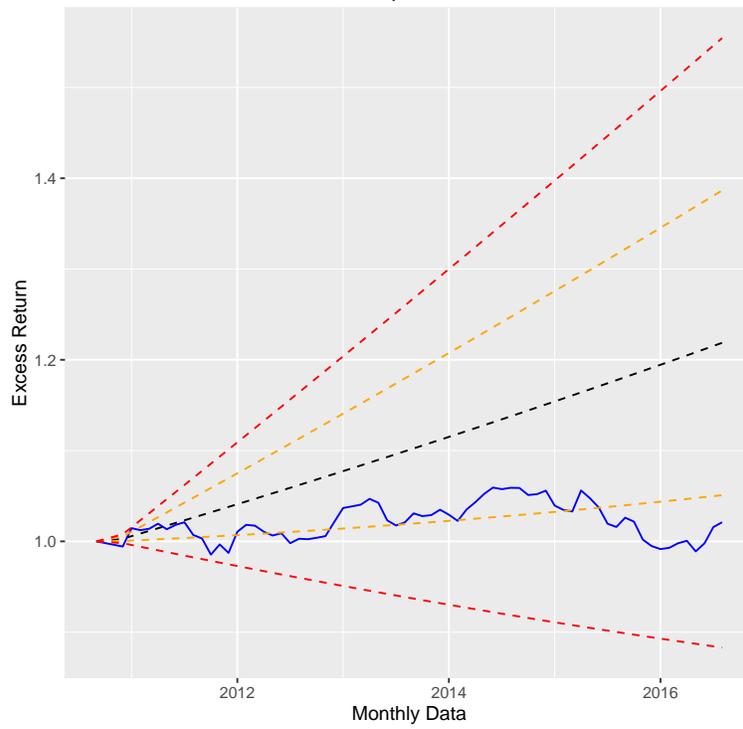
Eaton Vance Rolling 36 Month Information Ratio



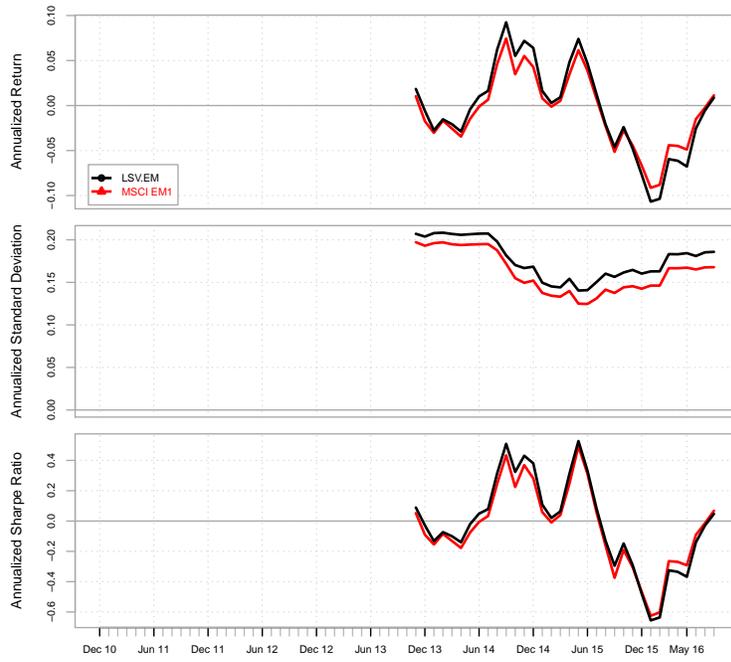
LSV.EM Cumulative Relative Performance



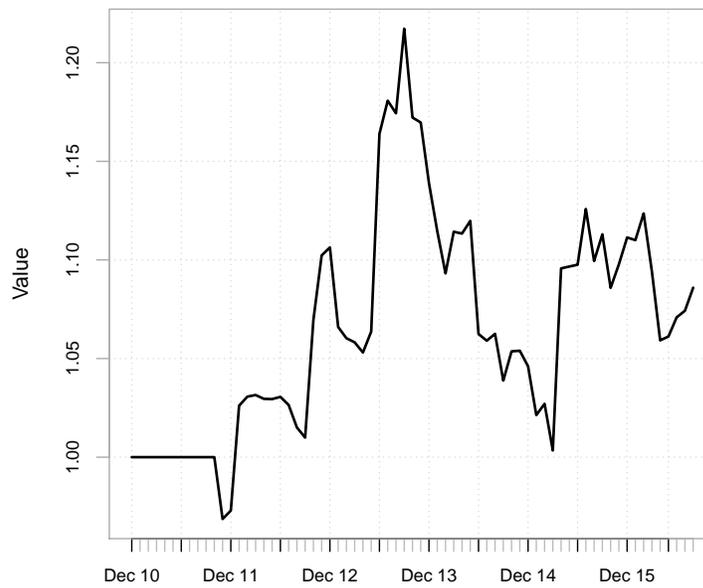
LSV.EM Actual Excess vs Expected Excess +/- 1 & 2 Std Dev



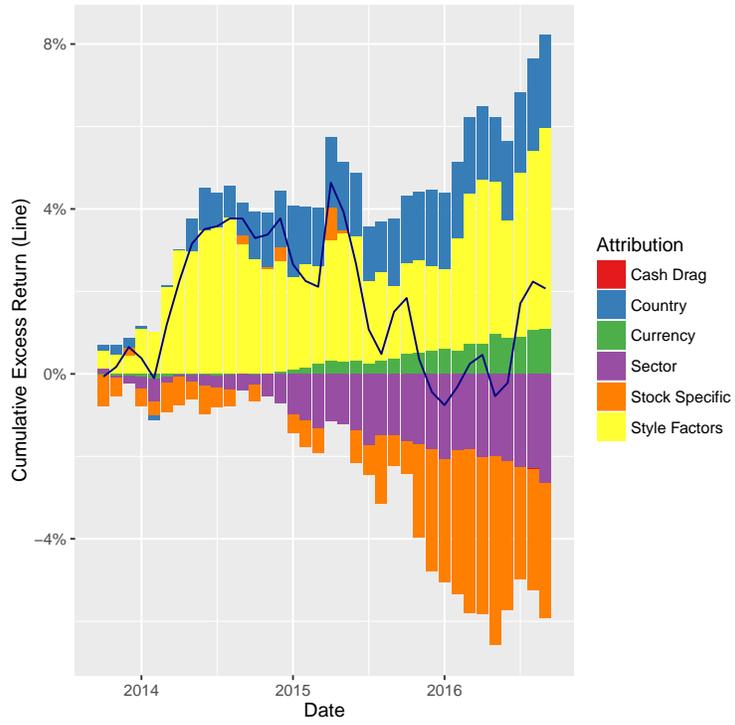
LSV.EM Rolling 3 year Performance



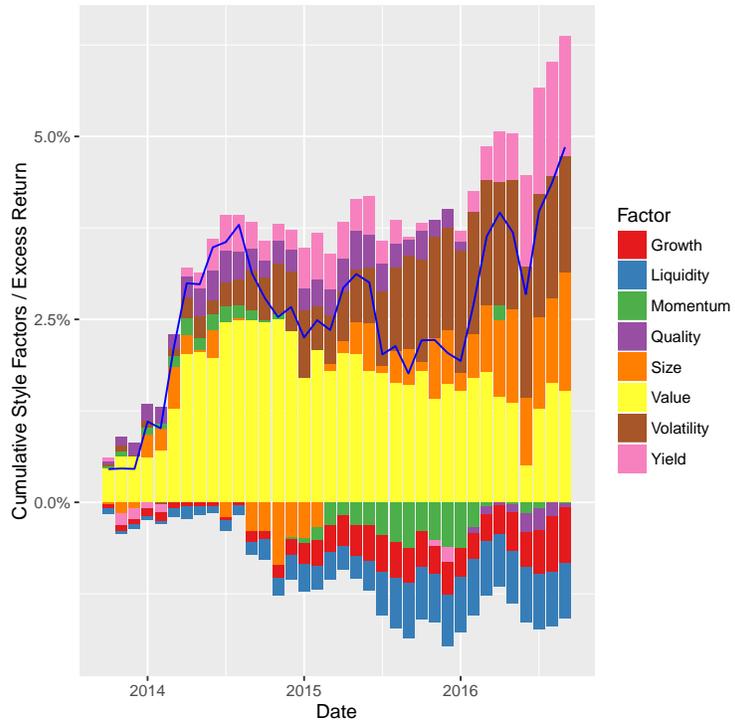
LSV.EM Rolling 12 Month Beta



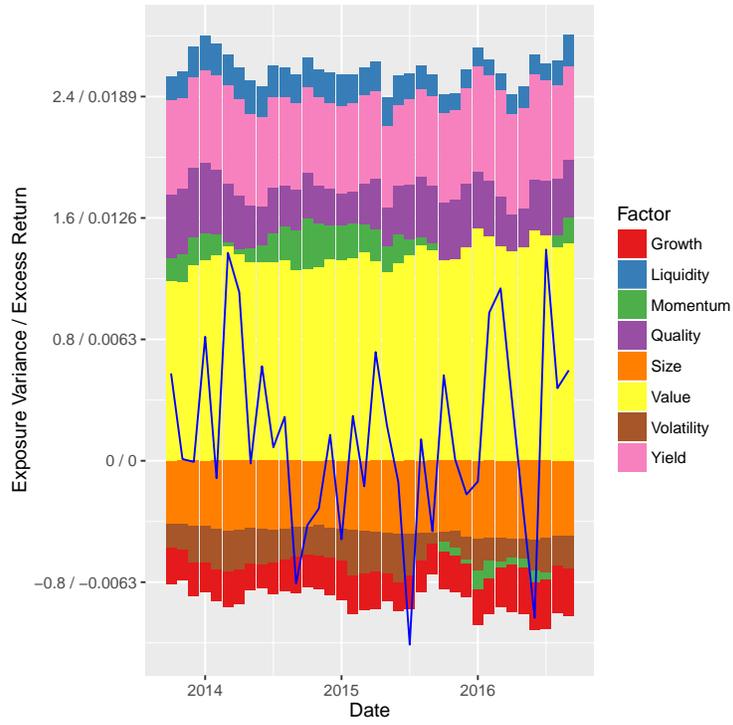
LSV.EM Style Factor Attribution



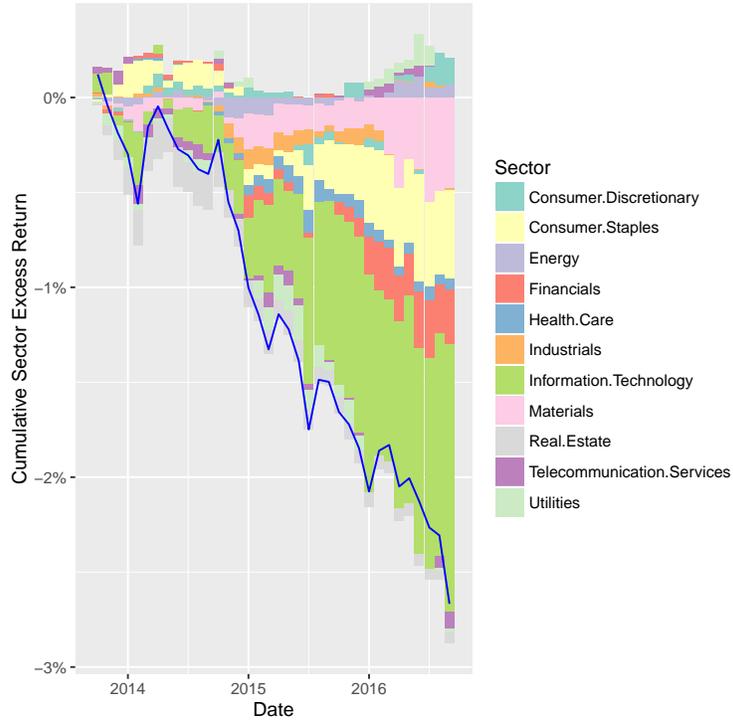
LSV.EM Style Factor Breakout



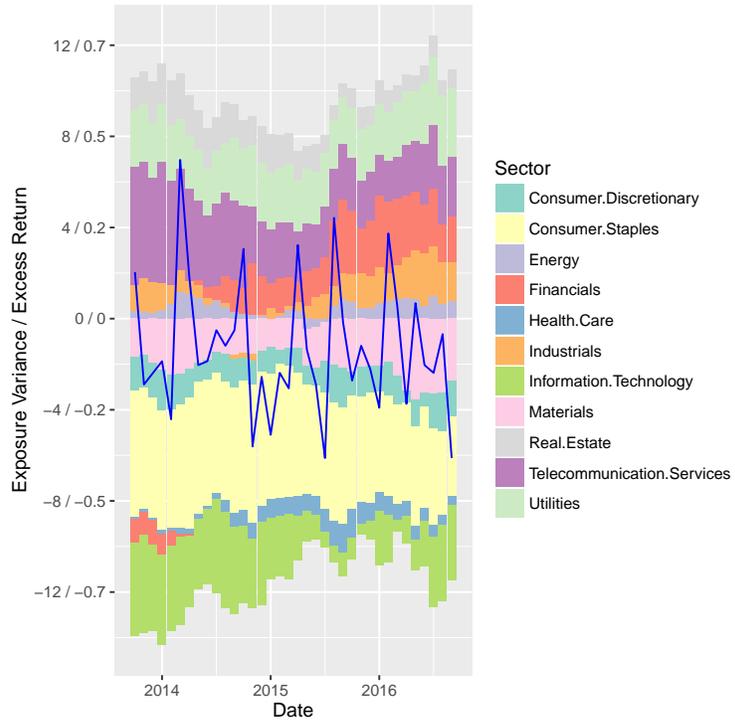
LSV.EM Monthly Style Factors Active Exposure



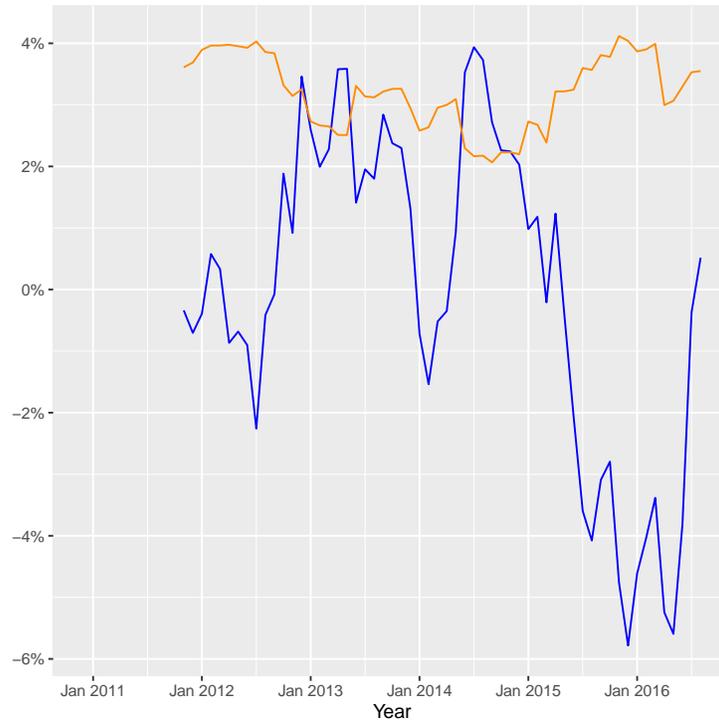
LSV.EM Monthly GICS Sector Return



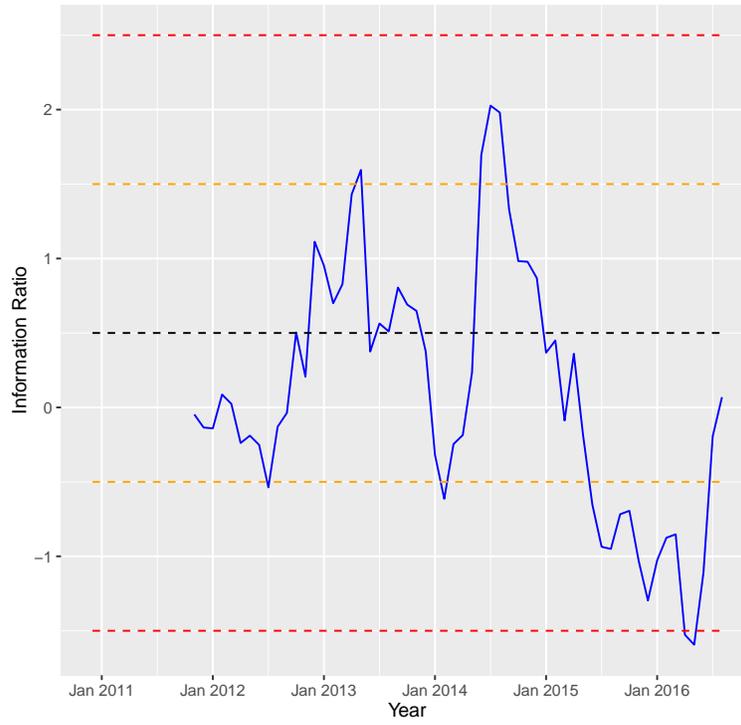
LSV.EM GICS Sector Active Exposure



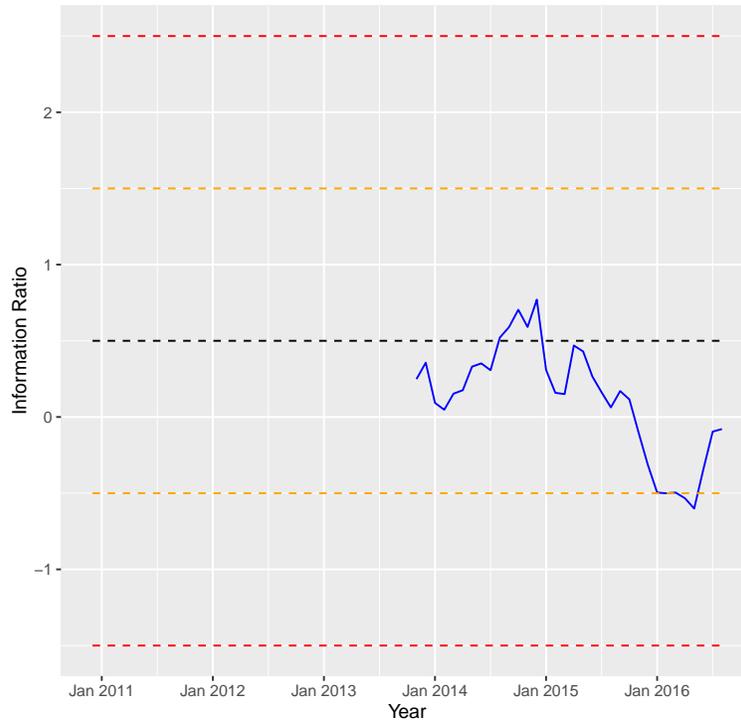
Rolling 12 Month Excess Return (Blue) & Tracking Error (Orange)



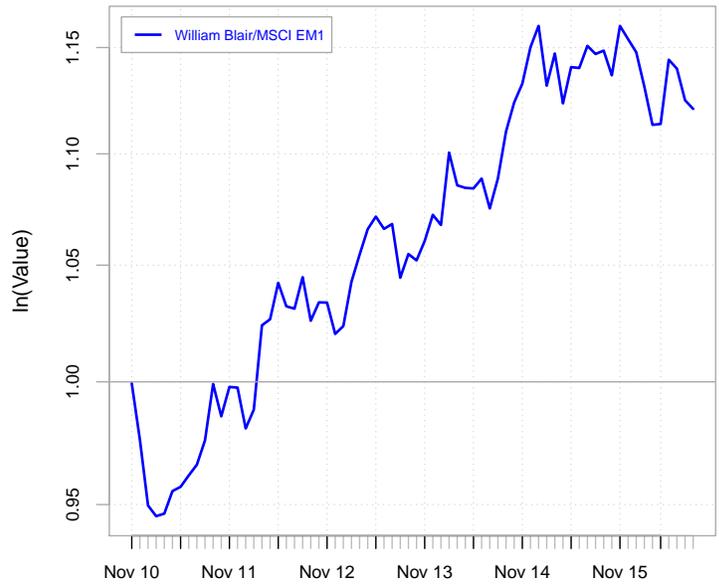
LSV.EM Rolling 12 Month Information Ratio



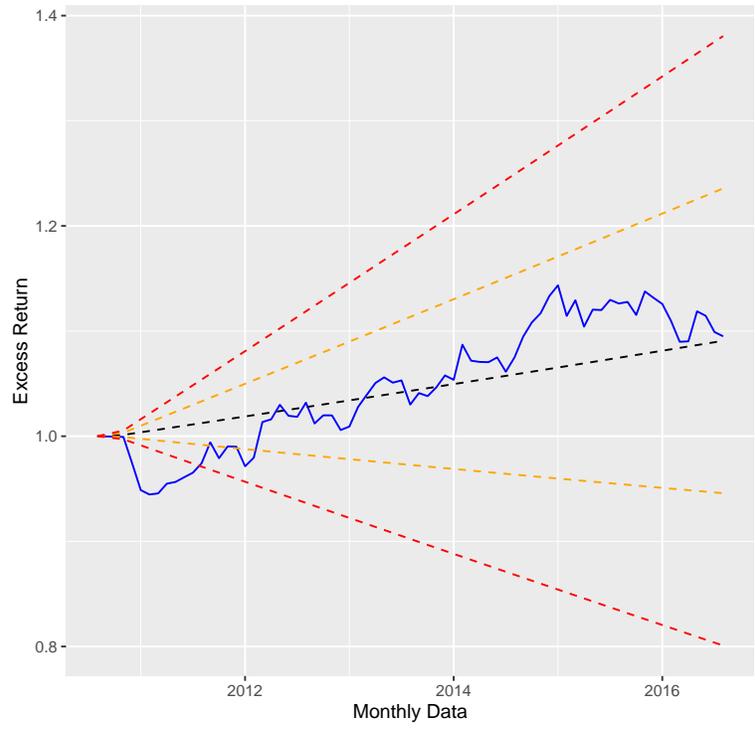
LSV.EM Rolling 36 Month Information Ratio



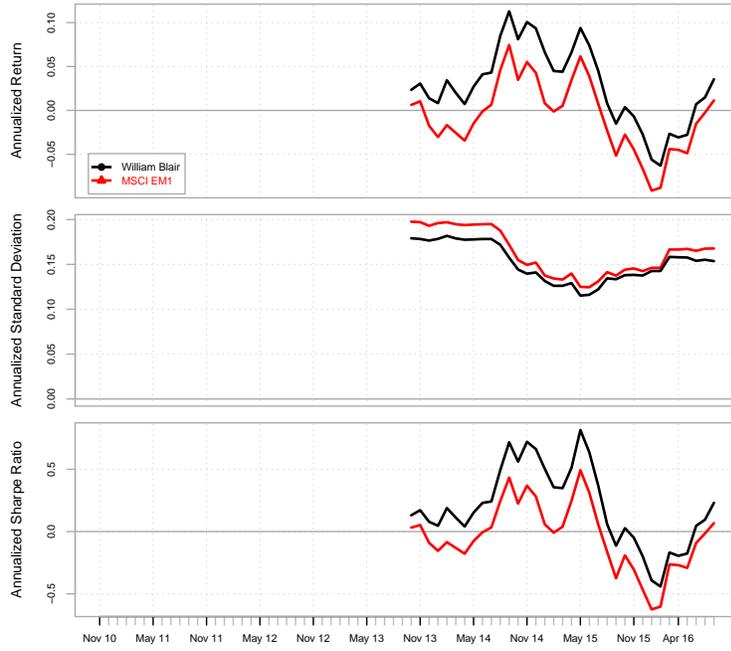
William Blair Cumulative Relative Performance



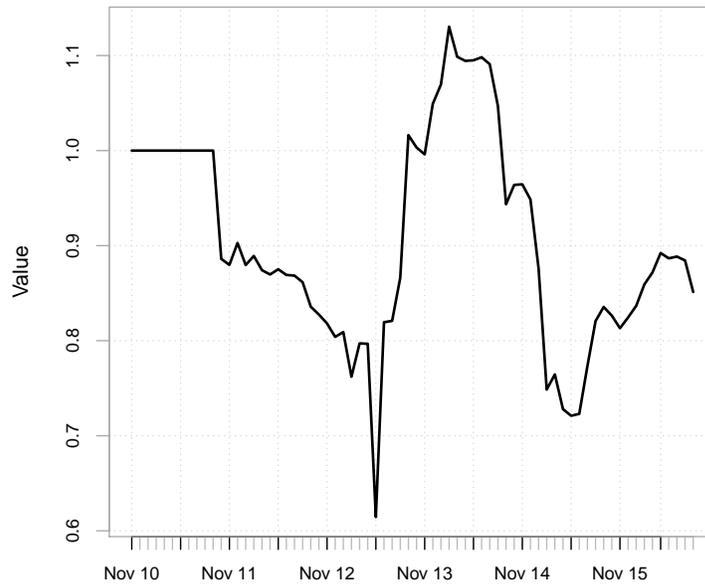
William Blair Actual Excess vs Expected Excess +/- 2 Std Dev



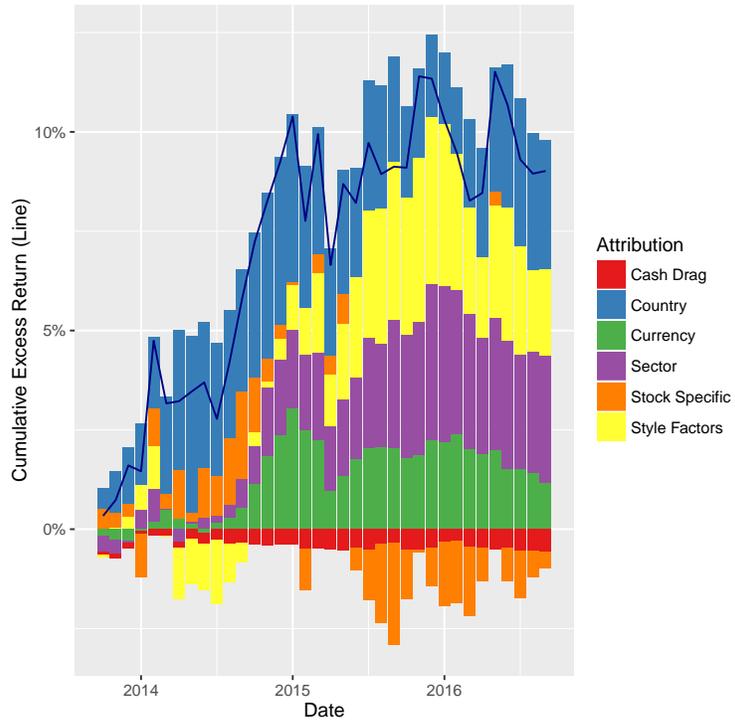
William Blair Rolling 3 year Performance



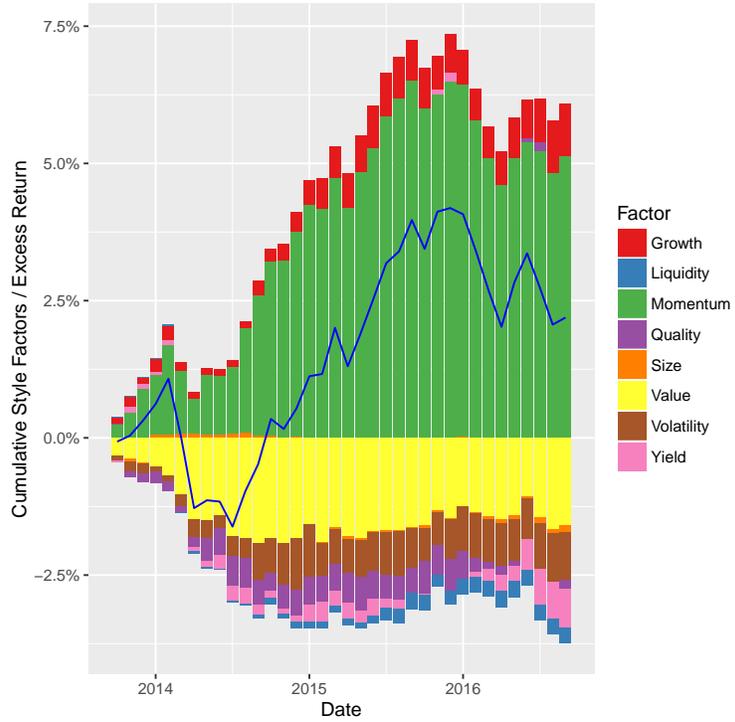
William Blair Rolling 12 Month Beta



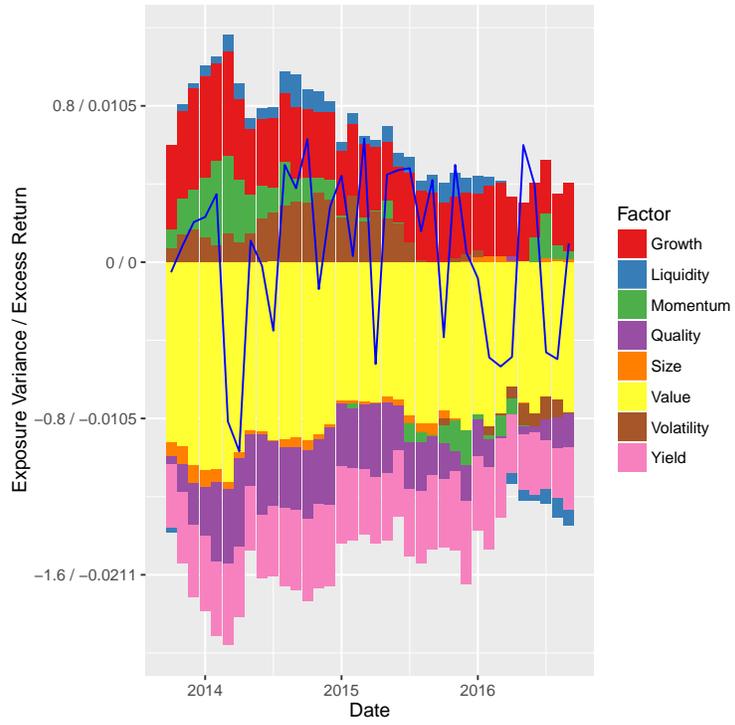
William Blair Style Factor Attribution



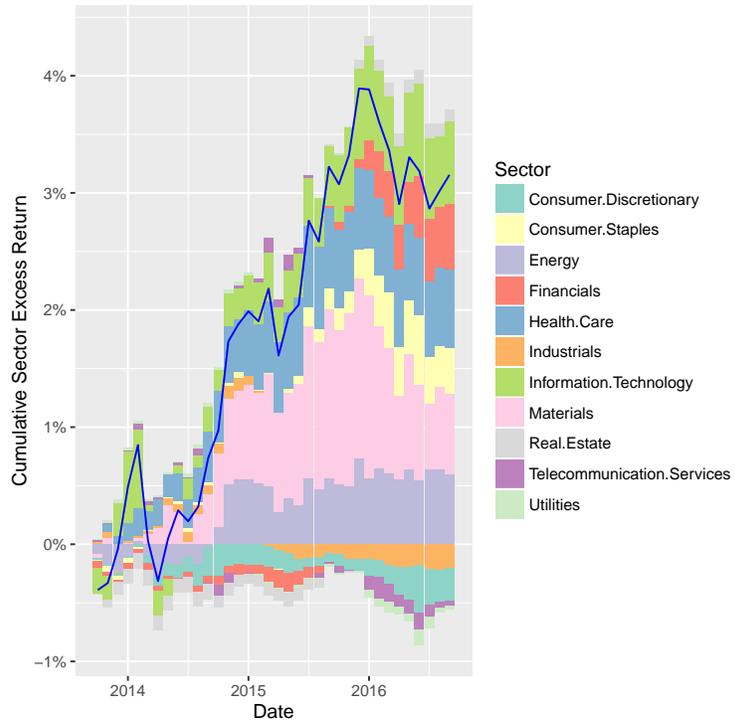
William Blair Style Factor Breakout



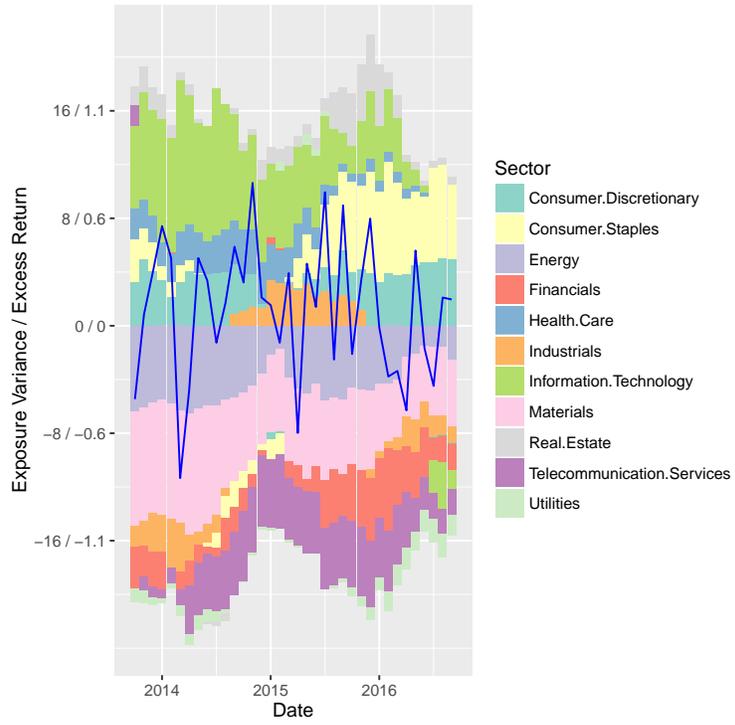
William Blair Monthly Style Factors Active Exposure



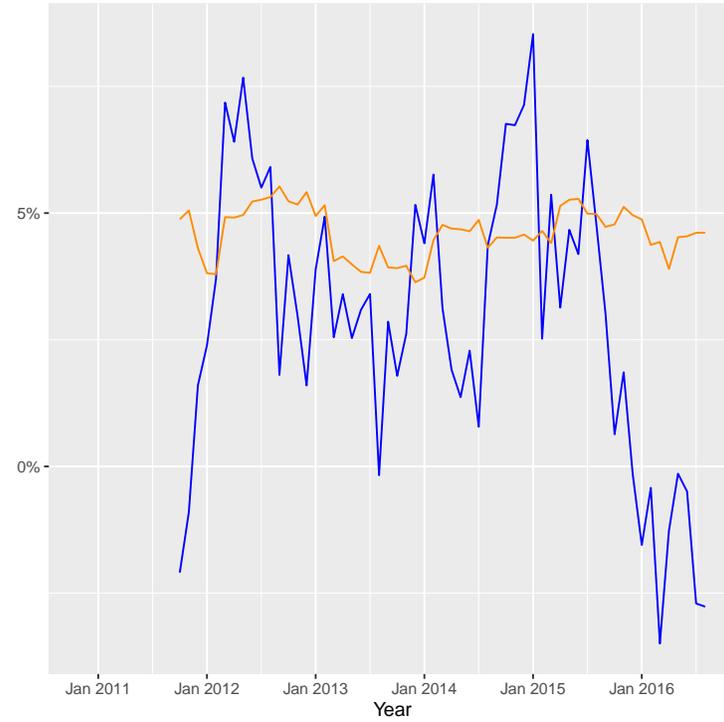
William Blair Monthly GICS Sector Return



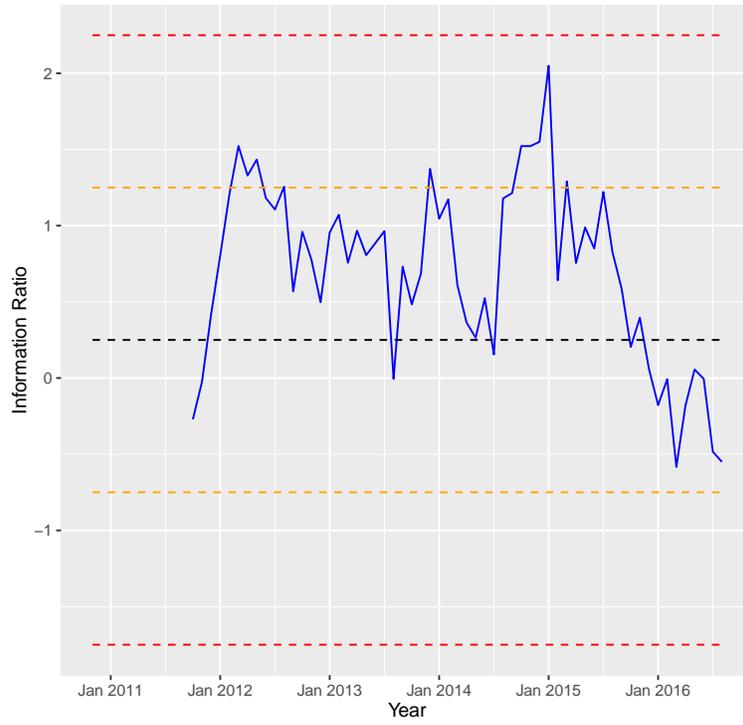
William Blair GICS Sector Active Exposure



Rolling 12 Month Excess Return (Blue) & Tracking Error (Orange)



William Blair Rolling 12 Month Information Ratio



William Blair Rolling 36 Month Information Ratio



**Confidential  
Meeting  
Materials  
Removed**

# Agenda Item #5

# Executive Presentation

**To: Arizona State Retirement System**  
**truView Risk Report August 31, 2016**

**Produced by State Street Global Exchange, Risk Services**

## Monthly Reallocation Summary\*

Month Ending September 30, 2016

### Portfolio Reductions

- TOTAL DOMESTIC EQUITY
  - \$2.3M – E2 (Large Cap)
  - \$2.2M – E7 (Large Cap)
  - \$2.2M – E8 (Large Cap)
  - \$1.0M – E3 (Mid Cap)
  - \$74.8M – EQUITY TRANSITION
- TOTAL CASH
  - \$189.0 – CASH-ASSETIZED
- **TOTAL REDUCTIONS\*\***
  - **\$271M**

### Portfolio Additions

- TOTAL DOMESTIC EQUITY
  - \$.4M – E4 (Mid Cap)
- TOTAL OPPORTUNISTIC EQUITY
  - \$75M – TORTOISE CAP ADVISORS
- **TOTAL ADDITIONS\*\***
  - **\$75M**

\*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 August 31, 2016

### Portfolio Reductions

- TOTAL DOMESTIC EQUITY
  - \$13.4M – E2 (Large Cap)
  - \$1.5M – E7 (Large Cap)
  - \$.6M – E8 (Large Cap)
  - \$3.0M – E4 (Mid Cap)
  - \$2.2M – E6 (Small Cap)
  - \$74.9M – EQUITY TRANSITION
- TOTAL CASH
  - \$61.1M – CASH-ASSETIZED
- **TOTAL REDUCTIONS\*\***
  - **\$157.6M**

### Portfolio Additions

- TOTAL DOMESTIC EQUITY
  - \$1.2M – E3 (Mid Cap)
- TOTAL OPPORTUNISTIC EQUITY
  - \$75M – TORTOISE CAP ADVISORS
- **TOTAL ADDITIONS\*\***
  - **\$76.2M**

\*Based on State Street accounting records for public markets and therefore exclude private market drawdowns.

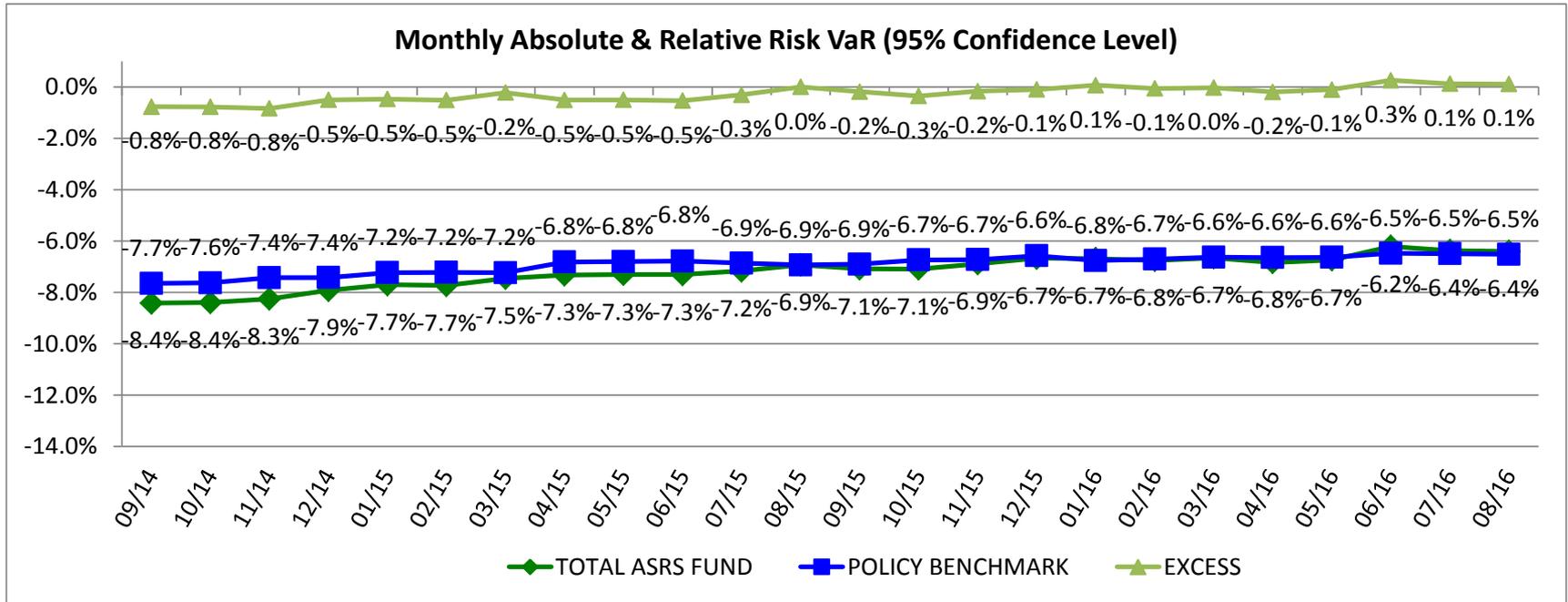
\*\*Reductions and additions do not include plan distributions.

# Monthly Risk Summary

Month Ending August 31, 2016

## Month-end Risk Profile

- Historical Risk (95% VaR) for all asset classes remain relatively constant from prior months. In aggregate, Total Plan risk increased 3 bps as the asset allocation remained largely the same over prior month. The increase in risk tracks the identical shift from the Policy Benchmark.
- Surplus risk under the Policy Benchmark is now 12 bps.



ARIZONA STATE RETIREMENT SYSTEM

As of August 31, 2016

TOTAL PLAN EXPOSURE OVERVIEW

Sector (Public US Equity Only)	\$ Value	% Value	**Blended US BM	Difference
CONSUMER NON-CYCLICAL	\$ 1,987,355,353	22.5%	23.9%	(1.4%)
FINANCIAL	\$ 1,489,607,143	16.9%	17.4%	(0.5%)
TECHNOLOGY	\$ 1,036,824,359	11.7%	13.2%	(1.5%)
INDUSTRIAL	\$ 911,338,290	10.3%	9.7%	0.6%
CONSUMER CYCLICAL	\$ 855,314,732	9.7%	9.9%	(0.2%)
COMMUNICATIONS	\$ 818,469,596	9.3%	13.0%	(3.7%)
FUNDS	\$ 594,381,183	6.7%	0.0%	6.7%
ENERGY	\$ 525,937,692	6.0%	7.0%	(1.1%)
UTILITIES	\$ 316,579,100	3.6%	3.2%	0.3%
BASIC MATERIALS	\$ 233,978,719	2.7%	2.5%	0.1%
CASH	\$ 52,008,315	0.6%	0.0%	0.6%
GOVERNMENT	\$ 3,880,890	0.0%	0.0%	0.0%
DIVERSIFIED	\$ 1,566,623	0.0%	0.0%	(0.0%)
INDEX	\$ 759,191	0.0%	0.0%	0.0%
<b>GRAND TOTAL</b>	<b>\$ 8,828,001,185</b>	<b>100.0%</b>	<b>100.0%</b>	<b>0.0%</b>

Country Category (Total Plan)	\$ Value	% Value	*Blended TOTAL BM	Difference
NORTH AMERICA	\$ 26,756,752,774	77.4%	67.0%	10.4%
EUROPE DEVELOPED	\$ 4,395,126,162	12.7%	16.8%	(4.1%)
ASIA DEVELOPED	\$ 2,085,968,890	6.0%	9.9%	(3.9%)
ASIA EM	\$ 811,617,072	2.3%	4.2%	(1.8%)
LATIN AMERICA	\$ 279,470,502	0.8%	1.1%	(0.3%)
AFRICA	\$ 99,872,536	0.3%	0.5%	(0.2%)
MIDDLE EAST	\$ 93,764,339	0.3%	0.3%	(0.1%)
EUROPE EM	\$ 42,824,659	0.1%	0.1%	(0.0%)
<b>GRAND TOTAL</b>	<b>\$ 34,565,396,933</b>	<b>100.0%</b>	<b>100.0%</b>	<b>0.0%</b>

Market Cap^ (Public Equities Only)	\$ Value	% Value	*Blended TOTAL BM	Difference
1) 0 - 100M	\$ 1,882,510	0.0%	0.0%	0.0%
2) 100M - 500M	\$ 245,533,775	1.5%	0.3%	1.3%
3) 500M - 1B	\$ 346,242,691	2.2%	1.1%	1.1%
4) 1B - 5B	\$ 2,418,593,725	15.1%	10.6%	4.5%
5) 5B - 10B	\$ 1,759,314,829	11.0%	10.3%	0.7%
6) 10B - 50B	\$ 5,508,872,580	34.4%	35.3%	(0.9%)
7) >50B	\$ 5,728,590,731	35.8%	42.5%	(6.7%)
<b>GRAND TOTAL</b>	<b>\$ 16,009,030,841</b>	<b>100.0%</b>	<b>100.0%</b>	<b>0.0%</b>

^Excludes cash and non-traded securities

Top 20 Issuer (Total Plan)	\$ Value	% Value	Market Cap	Sector	Industry Group
1 CASH***	\$ 1,518,345,181	4.4%		CASH	CASH
2 US TREASURY N/B	\$ 1,317,770,915	3.8%		GOVERNMENT	SOVEREIGN
3 FANNIE MAE	\$ 650,942,464	1.9%		MORTGAGE SECURITIES	FNMA COLLATERAL
4 FREDDIE MAC	\$ 228,978,874	0.7%		MORTGAGE SECURITIES	FGLMC COLLATERAL
5 TREASURY BILL	\$ 217,934,112	0.6%		GOVERNMENT	SOVEREIGN
6 ISHARES EDGE MSCI USA QUALITY FAC	\$ 166,005,986	0.5%	4) 1B - 5B	FUNDS	EQUITY FUND
7 ISHARES EDGE MSCI USA SIZE FACTOI	\$ 158,590,406	0.5%	2) 100M - 500M	FUNDS	EQUITY FUND
8 ISHARES MSCI EMERGING MARKETS E	\$ 151,107,754	0.4%	6) 10B - 50B	FUNDS	EQUITY FUND
9 ISHARES EDGE MSCI USA VALUE FACT	\$ 143,863,059	0.4%	3) 500M - 1B	FUNDS	EQUITY FUND
10 APPLE INC	\$ 142,946,939	0.4%	7) 50B+	TECHNOLOGY	COMPUTERS
11 MICROSOFT CORP	\$ 141,531,565	0.4%	7) 50B+	TECHNOLOGY	SOFTWARE
12 EXXON MOBIL CORP	\$ 132,970,586	0.4%	7) 50B+	ENERGY	OIL&GAS
13 JOHNSON & JOHNSON	\$ 132,099,117	0.4%	7) 50B+	CONSUMER NON-CYCLICAL	PHARMACEUTICALS
14 ISHARES EDGE MSCI USA MOMENTUM	\$ 125,921,732	0.4%	4) 1B - 5B	FUNDS	EQUITY FUND
15 GOVERNMENT NATIONAL MORTGAGE /	\$ 122,684,584	0.4%		MORTGAGE SECURITIES	GNMA2 COLLATERAL
16 ALPHABET INC	\$ 114,951,486	0.3%	7) 50B+	COMMUNICATIONS	INTERNET
17 AT&T INC	\$ 110,406,578	0.3%	7) 50B+	COMMUNICATIONS	TELECOMMUNICATIONS
18 PFIZER INC	\$ 91,236,970	0.3%	7) 50B+	CONSUMER NON-CYCLICAL	PHARMACEUTICALS
19 NESTLE SA	\$ 89,173,546	0.3%	7) 50B+	CONSUMER NON-CYCLICAL	FOOD
20 PROCTER & GAMBLE CO/THE	\$ 87,077,843	0.3%	7) 50B+	CONSUMER NON-CYCLICAL	COSMETICS/PERSONAL CARE

\*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 August 31, 2016

Sector (Public Intl Equity Only)	\$ Value	% Value	*Blended NON-US BM	Difference
FINANCIAL	\$ 1,618,577,071	22.0%	23.7%	(1.7%)
CONSUMER NON-CYCLICAL	\$ 1,616,639,166	22.0%	22.1%	(0.2%)
CONSUMER CYCLICAL	\$ 1,028,310,240	14.0%	12.1%	1.9%
INDUSTRIAL	\$ 879,592,070	12.0%	11.9%	0.1%
COMMUNICATIONS	\$ 674,173,607	9.2%	9.3%	(0.1%)
BASIC MATERIALS	\$ 400,402,359	5.4%	6.3%	(0.9%)
ENERGY	\$ 383,821,437	5.2%	5.2%	0.1%
TECHNOLOGY	\$ 347,745,829	4.7%	5.3%	(0.6%)
UTILITIES	\$ 236,172,332	3.2%	3.3%	(0.1%)
CASH	\$ 98,666,928	1.3%	0.0%	1.3%
DIVERSIFIED	\$ 55,017,295	0.7%	0.8%	(0.1%)
INDEX	\$ 19,375,674	0.3%	0.0%	0.3%
FX	\$ 50,471	0.0%	0.0%	(0.0%)
<b>GRAND TOTAL</b>	<b>\$ 7,358,544,479</b>	<b>100.0%</b>	<b>100.0%</b>	<b>0.0%</b>

Top 20 Industry Groups (Public Intl Only)	\$ Value	% Value	*Blended NON-US BM	Difference
1 BANKS	\$ 817,081,522	11.1%	11.9%	(0.8%)
2 PHARMACEUTICALS	\$ 540,782,916	7.3%	7.3%	0.0%
3 TELECOMMUNICATIONS	\$ 412,267,176	5.6%	5.3%	0.3%
4 FOOD	\$ 362,705,356	4.9%	4.5%	0.4%
5 OIL&GAS	\$ 349,883,470	4.8%	4.7%	0.1%
6 INSURANCE	\$ 345,308,711	4.7%	4.6%	0.0%
7 RETAIL	\$ 273,886,006	3.7%	2.8%	1.0%
8 AUTO MANUFACTURERS	\$ 244,135,629	3.3%	3.3%	0.1%
9 CHEMICALS	\$ 219,756,031	3.0%	3.5%	(0.5%)
10 DIVERSIFIED FINAN SERV	\$ 178,235,076	2.4%	2.5%	(0.1%)
11 SEMICONDUCTORS	\$ 170,592,060	2.3%	2.7%	(0.4%)
12 BEVERAGES	\$ 166,797,817	2.3%	2.4%	(0.2%)
13 ELECTRIC	\$ 160,218,656	2.2%	2.2%	(0.0%)
14 COMMERCIAL SERVICES	\$ 151,726,156	2.1%	2.0%	0.0%
15 REAL ESTATE	\$ 143,744,035	2.0%	2.2%	(0.2%)
16 BUILDING MATERIALS	\$ 140,294,994	1.9%	1.4%	0.5%
17 INTERNET	\$ 125,412,881	1.7%	2.3%	(0.6%)
18 TRANSPORTATION	\$ 118,420,458	1.6%	1.7%	(0.0%)
19 AUTO PARTS&EQUIPMENT	\$ 117,928,163	1.6%	1.4%	0.2%
20 ENGINEERING&CONSTRUCTIC	\$ 117,519,682	1.6%	1.5%	0.1%

## INTERNATIONAL EQUITY EXPOSURE OVERVIEW

Country Category (Public Intl Equity Only)	\$ Value	% Value	*Blended NON-US BM	Difference
EUROPE DEVELOPED	\$ 3,877,967,023	52.7%	49.4%	3.3%
ASIA DEVELOPED	\$ 2,054,871,736	27.9%	30.2%	(2.3%)
ASIA EM	\$ 803,571,247	10.9%	14.4%	(3.4%)
LATIN AMERICA	\$ 209,186,355	2.8%	2.7%	0.1%
AFRICA	\$ 91,595,924	1.2%	1.4%	(0.2%)
MIDDLE EAST	\$ 91,968,988	1.2%	1.1%	0.2%
NORTH AMERICA	\$ 186,426,224	2.5%	0.4%	2.1%
EUROPE EM	\$ 42,956,982	0.6%	0.4%	0.2%
<b>GRAND TOTAL</b>	<b>\$ 7,358,544,479</b>	<b>100.0%</b>	<b>100.0%</b>	<b>0.0%</b>

Market Cap** (Public Intl Equities Only)	\$ Value	% Value	*Blended NON-US BM	Difference
1) 0 - 100M	\$ 1,655,370	0.0%	0.0%	0.0%
2) 100M - 500M	\$ 61,603,279	0.9%	0.5%	0.4%
3) 500M - 1B	\$ 101,691,005	1.4%	1.3%	0.1%
4) 1B - 5B	\$ 819,235,530	11.3%	12.1%	(0.8%)
5) 5B - 10B	\$ 1,007,046,845	13.9%	13.2%	0.7%
6) 10B - 50B	\$ 3,142,060,968	43.4%	40.7%	2.7%
7) >50B	\$ 2,104,385,056	29.1%	32.2%	(3.1%)
<b>GRAND TOTAL</b>	<b>\$ 7,237,678,053</b>	<b>100.0%</b>	<b>100.0%</b>	<b>0.0%</b>

\*\*Excludes cash and non-traded securities

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

ARIZONA STATE RETIREMENT SYSTEM

TOTAL FIXED INCOME EXPOSURE OVERVIEW

As of August 31, 2016

Sector (Public Fixed Income Only)	\$ Value	% Value	*Blended FI BM	Difference
GOVERNMENT	\$ 1,609,589,156	28.9%	31.5%	(2.6%)
MORTGAGE SECURITIES	\$ 1,127,219,402	20.3%	21.3%	(1.1%)
INDEX	\$ 572,690,429	10.3%	0.0%	10.3%
FINANCIAL	\$ 417,945,363	7.5%	9.1%	(1.6%)
COMMUNICATIONS	\$ 374,453,226	6.7%	7.6%	(0.8%)
CONSUMER NON-CYCLICAL	\$ 356,134,943	6.4%	7.5%	(1.1%)
ENERGY	\$ 265,871,568	4.8%	5.7%	(1.0%)
CONSUMER CYCLICAL	\$ 235,452,755	4.2%	5.3%	(1.0%)
INDUSTRIAL	\$ 188,424,840	3.4%	3.9%	(0.6%)
TECHNOLOGY	\$ 134,037,802	2.4%	2.5%	(0.1%)
UTILITIES	\$ 104,843,780	1.9%	2.3%	(0.4%)
BASIC MATERIALS	\$ 74,659,553	1.3%	2.8%	(1.4%)
CASH	\$ 54,466,637	1.0%	0.0%	1.0%
BANK LOANS	\$ 26,846,835	0.5%	0.0%	0.5%
ASSET BACKED SECURITIES	\$ 19,055,683	0.3%	0.3%	0.0%
DIVERSIFIED	\$ 2,672,476	0.0%	0.1%	(0.1%)
<b>GRAND TOTAL</b>	<b>\$ 5,564,364,448</b>	<b>100.0%</b>	<b>100.0%</b>	<b>0.0%</b>

Top 20 Industry Groups (Public Fixed Income Only)	\$ Value	% Value	*Blended FI BM	Difference
1 SOVEREIGN	\$ 2,069,900,782	37.2%	29.4%	7.8%
2 FNMA COLLATERAL	\$ 653,324,010	11.7%	8.9%	2.9%
3 FGLMC COLLATERAL	\$ 230,286,284	4.1%	5.5%	(1.4%)
4 BANKS	\$ 228,332,062	4.1%	5.1%	(1.0%)
5 TELECOMMUNICATIONS	\$ 174,116,792	3.1%	3.7%	(0.6%)
6 OIL&GAS	\$ 168,301,833	3.0%	3.6%	(0.6%)
7 MEDIA	\$ 165,655,423	3.0%	3.4%	(0.4%)
8 GNMA2 COLLATERAL	\$ 130,681,001	2.3%	4.9%	(2.5%)
9 ELECTRIC	\$ 101,790,363	1.8%	2.2%	(0.3%)
10 HEALTHCARE-SERVICES	\$ 97,120,010	1.7%	1.9%	(0.2%)
11 DIVERSIFIED FINAN SERV	\$ 96,717,413	1.7%	1.9%	(0.1%)
12 PIPELINES	\$ 92,104,995	1.7%	1.6%	0.0%
13 PHARMACEUTICALS	\$ 89,487,938	1.6%	1.5%	0.1%
14 COMMERCIAL MBS	\$ 81,970,982	1.5%	1.2%	0.3%
15 RETAIL	\$ 79,995,004	1.4%	1.8%	(0.4%)
16 SOFTWARE	\$ 60,042,021	1.1%	1.0%	0.1%
17 Cash	\$ 54,466,637	1.0%	0.0%	1.0%
18 MUNICIPAL	\$ 53,512,594	1.0%	0.7%	0.3%
19 CHEMICALS	\$ 48,635,817	0.9%	0.9%	(0.0%)
20 REITS	\$ 45,582,860	0.8%	1.0%	(0.2%)

Credit Rating Group** (Public Fixed Income Only)	\$ Value	% Value	*Blended FI BM	Difference
01) AAA	\$ 3,320,711,123	63.6%	52.1%	11.5%
02) AA	\$ 169,300,429	2.8%	3.1%	(0.3%)
03) A	\$ 425,330,645	7.0%	7.9%	(0.9%)
04) BBB	\$ 618,374,534	10.2%	11.3%	(1.0%)
05) BB	\$ 455,062,600	7.4%	13.3%	(5.9%)
06) B	\$ 464,651,915	7.2%	9.2%	(2.0%)
07) CCC	\$ 96,110,113	1.5%	2.8%	(1.3%)
08) CC	\$ 1,150,751	0.0%	0.2%	(0.1%)
09) C	\$ -	0.0%	0.0%	(0.0%)
10) D	\$ 9,001,991	0.1%	0.0%	0.1%
11) Not Rated	\$ 4,670,347	0.0%	0.1%	(0.0%)
<b>GRAND TOTAL</b>	<b>\$ 5,564,364,448</b>	<b>100.0%</b>	<b>100.0%</b>	<b>0.0%</b>

Maturity Bucket (Public Fixed Income Only)	\$ Value	% Value	*Blended FI BM	Difference
0-1Y	\$ 221,402,857	4.0%	0.8%	3.2%
1Y-3Y	\$ 649,994,613	11.7%	18.3%	(6.6%)
3Y-5Y	\$ 792,605,223	14.2%	17.9%	(3.6%)
5Y-10Y	\$ 1,640,877,200	29.5%	29.5%	(0.0%)
10Y-15Y	\$ 183,005,247	3.3%	4.5%	(1.2%)
15Y+	\$ 2,076,479,308	37.3%	29.0%	8.3%
<b>GRAND TOTAL</b>	<b>\$ 5,564,364,448</b>	<b>100.0%</b>	<b>100.0%</b>	<b>0.0%</b>

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

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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
<b>MONTHLY RISK</b>																
CASH - UNASSETIZED	\$ 160,010,499	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	\$ 314,706,687	1%	(3.8%)	0.0%	0.1%	(3.9%)	0.0%	0.2%	(4.7%)	0.0%	0.2%	(6.5%)	2.5%	(1.9%)	0.0%	0.2%
INTEREST RATE SENSITIV	\$ 5,564,364,448	16%	(2.4%)	(0.0%)	(0.3%)	(2.2%)	0.0%	0.0%	(3.2%)	0.0%	0.3%	(5.1%)	1.4%	(1.3%)	(0.0%)	(0.4%)
US EQUITY	\$ 8,828,001,185	26%	(8.1%)	(2.1%)	(32.9%)	(7.9%)	(2.0%)	(30.9%)	(13.9%)	(3.5%)	(32.3%)	(29.5%)	5.5%	(4.0%)	(1.0%)	(30.9%)
INTERNATIONAL EQUITY	\$ 7,358,544,479	21%	(9.7%)	(1.9%)	(29.6%)	(9.2%)	(1.9%)	(29.6%)	(14.6%)	(2.9%)	(26.8%)	(35.4%)	6.1%	(4.5%)	(0.9%)	(28.9%)
REAL ESTATE	\$ 3,164,041,877	9%	(10.3%)	(0.9%)	(14.4%)	(10.7%)	(0.9%)	(14.5%)	(18.9%)	(1.6%)	(15.0%)	(40.0%)	7.0%	(5.3%)	(0.5%)	(14.3%)
FARMLAND & TIMBER	\$ 188,959,812	1%	(10.6%)	(0.1%)	(0.9%)	(11.0%)	(0.1%)	(0.9%)	(19.4%)	(0.1%)	(0.9%)	(40.8%)	7.2%	(5.4%)	(0.0%)	(0.9%)
PRIVATE EQUITY	\$ 2,839,706,694	8%	(10.8%)	(0.9%)	(13.7%)	(10.1%)	(0.8%)	(12.3%)	(17.2%)	(1.4%)	(12.8%)	(35.4%)	6.6%	(5.0%)	(0.4%)	(12.4%)
PRIVATE DEBT	\$ 3,031,799,711	9%	(2.3%)	(0.0%)	(0.4%)	(3.9%)	(0.2%)	(3.5%)	(7.6%)	(0.5%)	(4.2%)	(17.4%)	2.7%	(2.2%)	(0.1%)	(3.8%)
OPPORTUNISTIC EQUITY	\$ 282,898,673	1%	(11.1%)	(0.1%)	(1.4%)	(10.3%)	(0.1%)	(1.2%)	(17.7%)	(0.1%)	(1.3%)	(36.0%)	6.7%	(5.1%)	(0.0%)	(1.3%)
OPPORTUNISTIC DEBT	\$ 1,245,759,035	4%	(7.1%)	(0.2%)	(2.7%)	(8.5%)	(0.3%)	(4.0%)	(13.7%)	(0.4%)	(4.0%)	(28.8%)	5.4%	(4.0%)	(0.1%)	(3.9%)
GLOBAL INFLATION LINKED	\$ 219,797,085	1%	(7.9%)	(0.0%)	(0.5%)	(7.8%)	(0.0%)	(0.5%)	(11.7%)	(0.1%)	(0.5%)	(26.1%)	4.7%	(3.9%)	(0.0%)	(0.6%)
INFRASTRUCTURE	\$ 331,287,086	1%	(9.4%)	(0.1%)	(1.4%)	(8.9%)	(0.1%)	(1.3%)	(14.9%)	(0.1%)	(1.3%)	(35.1%)	5.7%	(4.5%)	(0.0%)	(1.3%)
MULTI-ASSET CLASS	\$ 1,035,519,663	3%	(5.7%)	(0.1%)	(2.0%)	(5.6%)	(0.1%)	(1.5%)	(8.2%)	(0.2%)	(1.4%)	(13.0%)	3.3%	(2.9%)	(0.1%)	(1.6%)
<b>GRAND TOTAL</b>	<b>\$ 34,565,396,933</b>	<b>100%</b>	<b>(6.4%)</b>	<b>(6.4%)</b>	<b>(100.0%)</b>	<b>(6.4%)</b>	<b>(6.4%)</b>	<b>(100.0%)</b>	<b>(10.9%)</b>	<b>(10.9%)</b>	<b>(100.0%)</b>	<b>(25.8%)</b>	<b>4.3%</b>	<b>(3.3%)</b>	<b>(3.3%)</b>	<b>(100.0%)</b>
<b>INTERIM POLICY BENCHMARK</b>			<b>(6.5%)</b>			<b>(6.4%)</b>			<b>(10.7%)</b>			<b>(25.7%)</b>	<b>4.4%</b>	<b>(3.2%)</b>		

<b>ANNUALIZED RISK</b>																
CASH - UNASSETIZED	\$ 160,010,499	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	\$ 314,706,687	1%	(13.0%)	0.0%	0.1%	(13.4%)	0.0%	0.2%	(16.1%)	0.1%	0.2%	N/A	8.7%	(6.5%)	0.0%	0.2%
INTEREST RATE SENSITIV	\$ 5,564,364,448	16%	(8.2%)	(0.1%)	(0.3%)	(7.7%)	0.0%	0.0%	(11.1%)	0.1%	0.3%	N/A	5.0%	(4.5%)	(0.0%)	(0.4%)
US EQUITY	\$ 8,828,001,185	26%	(28.2%)	(7.3%)	(32.9%)	(27.4%)	(6.8%)	(30.9%)	(48.2%)	(12.2%)	(32.3%)	N/A	19.1%	(13.9%)	(3.5%)	(30.9%)
INTERNATIONAL EQUITY	\$ 7,358,544,479	21%	(33.6%)	(6.6%)	(29.6%)	(31.9%)	(6.5%)	(29.6%)	(50.5%)	(10.1%)	(26.8%)	N/A	21.1%	(15.5%)	(3.3%)	(28.9%)
REAL ESTATE	\$ 3,164,041,877	9%	(35.7%)	(3.2%)	(14.4%)	(37.1%)	(3.2%)	(14.5%)	(65.4%)	(5.7%)	(15.0%)	N/A	24.3%	(18.3%)	(1.6%)	(14.3%)
FARMLAND & TIMBER	\$ 188,959,812	1%	(36.7%)	(0.2%)	(0.9%)	(38.2%)	(0.2%)	(0.9%)	(67.2%)	(0.3%)	(0.9%)	N/A	25.0%	(18.8%)	(0.1%)	(0.9%)
PRIVATE EQUITY	\$ 2,839,706,694	8%	(37.4%)	(3.0%)	(13.7%)	(35.0%)	(2.7%)	(12.3%)	(59.7%)	(4.8%)	(12.8%)	N/A	22.8%	(17.5%)	(1.4%)	(12.4%)
PRIVATE DEBT	\$ 3,031,799,711	9%	(7.9%)	(0.1%)	(0.4%)	(13.6%)	(0.8%)	(3.5%)	(26.2%)	(1.6%)	(4.2%)	N/A	9.2%	(7.6%)	(0.4%)	(3.8%)
OPPORTUNISTIC EQUITY	\$ 282,898,673	1%	(38.4%)	(0.3%)	(1.4%)	(35.7%)	(0.3%)	(1.2%)	(61.3%)	(0.5%)	(1.3%)	N/A	23.3%	(17.8%)	(0.1%)	(1.3%)
OPPORTUNISTIC DEBT	\$ 1,245,759,035	4%	(24.5%)	(0.6%)	(2.7%)	(29.5%)	(0.9%)	(4.0%)	(47.3%)	(1.5%)	(4.0%)	N/A	18.8%	(14.0%)	(0.4%)	(3.9%)
GLOBAL INFLATION LINKED	\$ 219,797,085	1%	(27.4%)	(0.1%)	(0.5%)	(27.2%)	(0.1%)	(0.5%)	(40.5%)	(0.2%)	(0.5%)	N/A	16.3%	(13.6%)	(0.1%)	(0.6%)
INFRASTRUCTURE	\$ 331,287,086	1%	(32.4%)	(0.3%)	(1.4%)	(30.8%)	(0.3%)	(1.3%)	(51.7%)	(0.5%)	(1.3%)	N/A	19.6%	(15.7%)	(0.2%)	(1.3%)
MULTI-ASSET CLASS	\$ 1,035,519,663	3%	(19.9%)	(0.4%)	(2.0%)	(19.5%)	(0.3%)	(1.5%)	(28.4%)	(0.5%)	(1.4%)	N/A	11.4%	(10.1%)	(0.2%)	(1.6%)
<b>GRAND TOTAL</b>	<b>\$ 34,565,396,933</b>	<b>100%</b>	<b>(22.2%)</b>	<b>(22.2%)</b>	<b>(100.0%)</b>	<b>(22.0%)</b>	<b>(22.0%)</b>	<b>(100.0%)</b>	<b>(37.8%)</b>	<b>(37.8%)</b>	<b>(100.0%)</b>	<b>N/A</b>	<b>14.8%</b>	<b>(11.3%)</b>	<b>(11.3%)</b>	<b>(100.0%)</b>
<b>INTERIM POLICY BENCHMARK</b>			<b>(22.6%)</b>			<b>(22.1%)</b>			<b>(37.2%)</b>			<b>N/A</b>	<b>15.1%</b>	<b>(11.3%)</b>		

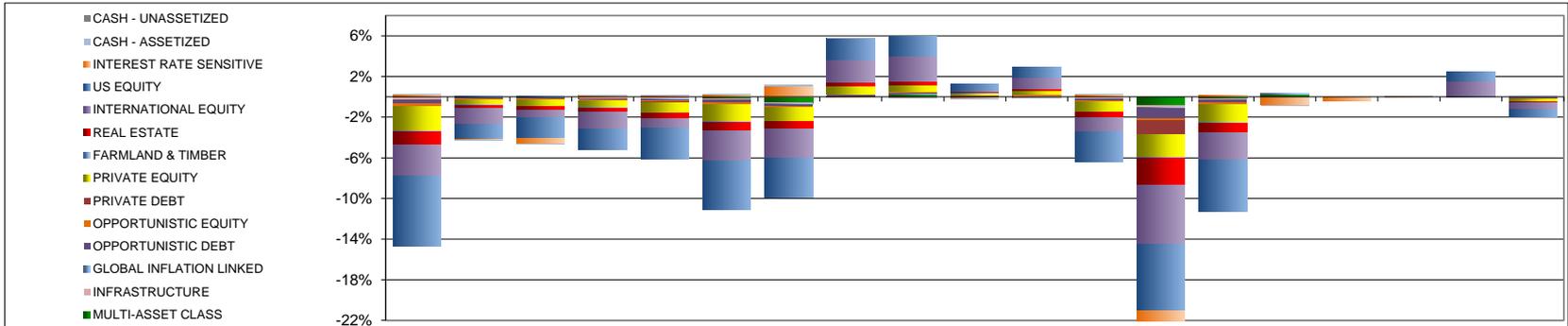
Strategy	\$ Value	% Value	Beta SP500	Corr SP500	Beta MSCI EAFE	Corr MSCI EAFE	Duration	Convexity	Notional Exposure	Gross Exposure	Gross Leverage
CASH - UNASSETIZED	\$ 160,010,499	0%	0.00		0.00				\$ 160,010,499	\$ 160,010,499	100.0%
CASH - ASSETIZED	\$ 314,706,687	1%	(0.06)	(0.34)	(0.05)	(0.29)			\$ 797,095,199	\$ 314,706,687	100.0%
INTEREST RATE SENSITIV	\$ 5,564,364,448	16%	(0.01)	(0.04)	0.01	0.03	5.27	0.186	\$ 5,196,616,182	\$ 5,564,364,448	100.0%
US EQUITY	\$ 8,828,001,185	26%	1.04	0.99	0.80	0.90	0.27	0.001	\$ 8,854,647,634	\$ 8,830,650,358	100.0%
INTERNATIONAL EQUITY	\$ 7,358,544,479	21%	1.06	0.90	0.98	0.99			\$ 7,358,577,214	\$ 7,374,418,748	100.2%
REAL ESTATE	\$ 3,164,041,877	9%	1.18	0.88	1.00	0.88			\$ 3,164,041,877	\$ 3,164,042,059	100.0%
FARMLAND & TIMBER	\$ 188,959,812	1%	1.19	0.87	1.02	0.87			\$ 188,959,812	\$ 188,959,812	100.0%
PRIVATE EQUITY	\$ 2,839,706,694	8%	1.20	0.95	0.92	0.86			\$ 2,839,706,694	\$ 2,839,711,454	100.0%
PRIVATE DEBT	\$ 3,031,799,711	9%	0.31	0.61	0.26	0.59	0.69	0.010	\$ 3,025,059,937	\$ 3,031,799,711	100.0%
OPPORTUNISTIC EQUITY	\$ 282,898,673	1%	1.23	0.95	0.93	0.85			\$ 282,898,673	\$ 282,898,673	100.0%
OPPORTUNISTIC DEBT	\$ 1,245,759,035	4%	0.78	0.75	0.66	0.75			\$ 1,245,759,035	\$ 1,245,759,035	100.0%
GLOBAL INFLATION LINKED	\$ 219,797,085	1%	0.28	0.62	0.25	0.65	0.23	0.001	\$ 436,720,021	\$ 219,797,085	100.0%
INFRASTRUCTURE	\$ 331,287,086	1%	1.05	0.97	0.90	0.98			\$ 331,287,086	\$ 331,287,086	100.0%
MULTI-ASSET CLASS	\$ 1,035,519,663	3%	0.04	0.57	0.03	0.50	19.49	3.929	\$ (9,341,232,726)	\$ 2,307,787,204	222.9%
<b>GRAND TOTAL</b>	<b>\$ 34,565,396,933</b>	<b>100%</b>	<b>1.10</b>	<b>0.96</b>	<b>0.92</b>	<b>0.95</b>	<b>4.94</b>	<b>0.182</b>	<b>\$ 24,540,147,136</b>	<b>\$ 35,856,192,858</b>	<b>103.7%</b>

ARIZONA STATE RETIREMENT SYSTEM  
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TOTAL PLAN STRESS TESTS

Strategy	\$ Value	% Value	Historical Scenarios													Predictive Scenarios						
			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: Oct	IR Sleepening: 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%	
<b>Stress Test Stand Alone</b>																						
CASH - UNASSETIZED	\$ 160,010,499	0.5%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CASH - ASSETIZED	\$ 314,706,687	0.9%	1.3	(0.6)	(8.0)	1.0	0.8	1.3	13.2	0.0	(1.1)	(1.0)	(1.6)	1.9	(0.3)	0.0	(9.0)	0.0	1.1	0.0	0.9	
INTEREST RATE SENSITIV	\$ 5,564,364,448	16.1%	1.6	(0.1)	(3.7)	0.7	0.8	1.3	6.6	(0.3)	(0.8)	(0.6)	(0.9)	1.3	(13.2)	0.8	(5.0)	(2.2)	0.5	0.0	0.4	
US EQUITY	\$ 8,828,001,185	25.5%	(26.9)	(5.9)	(7.6)	(8.1)	(11.9)	(18.8)	(15.3)	8.5	7.8	2.8	4.1	(11.5)	(25.9)	(19.8)	0.0	0.0	0.0	3.4	(3.1)	
INTERNATIONAL EQUITY	\$ 7,358,544,479	21.3%	(14.4)	(7.5)	(3.6)	(7.7)	(4.2)	(13.8)	(13.2)	10.1	11.5	(0.7)	5.2	(6.3)	(27.1)	(12.8)	(0.0)	0.0	0.0	7.2	(2.6)	
REAL ESTATE	\$ 3,164,041,877	9.2%	(14.0)	(3.1)	(4.0)	(4.2)	(6.2)	(9.9)	(7.9)	4.4	4.1	1.5	2.2	(6.0)	(28.9)	(10.3)	0.0	0.0	0.0	0.0	(1.2)	
FARMLAND & TIMBER	\$ 188,959,812	0.5%	(12.9)	(2.8)	(3.7)	(3.9)	(5.7)	(9.1)	(7.3)	4.1	3.7	1.3	2.0	(5.5)	(29.0)	(9.5)	0.0	0.0	0.0	0.0	(1.1)	
PRIVATE EQUITY	\$ 2,839,706,694	8.2%	(29.3)	(6.4)	(8.1)	(8.8)	(12.9)	(20.5)	(16.1)	9.3	8.1	2.9	4.4	(12.4)	(26.0)	(21.6)	0.0	0.0	0.0	0.0	(3.3)	
PRIVATE DEBT	\$ 3,031,799,711	8.8%	(0.6)	(0.1)	(0.2)	(0.2)	(0.3)	(0.4)	(0.3)	0.2	0.2	0.1	0.1	(0.3)	(15.8)	(0.4)	(0.0)	(0.1)	0.0	0.0	(0.2)	
OPPORTUNISTIC EQUITY	\$ 282,898,673	0.8%	(30.6)	(6.7)	(8.8)	(9.3)	(13.5)	(21.6)	(17.4)	9.7	8.8	3.2	4.6	(13.1)	(27.1)	(22.5)	0.0	0.0	0.0	0.0	(3.5)	
OPPORTUNISTIC DEBT	\$ 1,245,759,035	3.6%	(9.3)	(2.1)	(2.7)	(2.8)	(4.1)	(6.6)	(5.3)	3.0	2.7	1.0	1.4	(4.0)	(27.3)	(6.9)	0.0	0.0	0.0	0.0	(1.6)	
GLOBAL INFLATION LINKED	\$ 219,797,085	0.6%	(0.0)	0.0	0.1	(0.0)	(0.0)	(0.0)	(0.1)	(0.0)	0.0	0.0	0.0	(0.0)	(16.2)	0.0	0.1	0.0	(0.0)	(2.1)	(5.9)	
INFRASTRUCTURE	\$ 331,287,086	1.0%	(22.5)	(4.9)	(6.4)	(6.8)	(9.9)	(15.8)	(12.8)	7.1	6.5	2.3	3.4	(9.6)	(28.3)	(16.5)	0.0	0.0	0.0	0.0	(2.9)	
MULTI-ASSET CLASS	\$ 1,035,519,663	3.0%	(3.7)	(2.7)	(1.1)	(3.7)	(5.3)	(5.0)	(20.0)	0.5	7.8	1.6	2.6	(4.7)	(26.0)	(4.5)	9.3	(0.2)	(0.5)	1.6	(2.4)	
<b>GRAND TOTAL</b>	<b>\$ 34,565,396,933</b>	<b>100.0%</b>	<b>(14.4)</b>	<b>(4.2)</b>	<b>(4.7)</b>	<b>(5.1)</b>	<b>(6.0)</b>	<b>(10.9)</b>	<b>(8.7)</b>	<b>5.7</b>	<b>5.8</b>	<b>1.0</b>	<b>2.8</b>	<b>(6.2)</b>	<b>(23.2)</b>	<b>(11.2)</b>	<b>(0.6)</b>	<b>(0.4)</b>	<b>0.1</b>	<b>2.4</b>	<b>(1.9)</b>	
<b>INTERIM POLICY BENCHMARK</b>			<b>(15.1)</b>	<b>(4.8)</b>	<b>(5.2)</b>	<b>(5.7)</b>	<b>(5.9)</b>	<b>(11.8)</b>	<b>(8.3)</b>	<b>6.8</b>	<b>7.0</b>	<b>0.9</b>	<b>3.2</b>	<b>(6.3)</b>	<b>(21.0)</b>	<b>(11.8)</b>	<b>(1.2)</b>	<b>(0.6)</b>	<b>0.1</b>	<b>3.2</b>	<b>(2.1)</b>	

<b>Stress Test Contribution</b>																						
CASH - UNASSETIZED	\$ 160,010,499	0.5%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CASH - ASSETIZED	\$ 314,706,687	0.9%	0.0	(0.0)	(0.1)	0.0	0.0	0.0	0.1	0.0	(0.0)	(0.0)	(0.0)	0.0	(0.0)	0.0	(0.1)	0.0	0.0	0.0	0.0	
INTEREST RATE SENSITIV	\$ 5,564,364,448	16.1%	0.3	(0.0)	(0.6)	0.1	0.1	0.2	1.1	(0.0)	(0.1)	(0.1)	(0.1)	0.2	(2.1)	0.1	(0.8)	(0.4)	0.1	0.0	0.1	
US EQUITY	\$ 8,828,001,185	25.5%	(6.9)	(1.5)	(1.9)	(2.1)	(3.0)	(4.8)	(3.9)	2.2	2.0	0.7	1.0	(2.9)	(6.6)	(5.1)	0.0	0.0	0.0	0.9	(0.8)	
INTERNATIONAL EQUITY	\$ 7,358,544,479	21.3%	(3.1)	(1.6)	(0.8)	(1.6)	(0.9)	(2.9)	(2.8)	2.2	2.4	(0.1)	1.1	(1.3)	(5.8)	(2.7)	(0.0)	0.0	0.0	1.5	(0.6)	
REAL ESTATE	\$ 3,164,041,877	9.2%	(1.3)	(0.3)	(0.4)	(0.4)	(0.6)	(0.9)	(0.7)	0.4	0.4	0.1	0.2	(0.5)	(2.6)	(0.9)	0.0	0.0	0.0	0.0	(0.1)	
FARMLAND & TIMBER	\$ 188,959,812	0.5%	(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)	(0.1)	0.0	0.0	0.0	0.0	(0.0)	
PRIVATE EQUITY	\$ 2,839,706,694	8.2%	(2.4)	(0.5)	(0.7)	(0.7)	(1.1)	(1.7)	(1.3)	0.8	0.7	0.2	0.4	(1.0)	(2.1)	(1.8)	0.0	0.0	0.0	0.0	(0.3)	
PRIVATE DEBT	\$ 3,031,799,711	8.8%	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	(0.0)	(1.4)	(0.0)	(0.0)	(0.0)	0.0	0.0	(0.0)	
OPPORTUNISTIC EQUITY	\$ 282,898,673	0.8%	(0.3)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.1)	0.1	0.1	0.0	0.0	(0.1)	(0.2)	(0.2)	0.0	0.0	0.0	0.0	(0.0)	
OPPORTUNISTIC DEBT	\$ 1,245,759,035	3.6%	(0.3)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	0.1	0.1	0.0	0.1	(0.1)	(1.0)	(0.2)	0.0	0.0	0.0	0.0	(0.1)	
GLOBAL INFLATION LINKED	\$ 219,797,085	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	\$ 331,287,086	1.0%	(0.2)	(0.0)	(0.1)	(0.1)	(0.1)	(0.2)	(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	\$ 1,035,519,663	3.0%	(0.1)	(0.1)	(0.0)	(0.1)	(0.2)	(0.1)	(0.6)	0.0	0.2	0.0	0.1	(0.1)	(0.8)	(0.1)	0.3	(0.0)	(0.0)	0.0	(0.1)	
<b>GRAND TOTAL</b>	<b>\$ 34,565,396,933</b>	<b>100.0%</b>	<b>(14.4)</b>	<b>(4.2)</b>	<b>(4.7)</b>	<b>(5.1)</b>	<b>(6.0)</b>	<b>(10.9)</b>	<b>(8.7)</b>	<b>5.7</b>	<b>5.8</b>	<b>1.0</b>	<b>2.8</b>	<b>(6.2)</b>	<b>(23.2)</b>	<b>(11.2)</b>	<b>(0.6)</b>	<b>(0.4)</b>	<b>0.1</b>	<b>2.4</b>	<b>(1.9)</b>	
<b>INTERIM POLICY BENCHMARK</b>			<b>(15.1)</b>	<b>(4.8)</b>	<b>(5.2)</b>	<b>(5.7)</b>	<b>(5.9)</b>	<b>(11.8)</b>	<b>(8.3)</b>	<b>6.8</b>	<b>7.0</b>	<b>0.9</b>	<b>3.2</b>	<b>(6.3)</b>	<b>(21.0)</b>	<b>(11.8)</b>	<b>(1.2)</b>	<b>(0.6)</b>	<b>0.1</b>	<b>3.2</b>	<b>(2.1)</b>	



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, <u>making no assumption of the tail distribution</u> , 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, <u>making a Normal distribution assumption of the tail distribution</u> , 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. <u>Where VaR asks the question 'how bad can things get?', expected shortfall asks 'if things do get bad, what is our expected loss?'</u>
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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# Agenda Item #6

# State Street Global Services: Investment Compliance Review

Arizona State  
Retirement  
System



**STATE STREET**

# Arizona State Overview

For background purposes, following is a brief description of the compliance services provided for the ASRS investment portfolios:

## **Service Overview:**

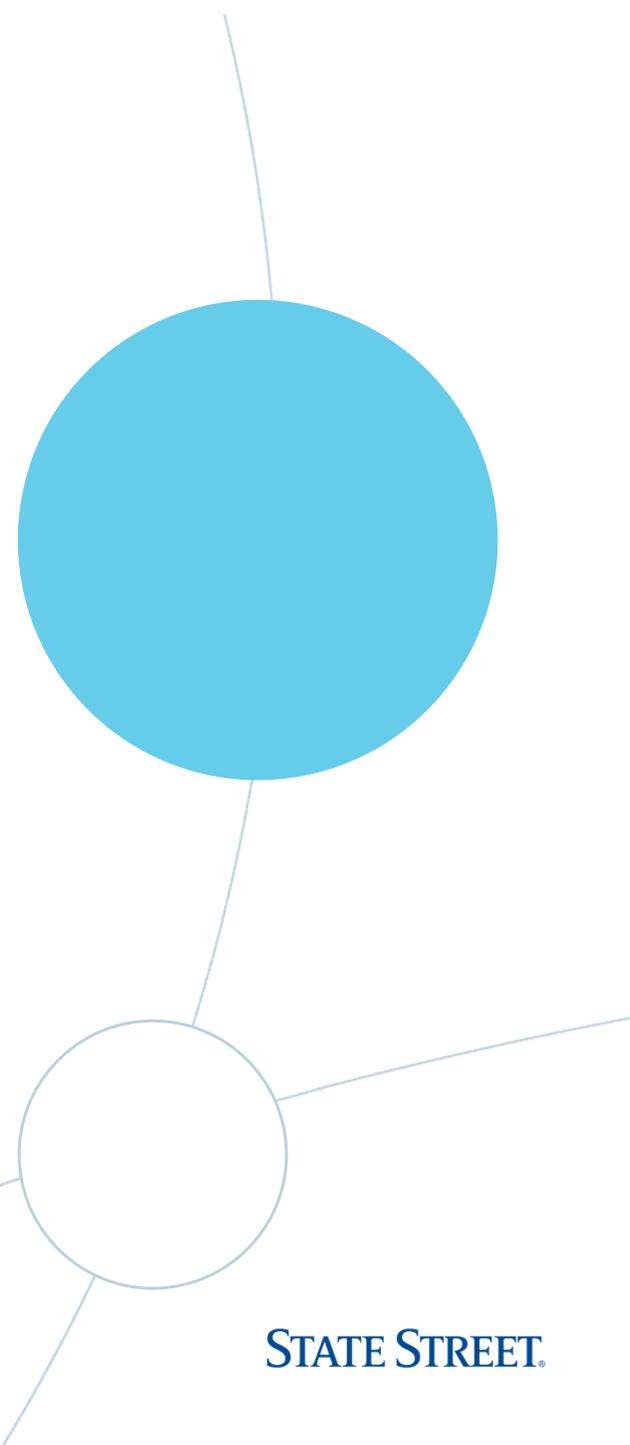
State Street works closely with the Plan to interpret investment guidelines and advise on different monitoring approaches. The compliance specialists will maintain the existing tests and add new tests as requested by the customers. Testing for the ASRS's portfolios is provided on a daily and monthly basis in a post-trade, pre-settlement environment. This includes:

- Clarification of rules
- Set up and ongoing modification of rules
- Validation and exception research
- Reporting provided daily or monthly.
- Comments and research posted within the Compliance Dashboard (MySS.com)

## **Additional Services:**

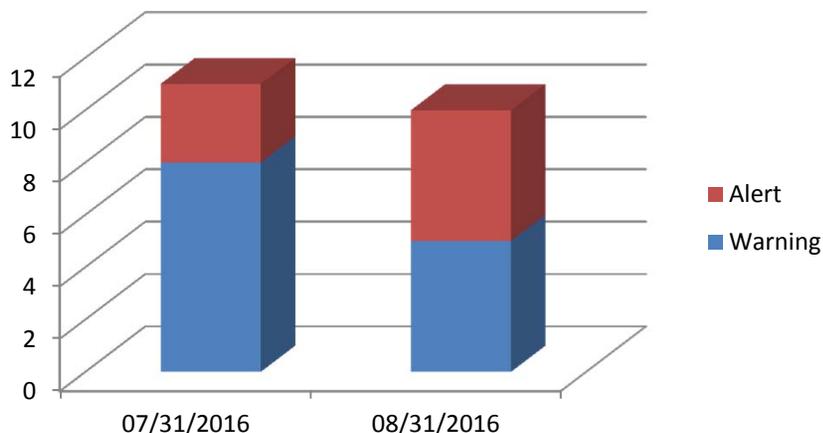
To satisfy the needs of more sophisticated customers, like Arizona, State Street provides additional assistance with the below:

- Alert validation with Investment Managers
- Quarterly governance meetings



# Report Card: Summary & Projects

## Alerts & Warnings July – August 2016



**Alert\*** : includes compliance rules which are hard limits and /or prohibition according to the Letters of Direction

**Warning:** includes compliance rules which have been designed as soft notification or flags (informational flag)

**Note:** Alerts and Warnings do not necessarily mean a violation has occurred. They could be a result of any of the following:

1. A data error/omission
2. A future action needs to occur to prevent a violation from taking place (i.e. future benchmark inclusion)
3. A violation has occurred

**\*\* All alerts/warnings were researched and resolved to both State Street & Arizona's satisfaction. Alerts/warnings have valid responses/actions.**

## Breakdown

- July: 3 Alerts – 3 Recurring / 8 Warnings – 6 Recurring
- August: 5 Alerts – 3 Recurring / 5 Warnings – 5 Recurring

## New Alerts/Warnings\*

- July: 2 New Warnings
  - Flag all warrants and rights & Warrants or rights obtained through corporate actions shall be disposed of in an orderly fashion – ZARDOYA OTIS SA RIGHT & MGM CHINA HOLDINGS LTD
- August: 2 New Alerts
  - Allowed securities and Securities contained on Index only
  - 1) HUNTINGTON BANCSHARES INC - Previously held FIRSTMERIT CORP, an index constituent, which was acquired by Huntington Bancshares Inc. Partial shares are sold by the custodian every 1-2 months.
  - 2) ENERSYS was removed from the S&P Small Cap 600 and added to the S&P MidCap 400 after close on Aug 25.
- **Alert of Note\*\*:** Flag unlisted securities and companies domicile in the US
  - On August 12, FMC CORP (US) was purchased. IM explained that FMC Corp is merging; the surviving entity will be French.
  - An additional 2,800 shares were purchased; State Street discovered that FMC Corp was not merging, it was in fact FMC Technologies (a separate company). IM had made the purchase in error and has agreed to make Arizona whole with a reimbursement of funds.

# Report Card: Summary & Projects (cont'd)

## Arizona Statutes on Investment Limits

### Max 80% equity test (Law 38-718 H) –

All Passes

#### July

58.19% of Market Value

55.37% of Cost

#### August

58.22% of Market Value

55.43% of Cost

### Max 40% foreign investments test (Law 38-718 I) –

All Passes

#### July

31.27% of Market Value

35.64% of Cost

#### August

31.46% of Market Value

35.84% of Cost

## Additional Items

- Additional compliance testing and reporting:
  - Downgrades reporting
  - Non – Testable Rules Summary & Testing Coverage
- Explore Additional Applicable Regulatory Testing
- Report Alerts & Warnings by Asset Classes

### Max 60% internally managed assets test (Law 38-718 J) –

All Passes

#### July

26.81% of Market Value

21.42% of Cost

#### August

26.52% of Market Value

21.34% of Cost

### Max 5% Issuer test (Law 38-718 K)

Test Results:

July: Largest holding – **Microsoft Corp 0.423% - Pass**

August: Largest holding – **Apple Inc. 0.427% - Pass**

### Max 10% Debt of Multinational Development Banks (Law 38-718 L)

Test Results:

July: **0.020% - Pass**

August: **0.020% - Pass**

### Arizona Restricted Country List

As of July 31<sup>st</sup>, August 31<sup>st</sup>, 2016 the Arizona funds were not invested in countries that support terrorism.

# 2015 Real Estate SMA Compliance Reviews

Prepared for Arizona State Retirement System | Phoenix, Arizona | October 18, 2016

# Compliance Review

## Goals and Objectives

- Ensure financial statements are prepared in accordance with ASRS Reporting Standards and partnership agreement requirements.
- Determine if an appropriate valuation policy is in place (ensure that ASRS valuation is properly calculated in accordance with stated policy and the waterfall mechanics of the partnership agreement).
- Determine if an appropriate expense policy is in place (confirm that expenses allocated to the account are appropriate and permitted under the partnership agreement).
- Ensure fees are calculated correctly and in accordance with the partnership agreement.

## Review Process

- Review audited financial statements at a high level for significant issues.
- Review and note if financial statements were prepared on a fair value basis.
- Review and independently verify the calculation of ASRS net asset value (NAV):
  - Also known as the waterfall calculation or hypothetical liquidation at book value (HLBV).
  - This calculation of NAV reflects ASRS's net proceeds—after all fees and incentive payments per the terms of the partnership agreement—if all assets were sold.
- Review and independently verify the management fee calculation.
- Review valuation policies for consistency with ASRS policies, operating agreements, and standards.
- Review expense policies for consistency with ASRS policies, operating agreements, and standards.
- Work with the manager and ASRS as necessary to address concerns and questions.
- Review corrective actions from prior compliance review and validate implementation.
- RCLCO report summarizing each review, including appendices demonstrating the results of the above tasks.

# Compliance Review Results

- RCLCO completed compliance reviews on the seven separately managed accounts (SMAs) that had at least one quarter of operations as of December, 31 2015. The review noted a number of inconsistencies relative to the provisions in the SMAs' operating agreements, which are detailed in the pages that follow. All items noted were addressed during the review. The results are summarized below:

Manager	Audited Financial Statements	NAV Calculation	Management Fee Calculation	Valuation Policy	Expense Policy
Buchanan	Compliant	Compliant	Compliant	Compliant	Compliant
CIM	Compliant	Compliant	Compliant	Compliant	Compliant
JEN	Compliant	Compliant	Compliant	Compliant	Compliant
L3	Compliant	Compliant	Compliant	Compliant	Compliant
Seavest	Compliant	Compliant	Compliant	Compliant	Compliant
USAA	Compliant	Compliant	Compliant	Compliant	Compliant
Ventas	Compliant	Compliant	Compliant	Compliant	Compliant
Vestar	Compliant	Compliant	Compliant	Compliant	Compliant

- As of the date of this report, the compliance reviews covering three SMA ventures are still in process due to on-going discussions covering variances and observations in relation to ASRS' NAV and/or the Asset Management Fee calculations or delay in completing required year-end financials due to a pending audit. The three SMA managers and the related ventures are:
  - Forest City: FC Cactus Residential Development Fund, LLC
  - Pegasus: Pegasus Cactus Self Storage Fund LLC
  - Pierce: PEP-Cactus Student Housing, LLC



# Asset Management Fee Calculations

- Four managers incorrectly charged asset management fees to the respective ventures:
  - Buchanan incorrectly calculated the Asset Management Fee, which is based on Unreturned Member Capital. In particular, Buchanan did not accurately count the days elapsed during 2015 covering the contributions made during the first half of 2015. Consequently, the SMA venture was overcharged by \$1,002.21. The overage will be deducted from the third quarter Asset Management Fee to be charged to the venture. Buchanan has further agreed to implement a consistent methodology utilizing Excel date functions to calculate elapsed days going forward.
  - JEN undercharged the SMA Venture \$92,200 for Asset Management Fees because it retroactively recorded a \$10 million distribution in October 2015 to proportionately reduce contributions made. In addition, the audit report incorrectly noted the fee for 2015 as \$300,000 due to an oversight. JEN acknowledged both errors and will record the correcting entries and bill the SMA for the actual amount due as well as recognize the deferred fee portion in the third quarter of 2016.
  - L3 undercharged the SMA venture \$1,105.95 for Asset Management Fees life to date through 2015 due to an inaccurate count of the days elapsed during 2015 and by utilizing the contribution date instead of the acquisition date for the properties per the operating agreement. L3 acknowledged the error and will book the correction in the third quarter 2016 financials and charge the SMA venture accordingly.
  - USAA undercharged the SMA venture \$19,454 for Asset Management Fees in 2015 due to incorrect calculation inputs including unreturned capital balances, net income as well as deductions covering the asset management fee and unrealized gain deductions. USAA acknowledged the error and will book the correction in the third quarter 2016 financials and charge the SMA venture accordingly.
- While each of the issues mentioned above has been addressed by the managers, RCLCO will pay particular attention to these and confirm the corrective actions—including the fee credits—during the 2016 compliance reviews and as part of on-going monitoring.

# Net Asset Value Calculations

- Five managers were noted to have nonmaterial variances in calculated ASRS NAV:
  - CIM's allocation of equity to ASRS based on the hypothetical liquidation of book value (HLBV) was overstated by \$731 due to an incorrect capital contribution date. CIM has corrected the date and the equity allocation will be adjusted accordingly in the 2016 third quarter reporting.
  - L3's allocation of equity to ASRS based on HLBV was overstated by \$120,383 (0.21%) because capital contributions from inception through May 2015 were recorded based on the capital request date rather than the actual capital contribution date and the waterfall included the impact of intercompany transfers rather than just actual capital flows to and from the investors. In addition we noted a delayed capital contribution by L3 in October 2015. L3 agreed with the observations and will book the correcting entries in the 2016 third quarter financials and ensure the waterfall will reflect capital contribution dates and only include investor flows (i.e., contributions and distributions to and from the venture) in the waterfall. Additionally, L3 will ensure that all their contributions will be made timely to coincide with ASRS' contributions.
  - Seavest's allocation of equity to ASRS and the Seavest investor entity utilizing HLBV was overstated by \$2,979 (0.1%) and \$447 (0.1%), respectively, due to an incorrect capital contribution date. Seavest has corrected the date and the equity allocation will be adjusted accordingly in the 2016 third quarter reporting.
  - USAA addressed last year's issue (i.e., utilizing Percentage Interest or proportional allocation) and correctly used HLBV in 2015. However, the allocation of equity using HLBV incorrectly overstated ASRS' NAV by \$110,144 (0.13%) due to incorrect quarterly compounding of the 8.25% preferred return, incorrect capital contribution dates, understated ASRS capital contribution on August 25, 2017 for \$10,618 and inconsistent application of the pooling provisions of the waterfall. USAA agreed with observations and will book the correcting entries in the 2016 third quarter financials and ensure that the pooled provisions of the waterfall and the prescribed compounding convention are implemented consistently per the operating agreement.
  - Vestar's HLBV calculations failed to include all Capital Contributions in 2015. However, the oversight had no material impact on the promote calculation nor the equity allocation between the members, which remained at 80/20 Percentage Interests, as none of the hurdle rates stipulated in the operating agreement were met. Vestar already adjusted the books and records of the venture in early 2016 to account for all contributions with the correct amounts and dates, which we confirmed upon review of the HLBV calculations for the second quarter of 2016.

## Conclusion

- Overall, the compliance review process was instructive for the SMA managers, RCLCO, and ASRS and ensured continuing accuracy of accounting for the investments.
- All of the SMA managers have implemented or further enhanced policies and processes to ensure compliance with operating agreement requirements and ASRS standards.
- The 2015 reviews completed so far ensured that all parties concur on the calculation of asset management fees and NAV allocation between the SMA manager and ASRS.

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**RCLCO**

# Agenda Item #7

# Arizona State Retirement System

## Independent ASRS Investment Program Oversight

October 24, 2016

Allan Martin, Partner, NEPC

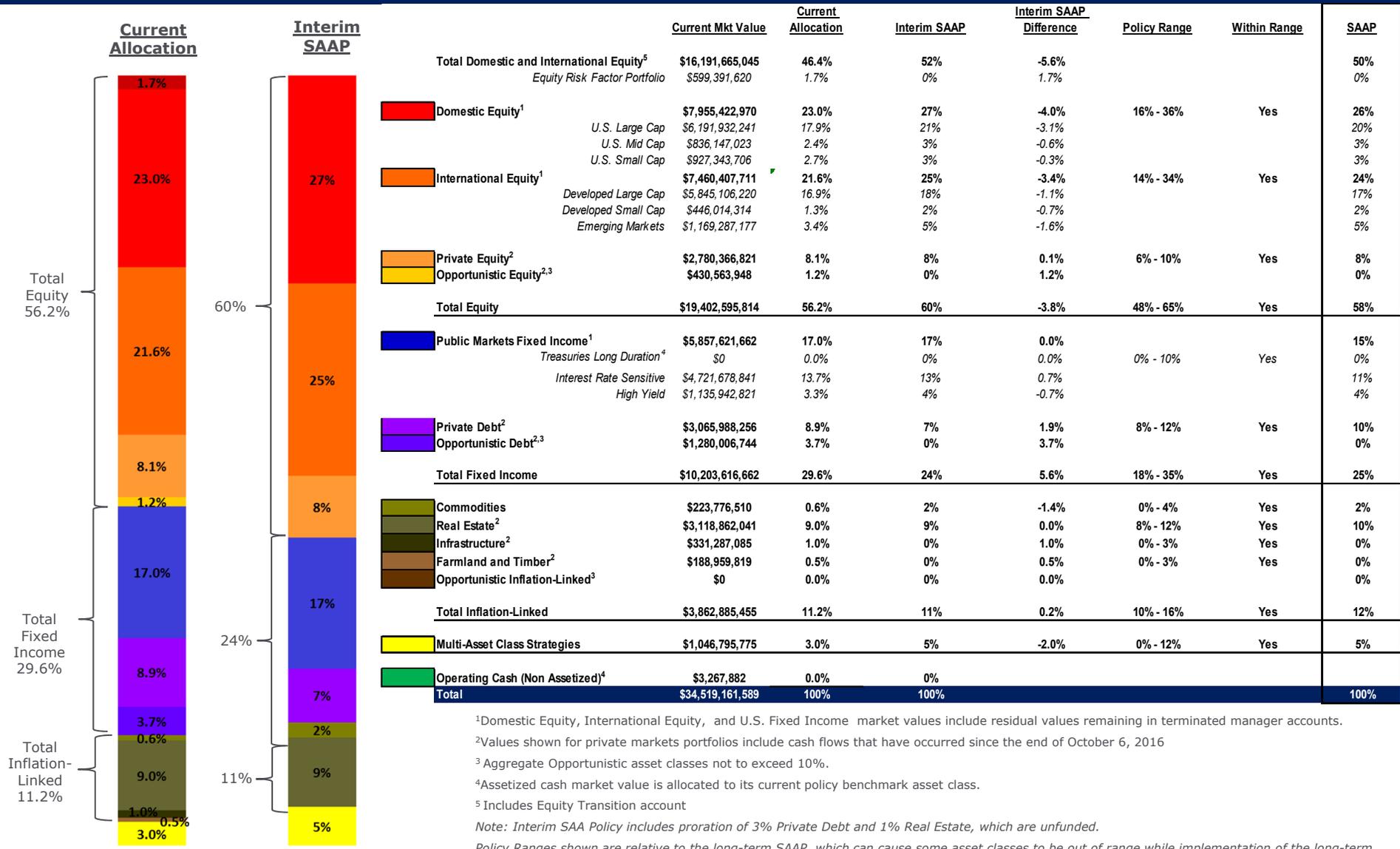


- Independent Oversight/Compliance
  - SAA Policy Compliance
  - Asset Class Committee Monitoring
- Market Environment Update
- Appendix: SAA Policy History

# Independent Oversight/Compliance



# SAA Policy Compliance



	Current Mkt Value	Current Allocation	Interim SAAP	Interim SAAP Difference	Policy Range	Within Range	SAAP
<b>Total Domestic and International Equity<sup>5</sup></b>	<b>\$16,191,665,045</b>	<b>46.4%</b>	<b>52%</b>	<b>-5.6%</b>			<b>50%</b>
Equity Risk Factor Portfolio	\$599,391,620	1.7%	0%	1.7%			0%
<b>Domestic Equity<sup>1</sup></b>	<b>\$7,955,422,970</b>	<b>23.0%</b>	<b>27%</b>	<b>-4.0%</b>	<b>16% - 36%</b>	<b>Yes</b>	<b>26%</b>
U.S. Large Cap	\$6,191,932,241	17.9%	21%	-3.1%			20%
U.S. Mid Cap	\$836,147,023	2.4%	3%	-0.6%			3%
U.S. Small Cap	\$927,343,706	2.7%	3%	-0.3%			3%
<b>International Equity<sup>1</sup></b>	<b>\$7,460,407,711</b>	<b>21.6%</b>	<b>25%</b>	<b>-3.4%</b>	<b>14% - 34%</b>	<b>Yes</b>	<b>24%</b>
Developed Large Cap	\$5,845,106,220	16.9%	18%	-1.1%			17%
Developed Small Cap	\$446,014,314	1.3%	2%	-0.7%			2%
Emerging Markets	\$1,169,287,177	3.4%	5%	-1.6%			5%
<b>Private Equity<sup>2</sup></b>	<b>\$2,780,366,821</b>	<b>8.1%</b>	<b>8%</b>	<b>0.1%</b>	<b>6% - 10%</b>	<b>Yes</b>	<b>8%</b>
<b>Opportunistic Equity<sup>2,3</sup></b>	<b>\$430,563,948</b>	<b>1.2%</b>	<b>0%</b>	<b>1.2%</b>			<b>0%</b>
<b>Total Equity</b>	<b>\$19,402,595,814</b>	<b>56.2%</b>	<b>60%</b>	<b>-3.8%</b>	<b>48% - 65%</b>	<b>Yes</b>	<b>58%</b>
<b>Public Markets Fixed Income<sup>1</sup></b>	<b>\$5,857,621,662</b>	<b>17.0%</b>	<b>17%</b>	<b>0.0%</b>			<b>15%</b>
Treasuries Long Duration <sup>4</sup>	\$0	0.0%	0%	0.0%	0% - 10%	Yes	0%
Interest Rate Sensitive	\$4,721,678,841	13.7%	13%	0.7%			11%
High Yield	\$1,135,942,821	3.3%	4%	-0.7%			4%
<b>Private Debt<sup>2</sup></b>	<b>\$3,065,988,256</b>	<b>8.9%</b>	<b>7%</b>	<b>1.9%</b>	<b>8% - 12%</b>	<b>Yes</b>	<b>10%</b>
<b>Opportunistic Debt<sup>2,3</sup></b>	<b>\$1,280,006,744</b>	<b>3.7%</b>	<b>0%</b>	<b>3.7%</b>			<b>0%</b>
<b>Total Fixed Income</b>	<b>\$10,203,616,662</b>	<b>29.6%</b>	<b>24%</b>	<b>5.6%</b>	<b>18% - 35%</b>	<b>Yes</b>	<b>25%</b>
<b>Commodities</b>	<b>\$223,776,510</b>	<b>0.6%</b>	<b>2%</b>	<b>-1.4%</b>	<b>0% - 4%</b>	<b>Yes</b>	<b>2%</b>
<b>Real Estate<sup>2</sup></b>	<b>\$3,118,862,041</b>	<b>9.0%</b>	<b>9%</b>	<b>0.0%</b>	<b>8% - 12%</b>	<b>Yes</b>	<b>10%</b>
<b>Infrastructure<sup>2</sup></b>	<b>\$331,287,085</b>	<b>1.0%</b>	<b>0%</b>	<b>1.0%</b>	<b>0% - 3%</b>	<b>Yes</b>	<b>0%</b>
<b>Farmland and Timber<sup>2</sup></b>	<b>\$188,959,819</b>	<b>0.5%</b>	<b>0%</b>	<b>0.5%</b>	<b>0% - 3%</b>	<b>Yes</b>	<b>0%</b>
<b>Opportunistic Inflation-Linked<sup>3</sup></b>	<b>\$0</b>	<b>0.0%</b>	<b>0%</b>	<b>0.0%</b>			<b>0%</b>
<b>Total Inflation-Linked</b>	<b>\$3,862,885,455</b>	<b>11.2%</b>	<b>11%</b>	<b>0.2%</b>	<b>10% - 16%</b>	<b>Yes</b>	<b>12%</b>
<b>Multi-Asset Class Strategies</b>	<b>\$1,046,795,775</b>	<b>3.0%</b>	<b>5%</b>	<b>-2.0%</b>	<b>0% - 12%</b>	<b>Yes</b>	<b>5%</b>
<b>Operating Cash (Non Assetized)<sup>4</sup></b>	<b>\$3,267,882</b>	<b>0.0%</b>	<b>0%</b>				
<b>Total</b>	<b>\$34,519,161,589</b>	<b>100%</b>	<b>100%</b>				<b>100%</b>

<sup>1</sup>Domestic Equity, International Equity, and U.S. Fixed Income market values include residual values remaining in terminated manager accounts.  
<sup>2</sup>Values shown for private markets portfolios include cash flows that have occurred since the end of October 6, 2016  
<sup>3</sup>Aggregate Opportunistic asset classes not to exceed 10%.  
<sup>4</sup>Assetized cash market value is allocated to its current policy benchmark asset class.  
<sup>5</sup>Includes Equity Transition account  
 Note: Interim SAA Policy includes proration of 3% Private Debt and 1% 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 October 6, 2016. Data shown above will differ from what is presented in the 3Q 2016 Board Report.  
 Market values include manager held cash.

- **Two Asset Class Committee meetings have been held since the last time we provided an update on the ASRS Asset Class Committee Meetings.**
- **August 11, 2016 – Private Markets Committee**
  - Real Estate manager recommendation (\$500mm)
    - Consistent with strategic plan at the Total Fund level (SAAP Target 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
- **September 22, 2016 – Combined Public and Private Markets Committee**
  - Public Markets Monthly Status Report
  - Private Markets Monthly Status Report, General Discussion and Review of Deal Flow
  - Semi-Annual Private Markets SMA report
  - Opportunistic Debt manager withdrawals
    - Consistent with strategic plan at the Total Fund level (SAAP Target is 0%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

# Market Environment Update



	2009	2010	2011	2012	2013	2014	2015	Q1	Q2	Q3	Sept	YTD
<b>EM Local Credit</b>	22.0%	15.7%	-1.8%	16.8%	-9.0%	-5.7%	-14.9%	11.0%	2.7%	2.7%	2.0%	17.1%
<b>EM Equity</b>	78.5%	18.9%	-18.4%	18.2%	-2.6%	-2.2%	-14.9%	5.7%	0.7%	9.0%	1.3%	16.0%
<b>US High Yield</b>	58.2%	15.1%	5.0%	15.8%	7.4%	2.5%	-4.5%	3.4%	5.5%	5.6%	0.7%	15.1%
<b>US Long Treasuries</b>	-12.9%	9.4%	29.9%	3.6%	-12.7%	25.1%	-1.2%	8.2%	6.4%	-0.4%	-1.6%	14.7%
<b>Global Credit</b>	2.6%	5.2%	6.4%	1.6%	-4.0%	-0.5%	-3.6%	7.1%	3.4%	0.3%	0.7%	11.1%
<b>US Small/Mid Cap</b>	34.4%	26.7%	-2.5%	17.9%	36.8%	7.1%	-2.9%	0.4%	3.6%	6.6%	0.5%	10.8%
<b>Commodities</b>	18.9%	16.8%	-13.3%	-1.1%	-9.5%	-17.0%	-24.7%	0.4%	12.8%	-3.9%	3.1%	8.9%
<b>US Large Cap</b>	26.5%	15.1%	2.1%	16.0%	32.4%	13.7%	1.4%	1.3%	2.5%	3.9%	0.0%	7.8%
<b>US Credit</b>	5.9%	6.5%	7.8%	4.2%	-2.0%	6.0%	0.5%	3.0%	2.2%	0.5%	-0.1%	5.8%
<b>Int'l Developed Equity</b>	31.8%	7.8%	-12.1%	17.3%	22.8%	-4.9%	-0.8%	-3.0%	-1.5%	6.4%	1.2%	1.7%

Source: Bloomberg, Barclays, S&P, Russell, MSCI, JP Morgan, Credit Suisse

S&P 500 = US Large Cap  
 Russell 2500 = US Small/Mid Cap  
 MSCI EAFE = International Developed Equity  
 MSCI EM = Emerging Market Equity  
 Barclays Agg = US Credit  
 Barclays Long Treasury = US Long Treasuries  
 Barclays High Yield = US HY  
 WGBI = Global Credit  
 GBI-EM Global Diversified = EM Local Credit  
 Bloomberg Commodity = Commodities



Index Performance Summary as of 09/30/2016

	2009	2010	2011	2012	2013	2014	2015	Q1	Q2	Q3	Sept	YTD
<b>Barclays US STRIPS 20+ Yr</b>	-36.0%	10.9%	58.5%	3.0%	-21.0%	46.4%	-3.7%	11.4%	9.6%	-0.2%	-2.8%	21.8%
<b>JPM GBI-EM Global Div</b>	22.0%	15.7%	-1.8%	16.8%	-9.0%	-5.7%	-14.9%	11.0%	2.7%	2.7%	2.0%	17.1%
<b>Barclays US Long Credit</b>	16.8%	10.7%	17.1%	12.7%	-6.6%	16.4%	-4.6%	6.8%	6.7%	2.3%	-1.1%	16.5%
<b>MSCI EM</b>	78.5%	18.9%	-18.4%	18.2%	-2.6%	-2.2%	-14.9%	5.7%	0.7%	9.0%	1.3%	16.0%
<b>Alerian MLP</b>	76.4%	35.9%	13.9%	4.8%	27.6%	4.8%	-32.6%	-4.2%	19.7%	1.1%	1.9%	15.9%
<b>Barclays US Govt/Credit Long</b>	1.9%	10.2%	22.5%	8.8%	-8.8%	19.3%	-3.3%	7.3%	6.5%	1.2%	-1.3%	15.7%
<b>Barclays US Corporate HY</b>	58.2%	15.1%	5.0%	15.8%	7.4%	2.5%	-4.5%	3.4%	5.5%	5.6%	0.7%	15.1%
<b>JPM EMBI Global Diversified</b>	29.8%	12.2%	7.3%	17.4%	-5.3%	7.4%	1.2%	5.0%	5.0%	4.0%	0.4%	14.8%
<b>FTSE NAREIT Equity REITs</b>	28.0%	28.0%	8.3%	18.1%	2.5%	30.1%	3.2%	6.0%	7.0%	-1.4%	-1.8%	11.8%
<b>Russell 2000</b>	27.2%	26.9%	-4.2%	16.3%	38.8%	4.9%	-4.4%	-1.5%	3.8%	9.0%	1.1%	11.5%
<b>Citi WGBI</b>	2.6%	5.2%	6.4%	1.6%	-4.0%	-0.5%	-3.6%	7.1%	3.4%	0.3%	0.7%	11.1%
<b>Russell 2500</b>	34.4%	26.7%	-2.5%	17.9%	36.8%	7.1%	-2.9%	0.4%	3.6%	6.6%	0.5%	10.8%
<b>Bloomberg Commodity</b>	18.9%	16.8%	-13.3%	-1.1%	-9.5%	-17.0%	-24.7%	0.4%	12.8%	-3.9%	3.1%	8.9%
<b>Russell 1000</b>	28.4%	16.1%	1.5%	16.4%	33.1%	13.2%	0.9%	1.2%	2.5%	4.0%	0.1%	7.9%
<b>S&amp;P 500</b>	26.5%	15.1%	2.1%	16.0%	32.4%	13.7%	1.4%	1.3%	2.5%	3.9%	0.0%	7.8%
<b>Credit Suisse Leveraged Loan</b>	44.9%	10.0%	1.8%	9.4%	6.2%	2.1%	-0.4%	1.3%	2.9%	3.1%	0.9%	7.5%
<b>MSCI ACWI</b>	34.6%	12.7%	-7.3%	16.1%	22.8%	4.2%	-2.4%	0.2%	1.0%	5.3%	0.6%	6.6%
<b>Barclays US Agg Bond</b>	5.9%	6.5%	7.8%	4.2%	-2.0%	6.0%	0.5%	3.0%	2.2%	0.5%	-0.1%	5.8%
<b>Barclays US Agg Interm</b>	6.5%	6.1%	6.0%	3.6%	-1.0%	4.1%	1.2%	2.3%	1.4%	0.3%	0.2%	4.1%
<b>Barclays Municipal</b>	12.9%	2.4%	10.7%	6.8%	-2.6%	9.1%	3.3%	1.7%	2.6%	-0.3%	-0.5%	4.0%
<b>MSCI EAFE</b>	31.8%	7.8%	-12.1%	17.3%	22.8%	-4.9%	-0.8%	-3.0%	-1.5%	6.4%	1.2%	1.7%
<b>BC US Govt/Credit 1-3 Yr</b>	3.8%	2.8%	1.6%	1.3%	0.6%	0.8%	0.7%	1.0%	0.7%	0.0%	0.1%	1.7%
<b>Credit Suisse Hedge Fund</b>	18.6%	10.9%	-2.5%	7.7%	9.7%	4.1%	-0.7%	-2.2%	0.6%	1.6%	-	0.0%

Source: Bloomberg, Barclays, Alerian, Nareit, MSCI, JP Morgan, Credit Suisse

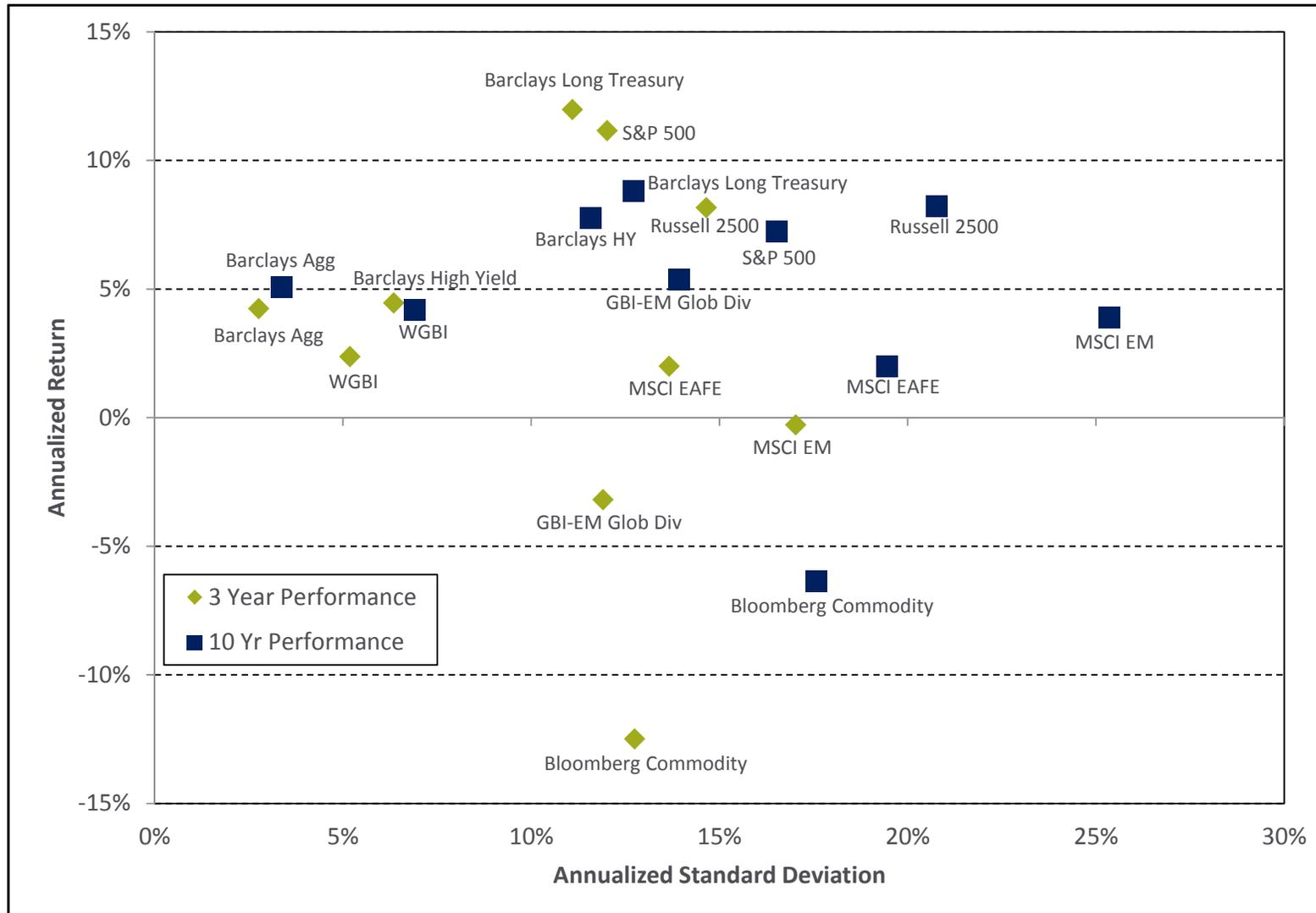


Near Term Broad Market Performance Summary as of 09/30/2016



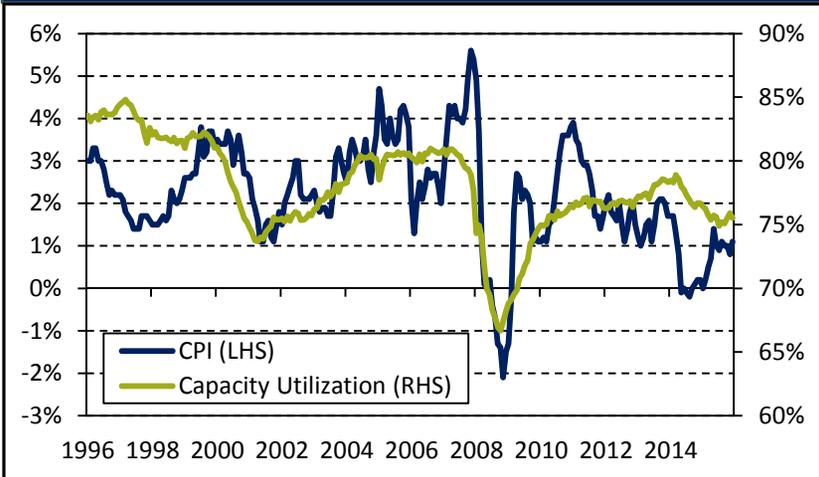
Source: Bloomberg, Standard and Poors, Russell, MSCI, Barclays, Citigroup, JP Morgan  
 \*1 Yr Range: Represents range of cumulative high/low daily index returns for an investment made one year ago

Long Term Broad Market Performance Summary as of 09/30/2016



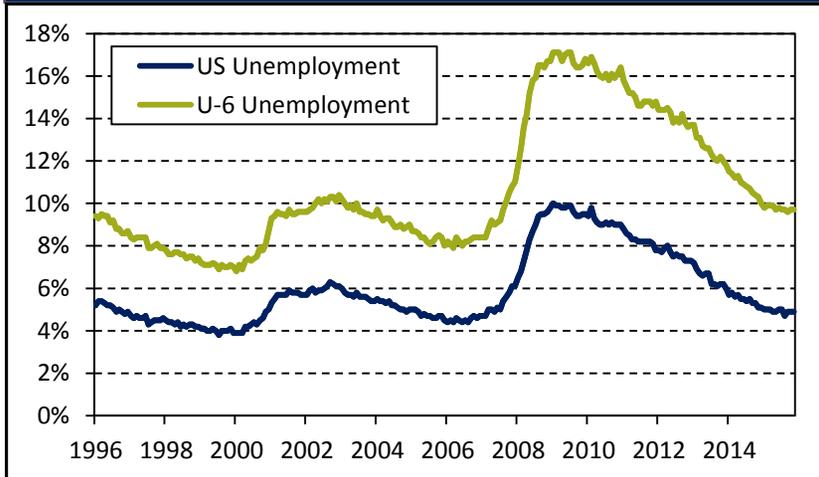
Source: Bloomberg, Standard and Poors, Russell, MSCI, Barclays, Citigroup, JP Morgan

**Inflation experiences slight uptick**



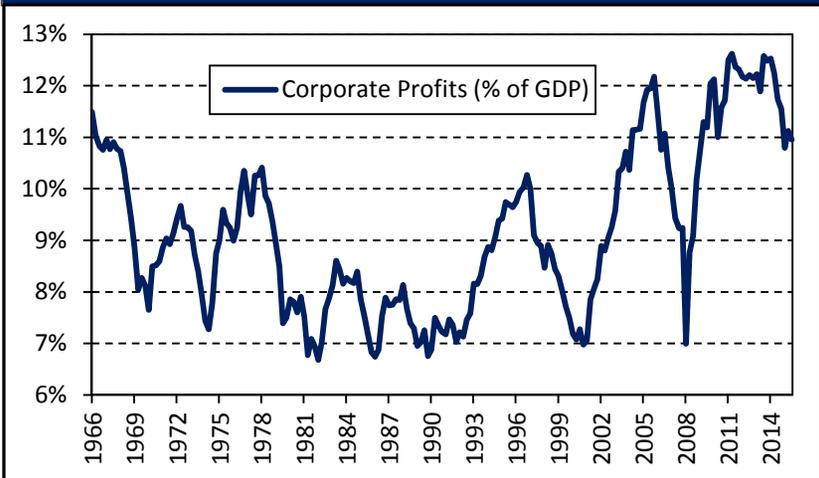
Source: Bloomberg, Federal Reserve, Bureau of Labor Statistics

**Unemployment remains steady**



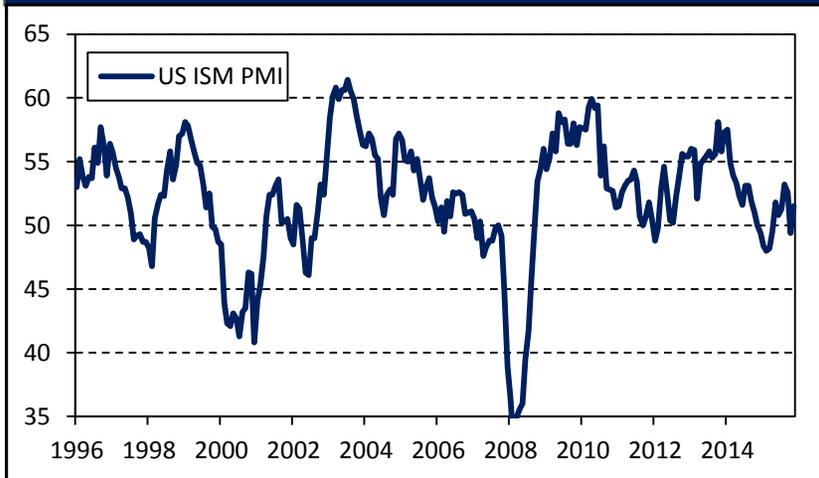
Source: Bloomberg, Bureau of Labor Statistics

**Corporate profits continue to decline**



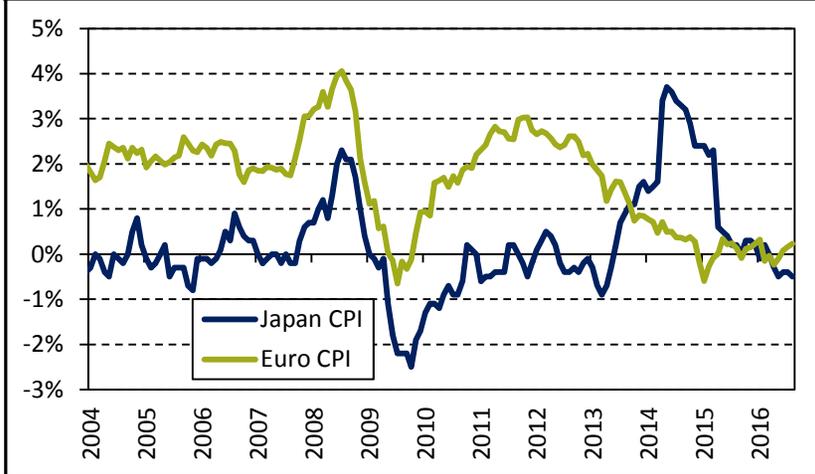
Source: Bloomberg, Bureau of Economic Analysis

**Manufacturing is relatively neutral**



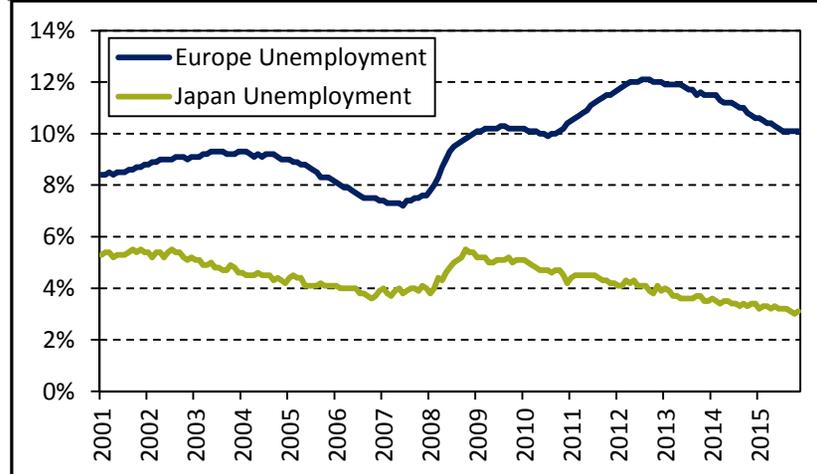
Source: Bloomberg, Institute for Supply Management

**Inflation in Europe experiences a slight uptick**



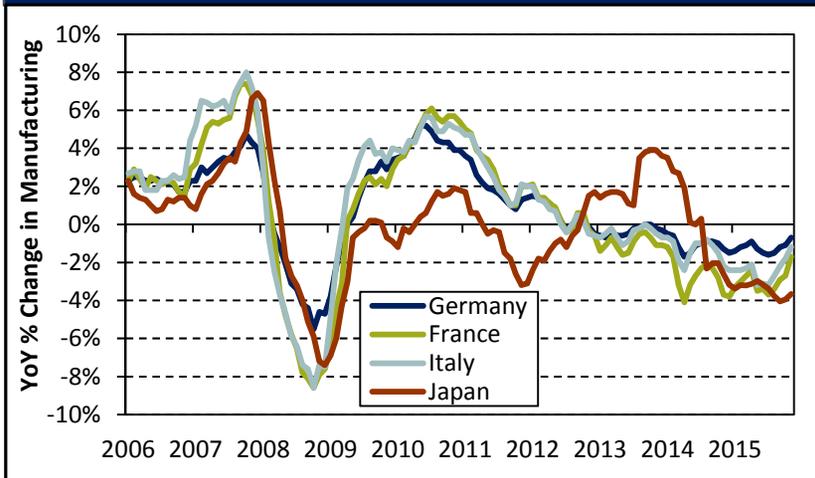
Source: Bloomberg, Japan Ministry of Internal Affairs and Communications, Eurostat

**Europe unemployment trending lower**



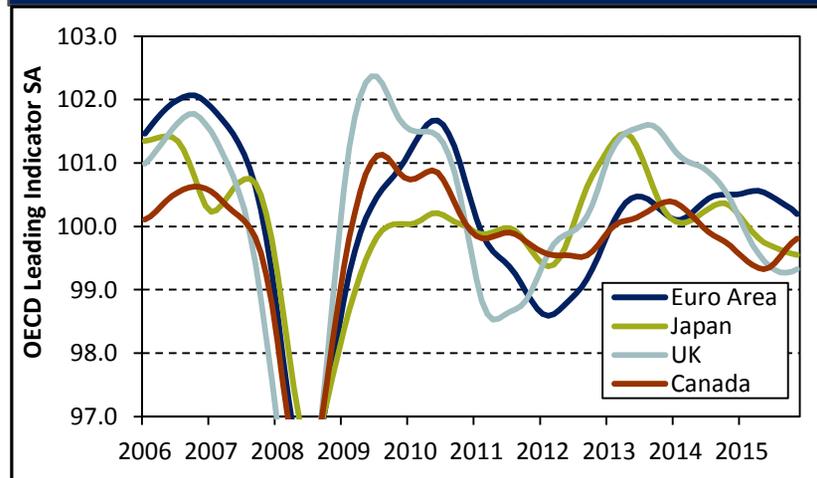
Source: Bloomberg, Japan Ministry of Internal Affairs and Communications, Eurostat

**Manufacturing approaches neutral territory**



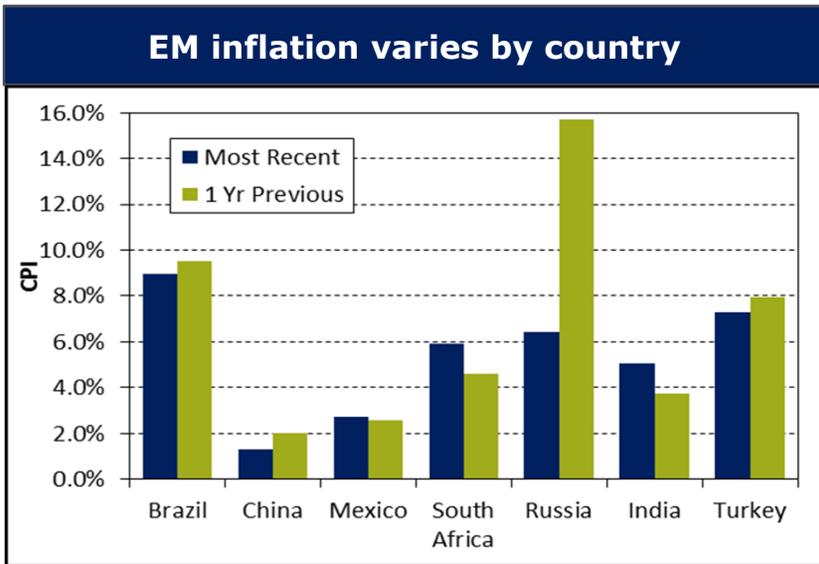
Source: Bloomberg, OECD, Eurostat

**Euro Area and Japan leading indicators have declined**

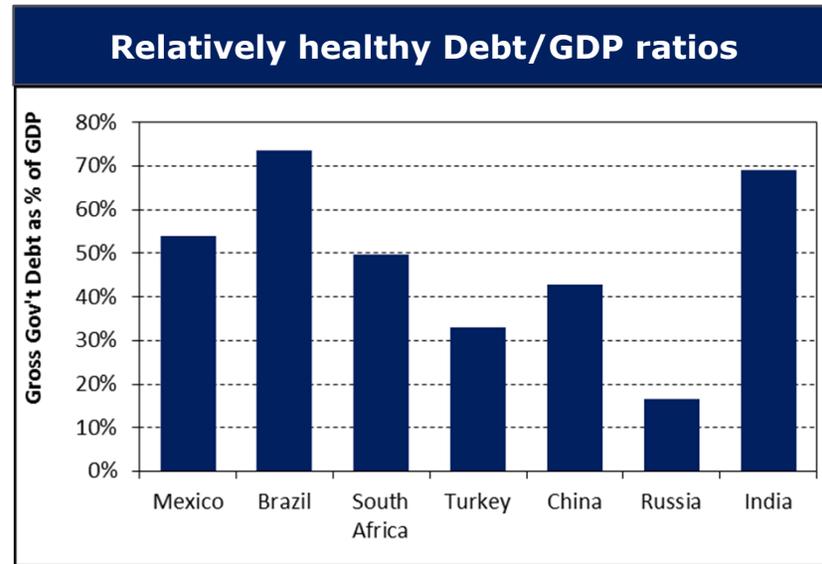


Source: Bloomberg, OECD

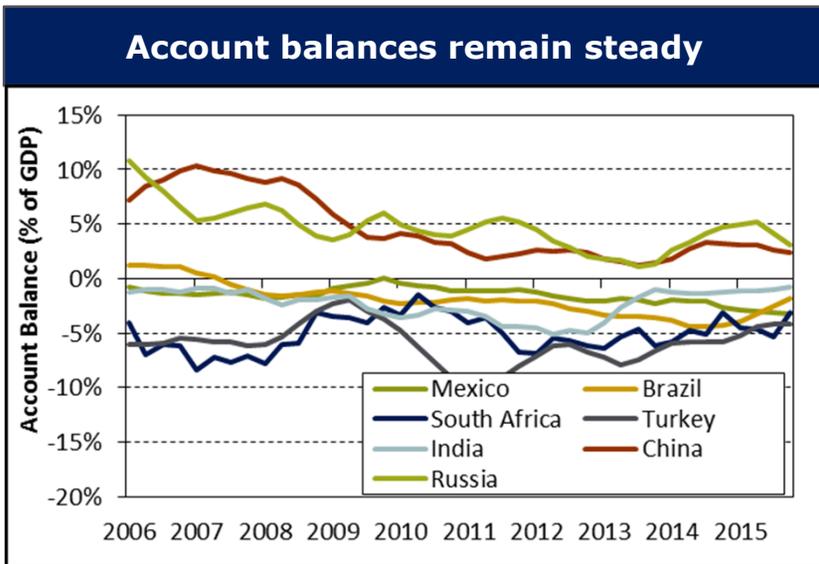
Emerging Market Economic Indicators



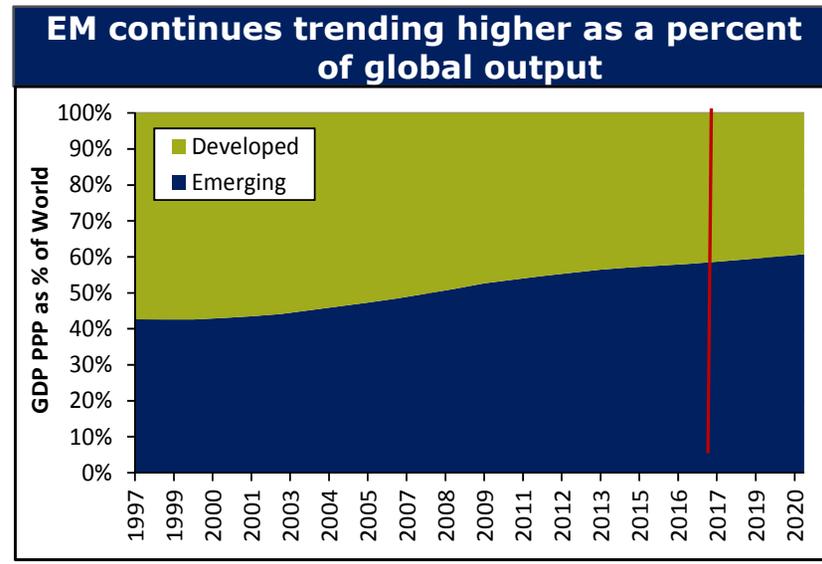
Source: Bloomberg



Source: Bloomberg, IMF



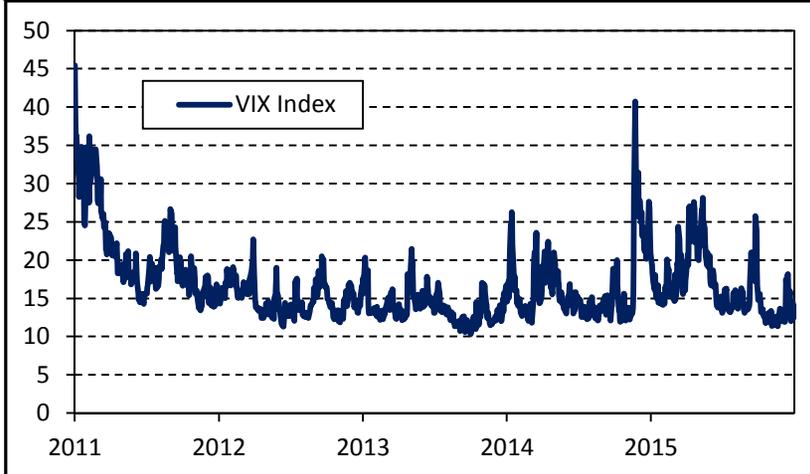
Source: Bloomberg



Source: Bloomberg, IMF

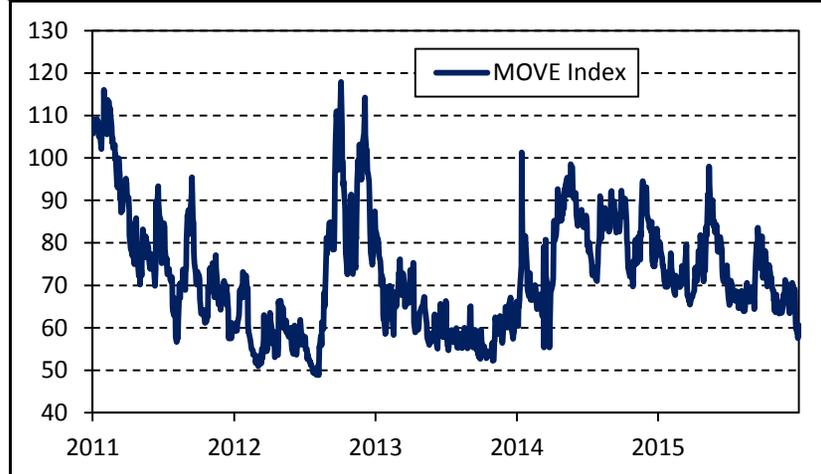
Volatility

Equity volatility seeing recent decrease



Source: Bloomberg, CBOE

Treasury volatility continues decreasing as a rate hike approaches



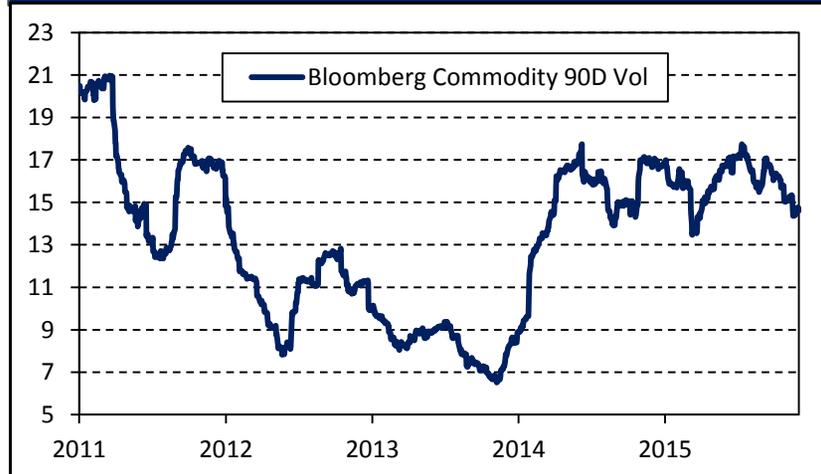
Source: Bloomberg, Merrill Lynch

Currency volatility remains elevated



Source: Bloomberg, Deutsche Bank

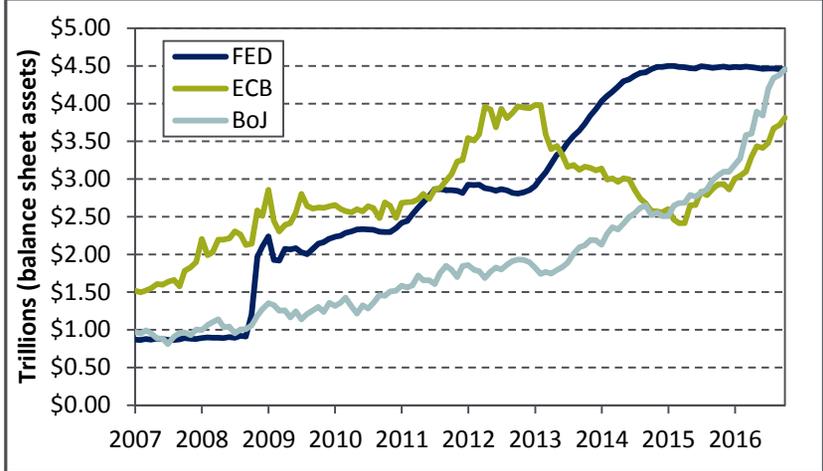
Commodity volatility continues to decline



Source: Bloomberg, Merrill Lynch

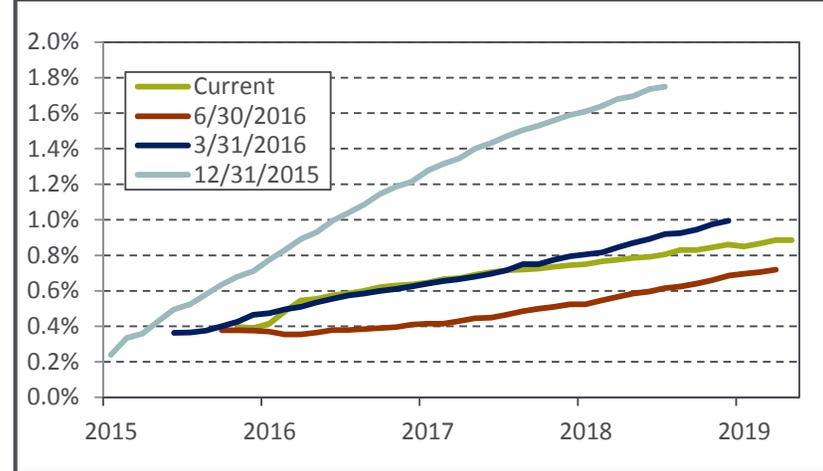
Central Banks

Central banks continue increasing balance sheet size



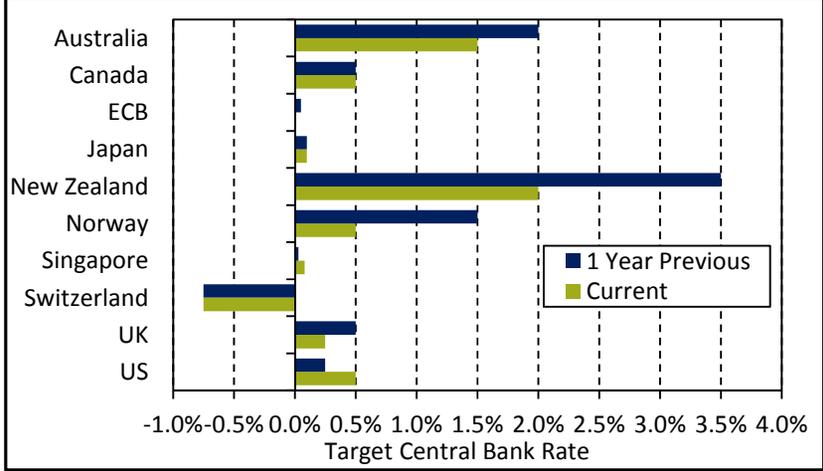
Source: Bloomberg, Federal Reserve, Bank of Japan, ECB, NEPC

Market expectations for interest rates echo the lower for longer sentiment



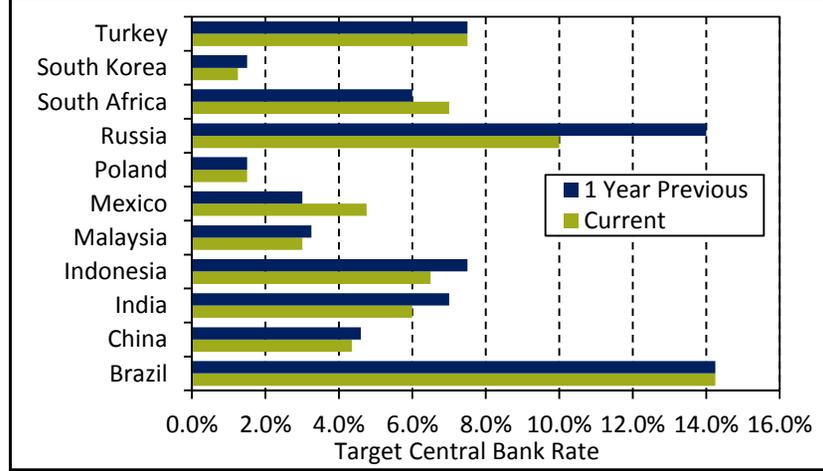
Source: Bloomberg, Federal Reserve

Developed market interest rates are mostly lower than one year previous



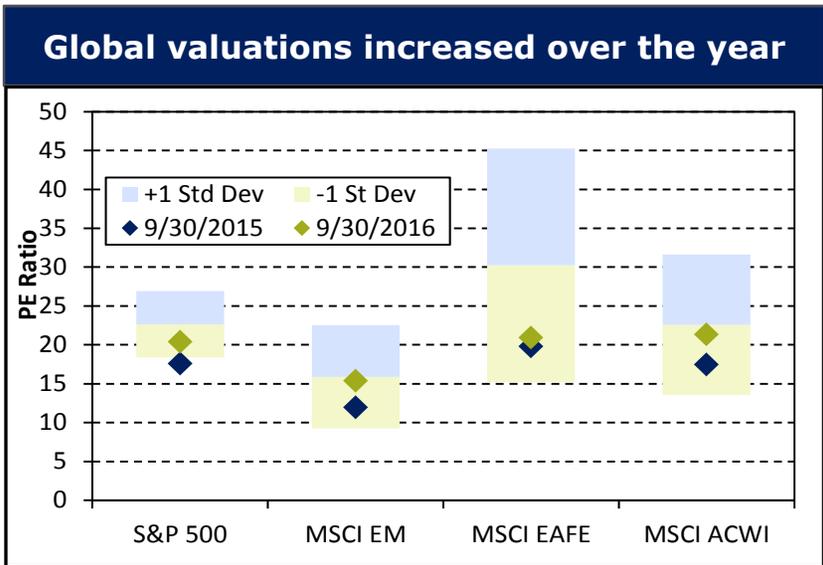
Source: Bloomberg

EM central bank policies vary by country-specific economic conditions



Source: Bloomberg

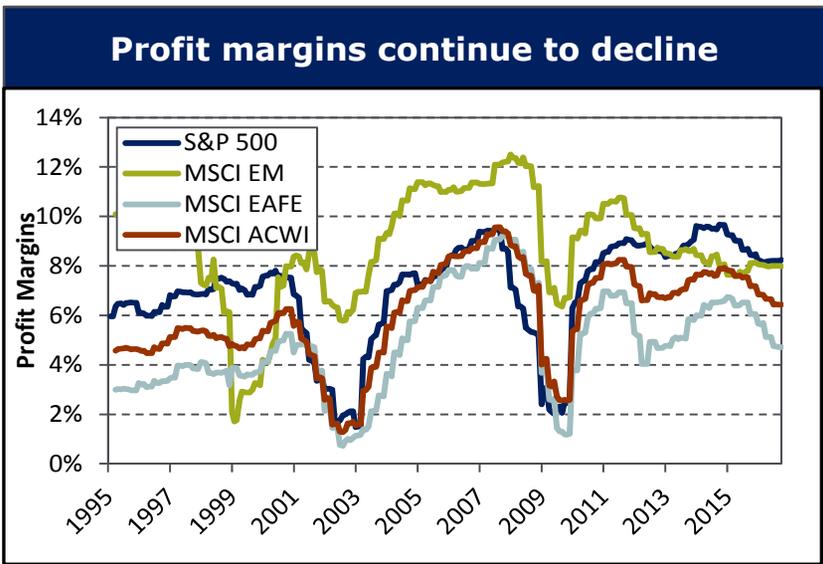
Global Equity



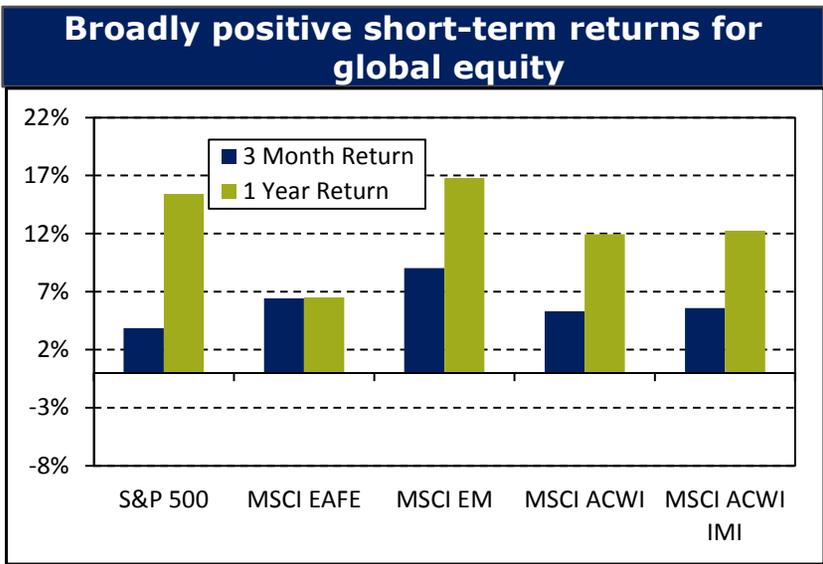
Source: Bloomberg, Standard and Poors, MSCI \*MSCI EAFE is ex UK Telecom  
\*Standard deviation calculations based on 20 years of data



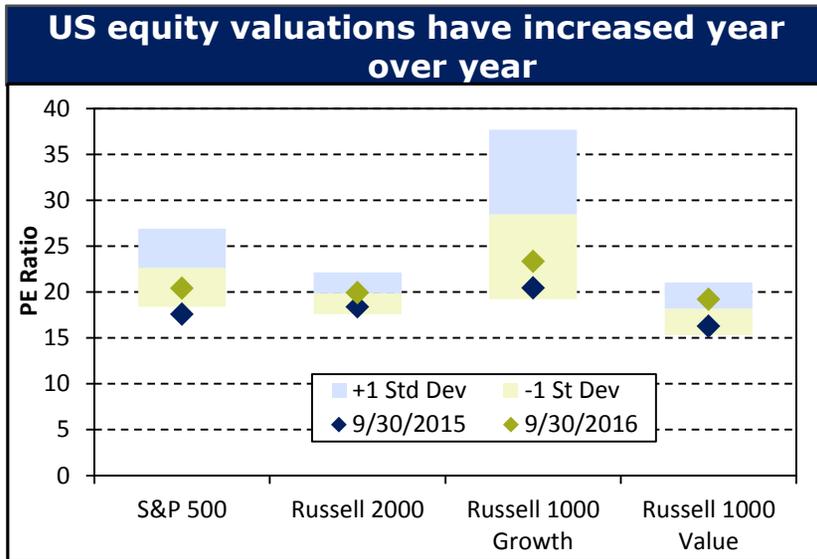
Source: Bloomberg, Standard and Poors, MSCI



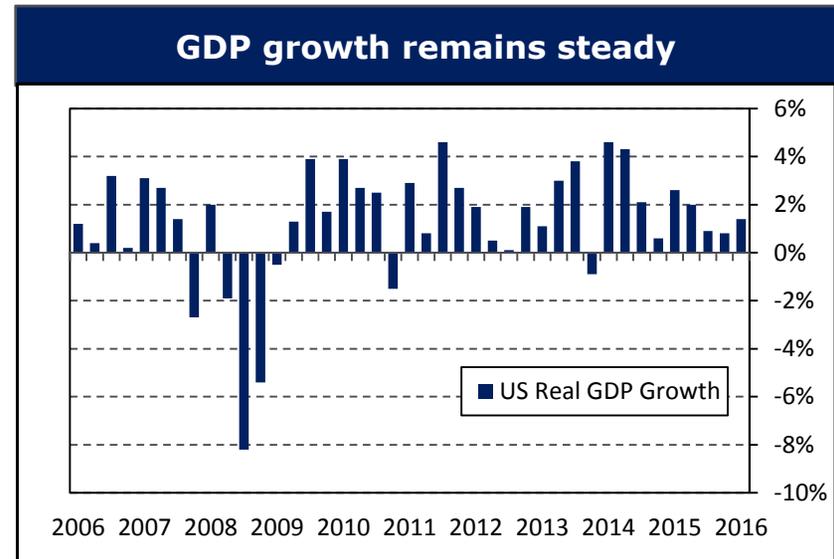
Source: Bloomberg, MSCI



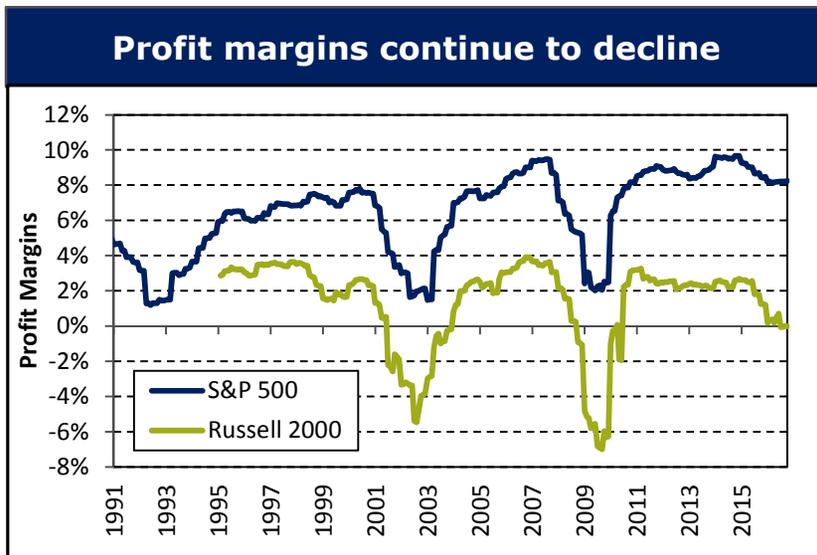
Source: Bloomberg, MSCI



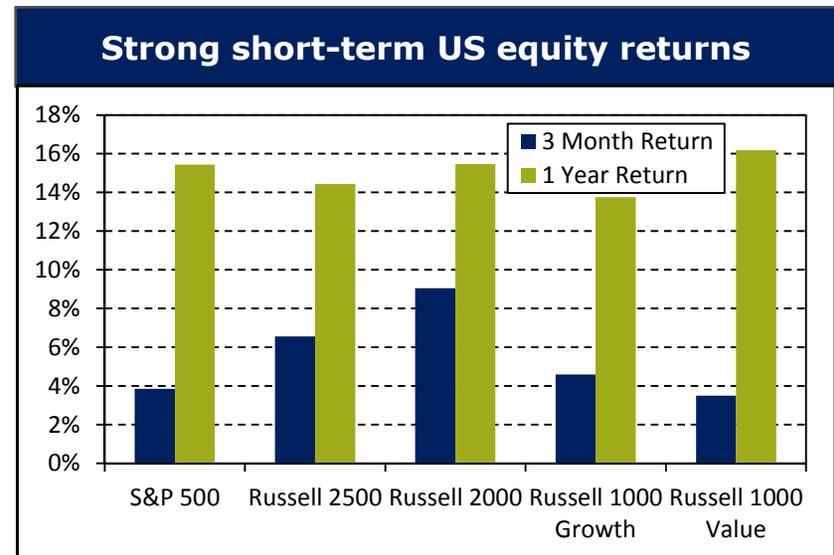
Source: Bloomberg, Standard and Poors, Russell \*Russell 2000 PE is index adjusted positive\* Standard deviation calculations based on 20 years of data



Source: Bloomberg, Bureau of Economic Analysis

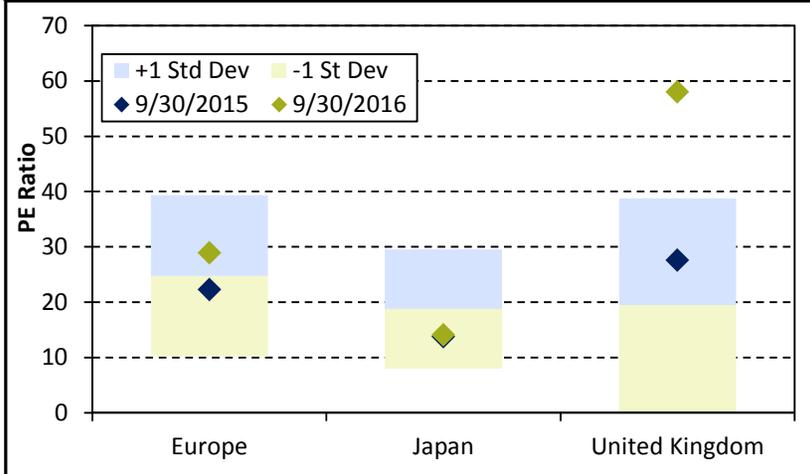


Source: Bloomberg, Standard and Poors, Russell



Source: Bloomberg, Standard and Poors, Russell

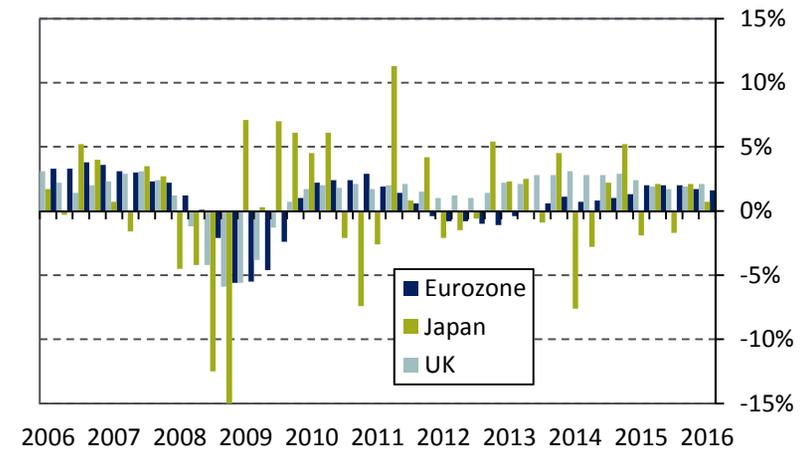
### UK PE ratio remains elevated



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

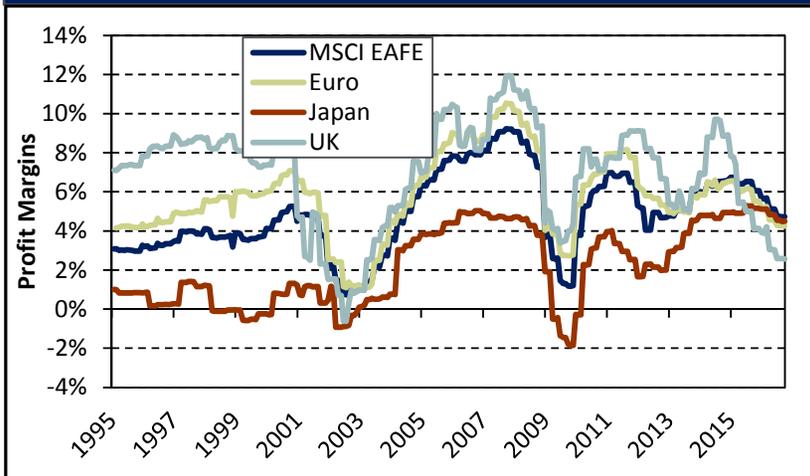
\*Standard deviation calculations based on 20 years of data, with Europe since 12/1998

### Global growth varies by country



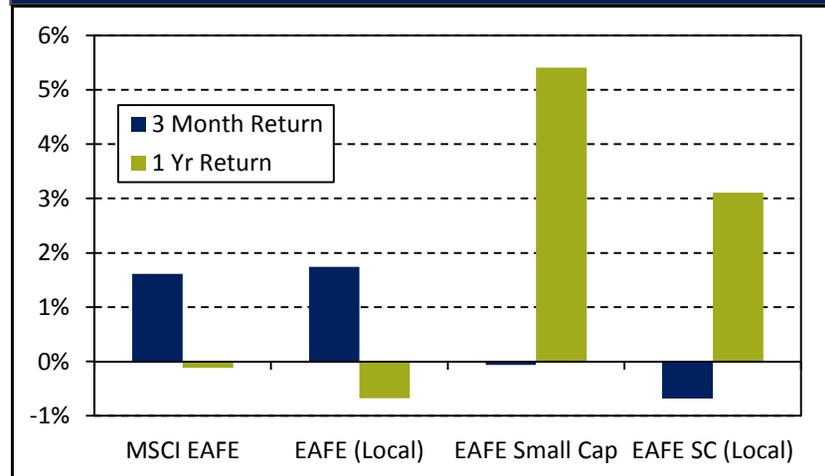
Source: Bloomberg

### Margins continue to decline, particularly in the UK



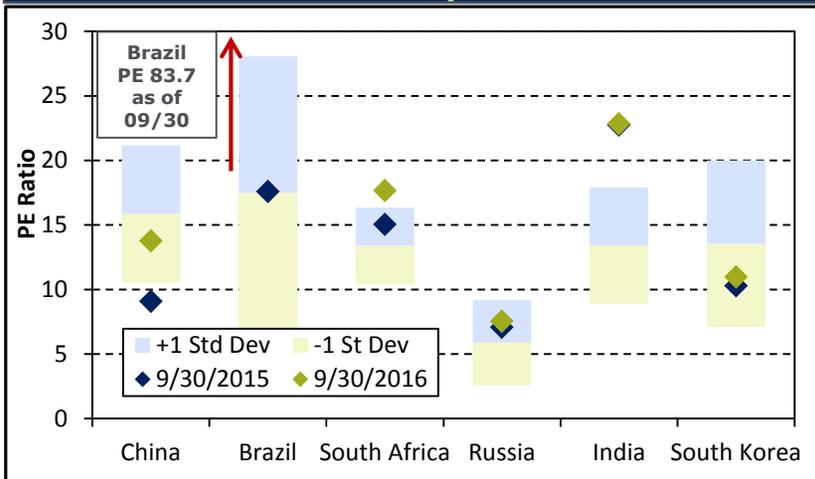
Source: Bloomberg, MSCI

### EAFE small cap returns have struggled in recent months



Source: Bloomberg, MSCI

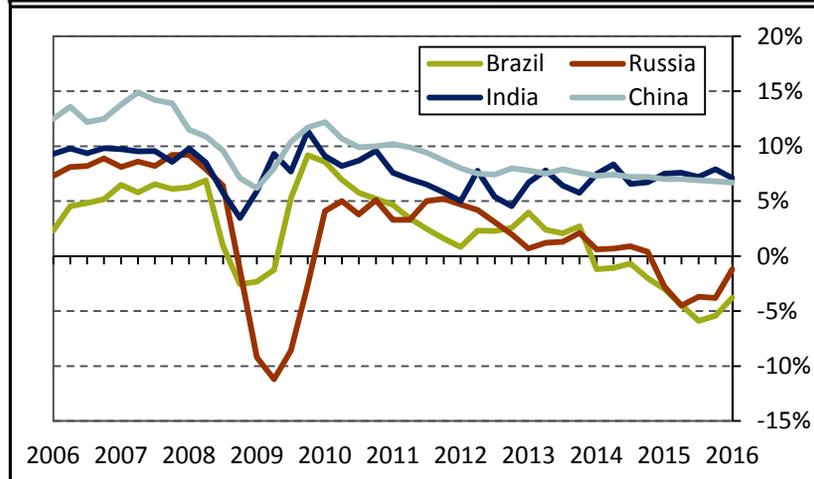
**Regional valuations similar year over year with the exception of Brazil**



Source: Bloomberg, MSCI

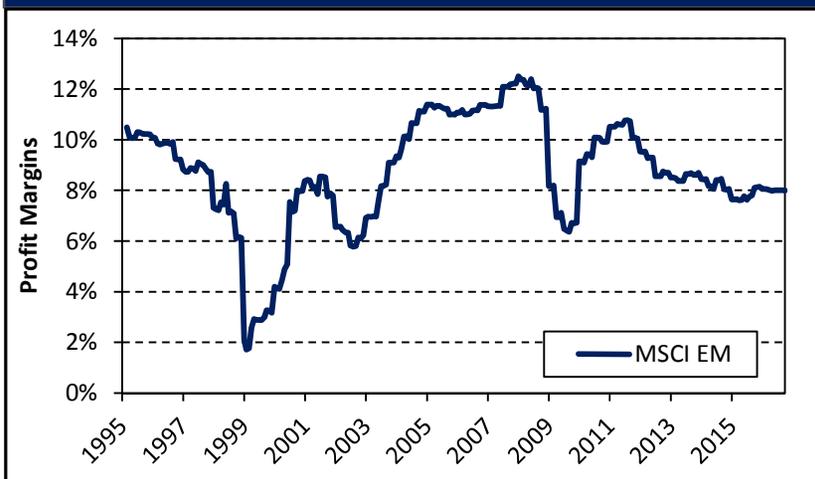
\*Standard deviation calculations based on 20 years of data, with Russia since 01/1998

**Russia and Brazil experience upward trends in growth**



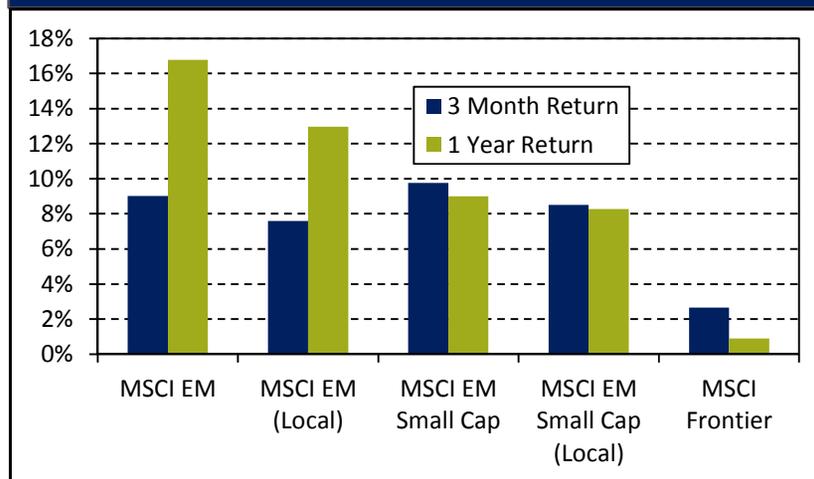
Source: Bloomberg

**Profit margins in line with history**



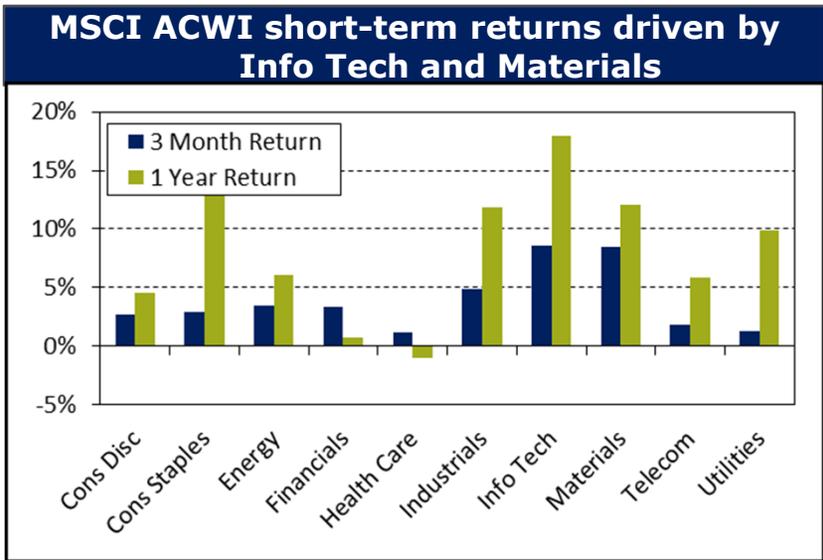
Source: Bloomberg, MSCI

**Strong short-term returns for EM**

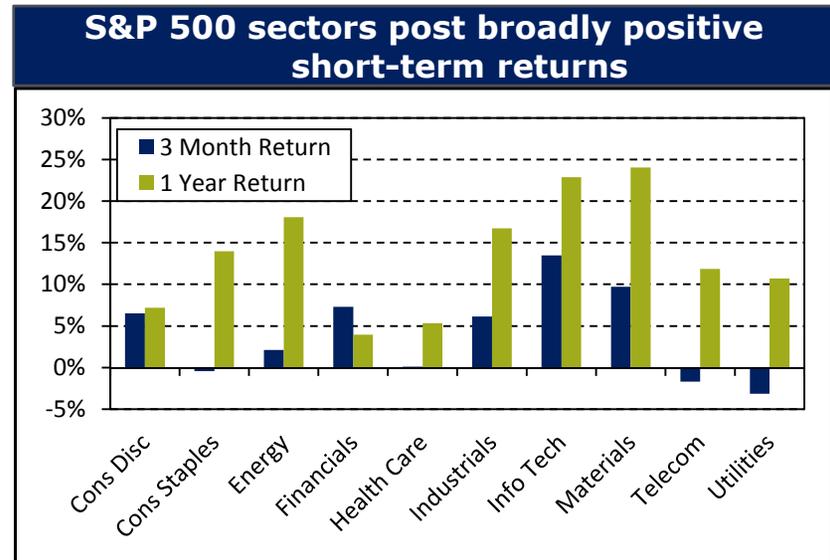


Source: Bloomberg, MSCI

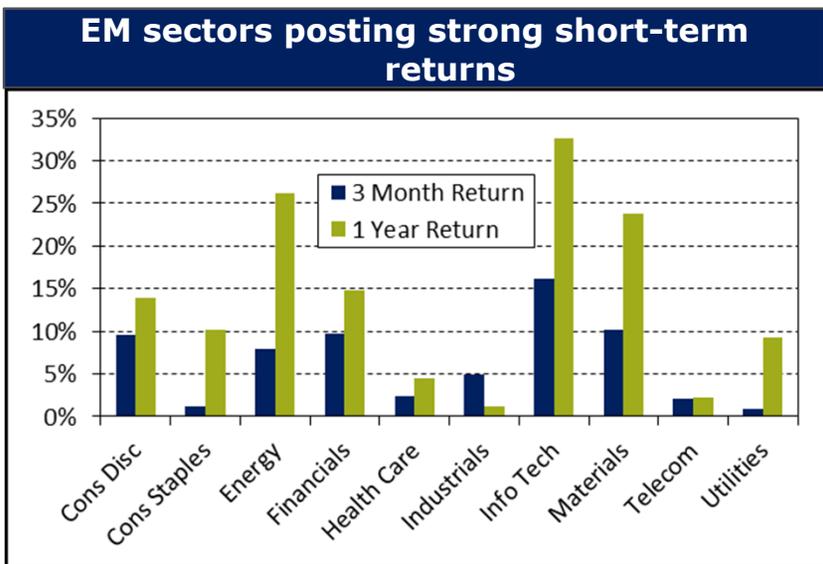
Global Equity by Sector



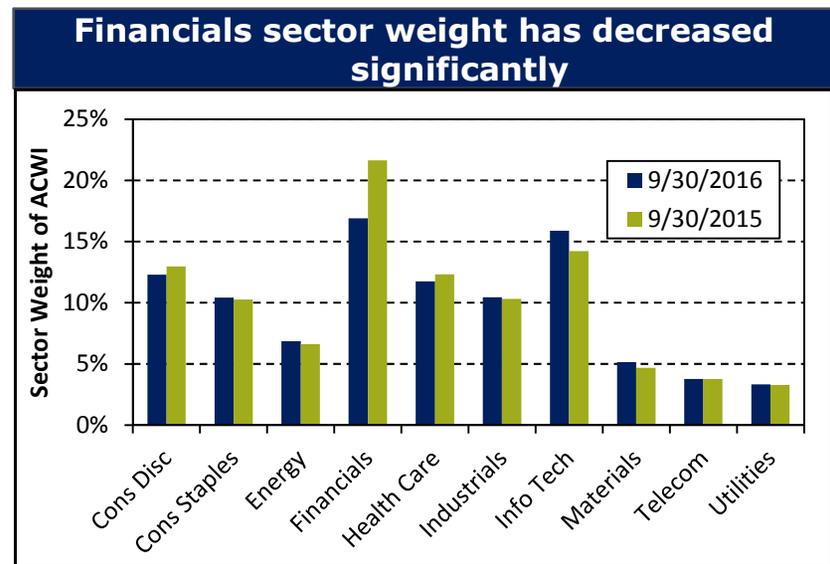
Source: Bloomberg, MSCI



Source: Bloomberg, Standard and Poors

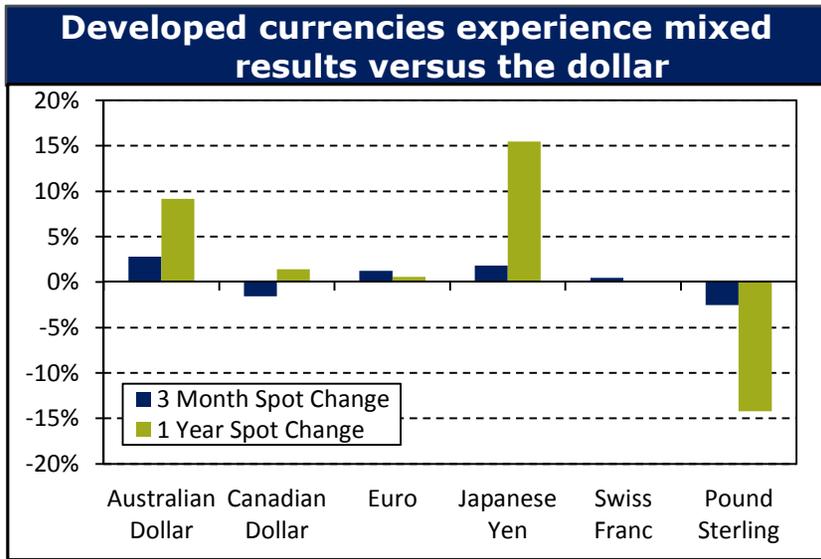


Source: Bloomberg, MSCI

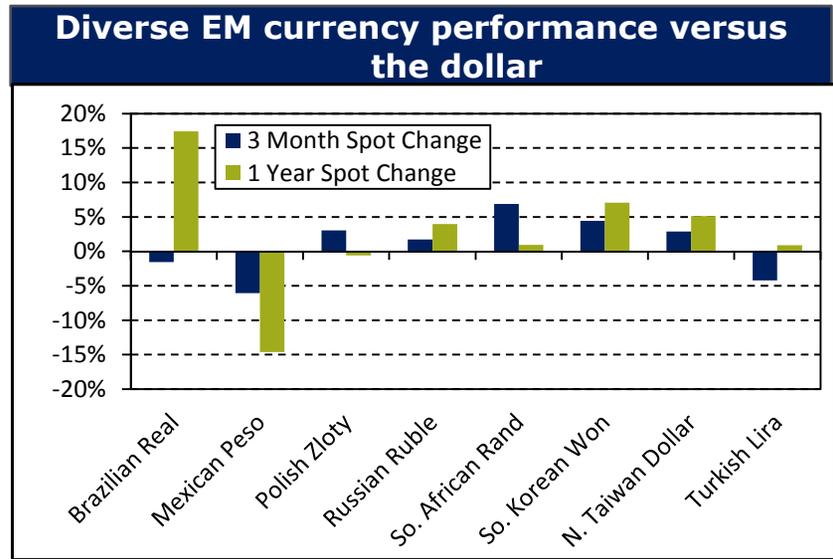


Source: Bloomberg, MSCI

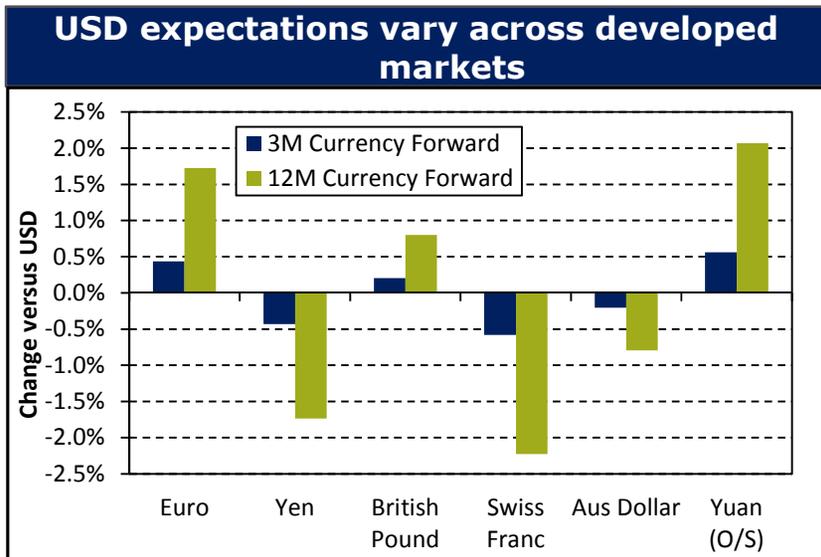
Currencies



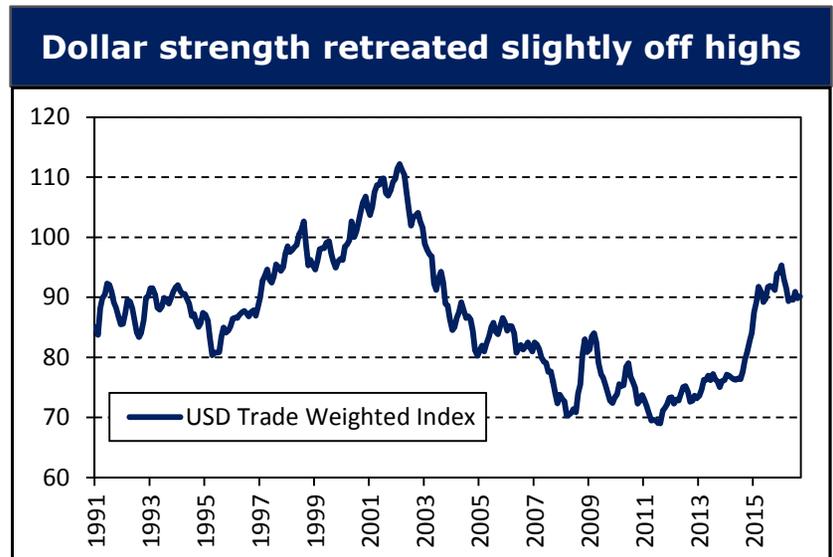
Source: Bloomberg



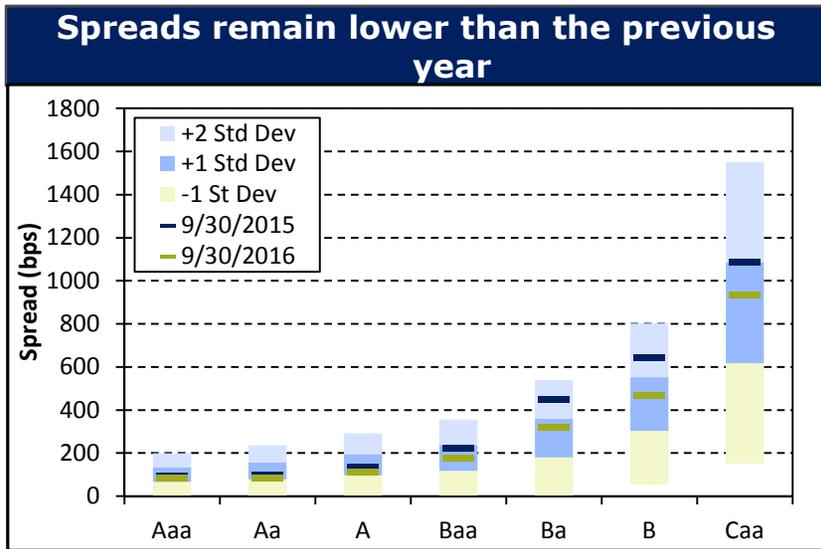
Source: Bloomberg



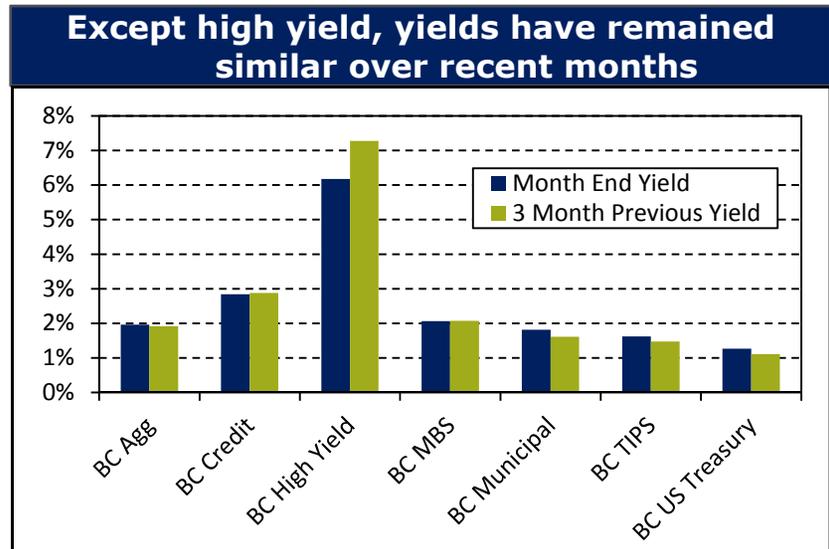
Source: Bloomberg



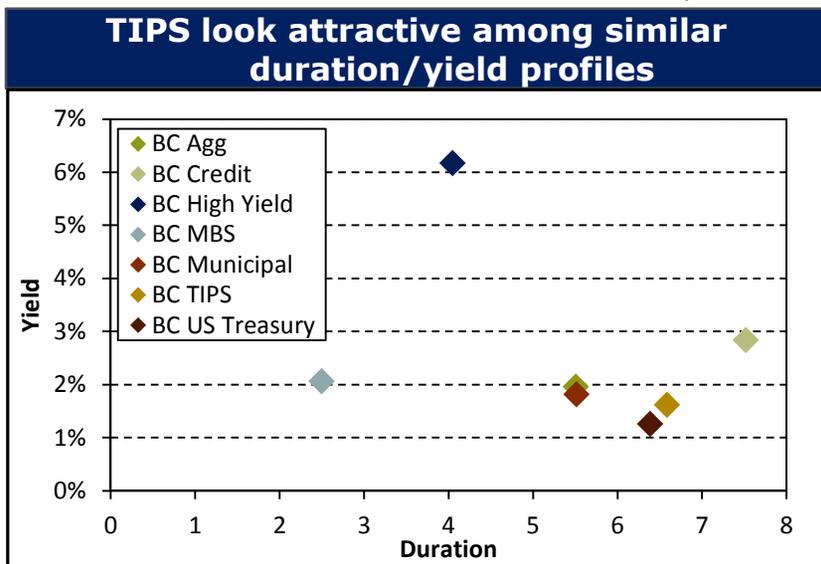
Source: Bloomberg, Federal Reserve



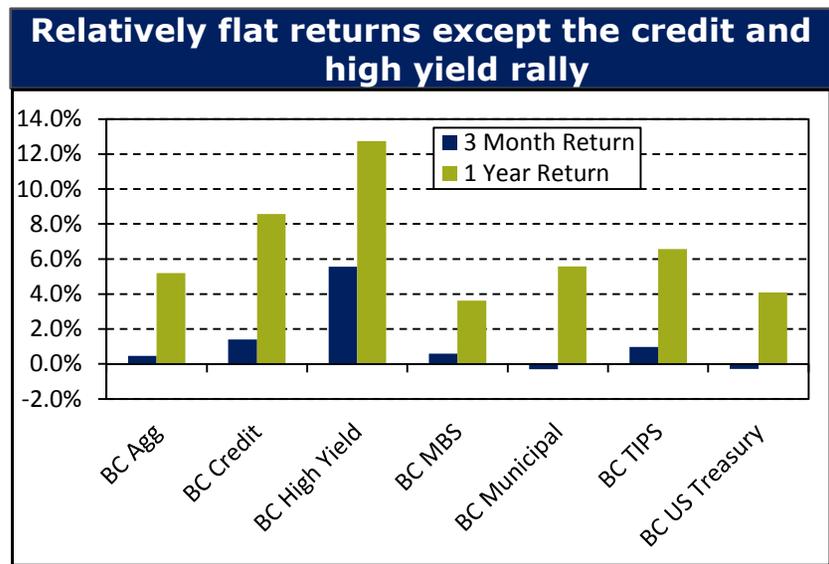
Source: Bloomberg, Barclays  
\*Standard deviation calculations based on 20 years of data



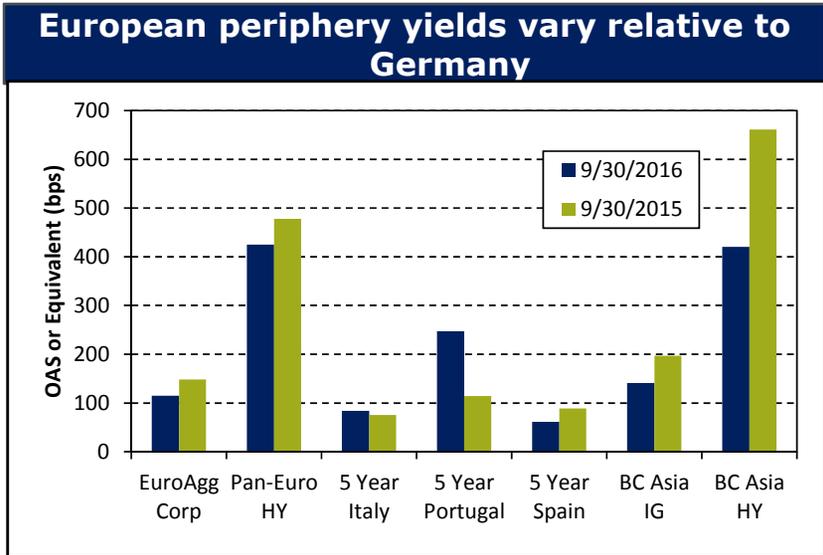
Source: Bloomberg, Barclays



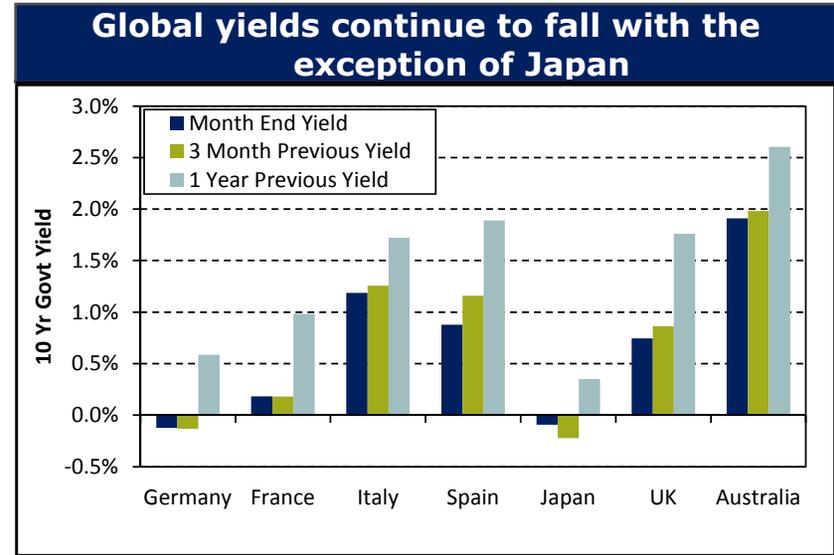
Source: Bloomberg, Barclays



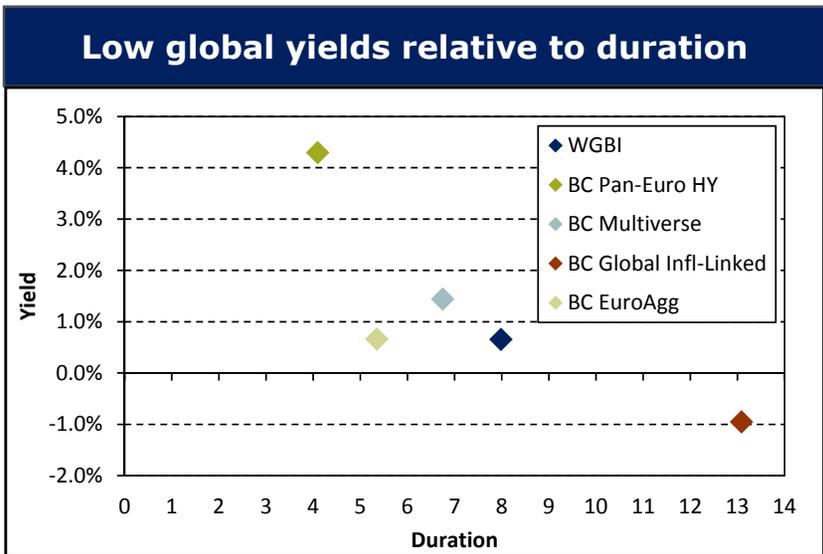
Source: Bloomberg, Barclays



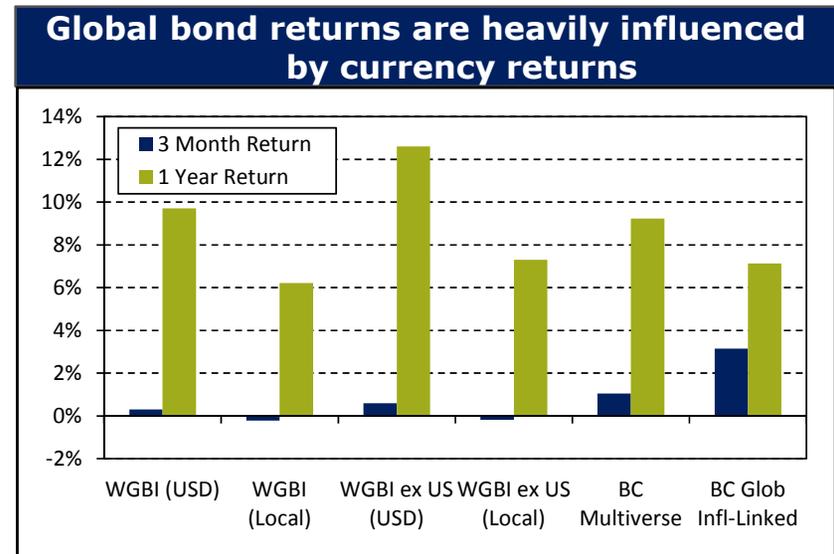
Source: Barclays, Bloomberg, \*European periphery spreads are over equivalent German Bund



Source: Bloomberg



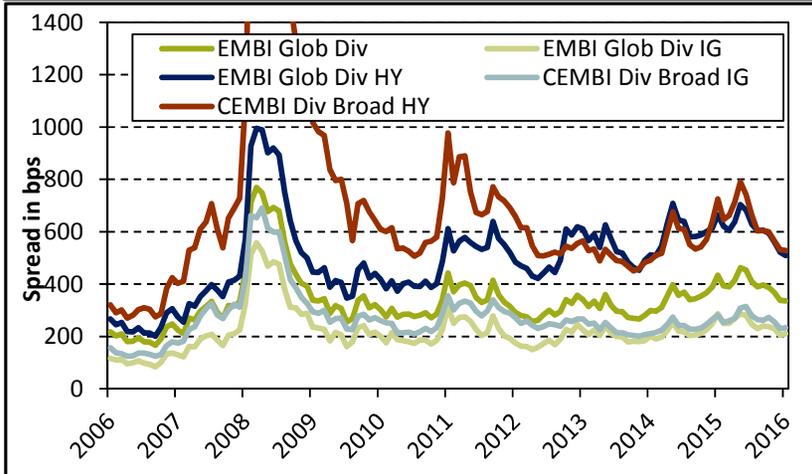
Source: Bloomberg, Citigroup, Barclays



Source: Bloomberg, Citigroup, Barclays

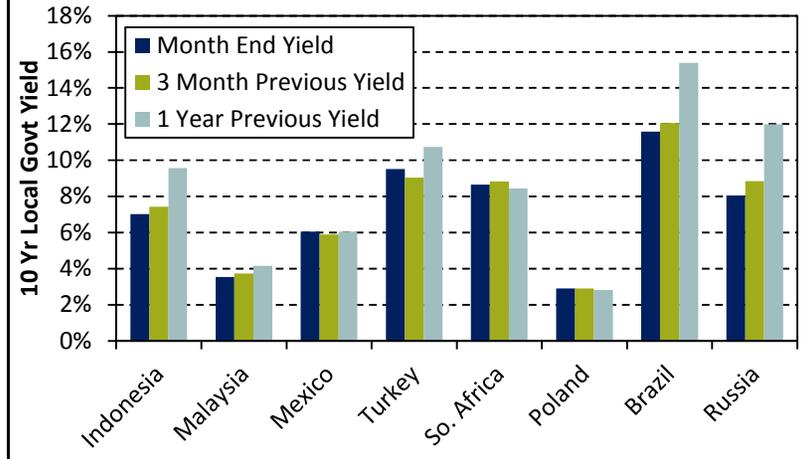


**Spreads continue to decline**



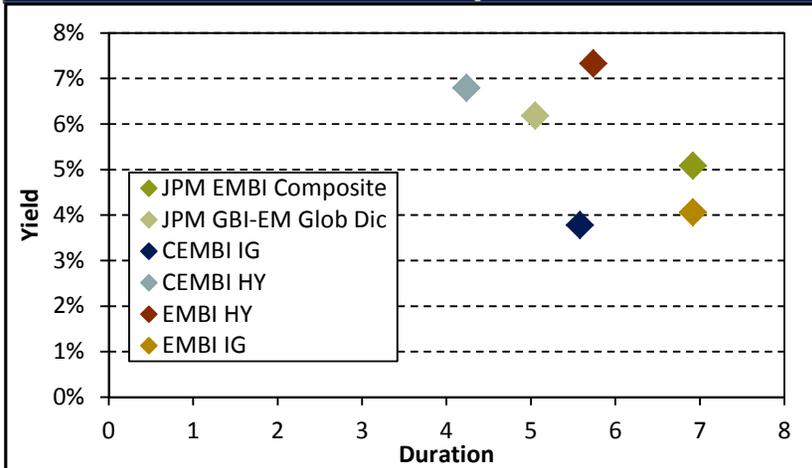
Source: Bloomberg, JP Morgan

**EM local bond yields have declined for more volatile markets**



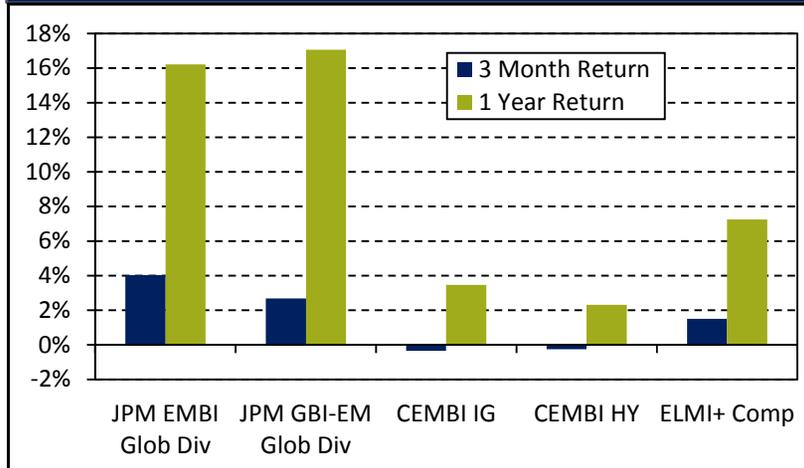
Source: Bloomberg

**EM yields remain attractive versus global counterparts**



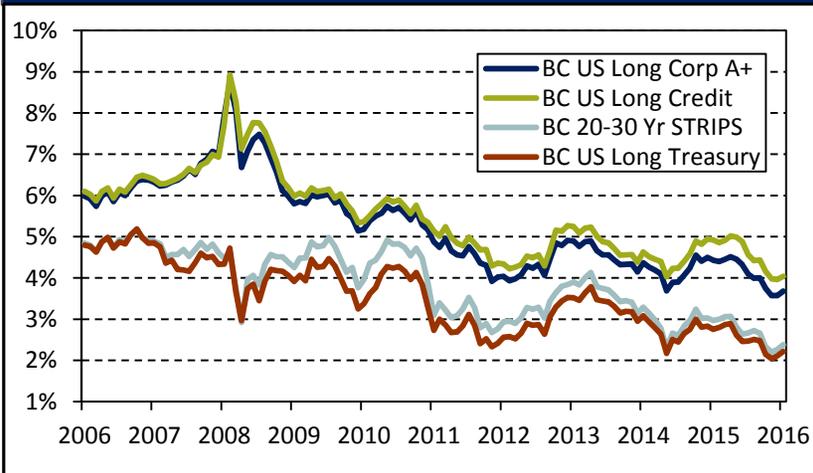
Source: Bloomberg, JP Morgan

**EM debt continues to perform well**



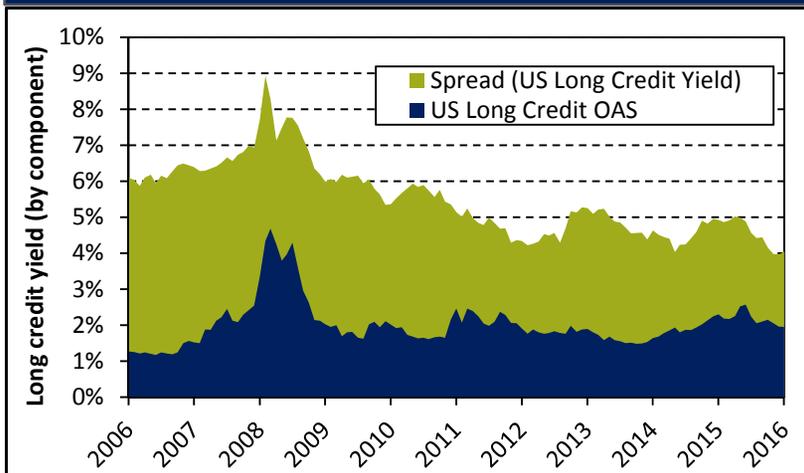
Source: Bloomberg, JP Morgan

**Long duration yields continue to decline**



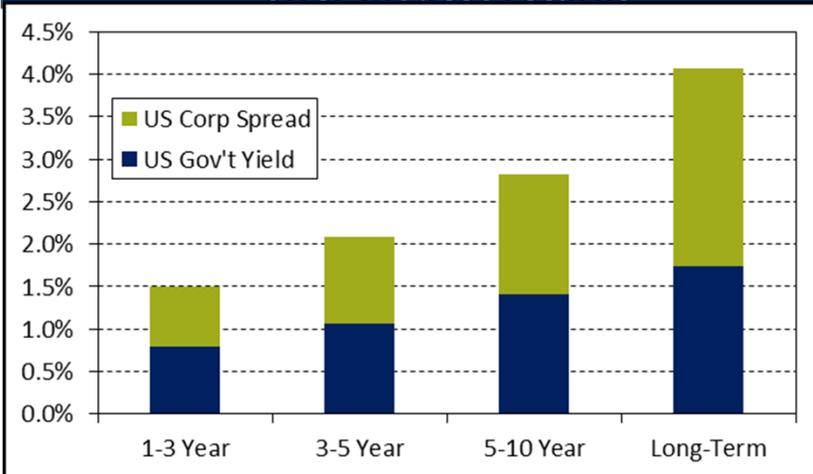
Source: Bloomberg, Citigroup, Barclays

**Lower yields driven by real rates**



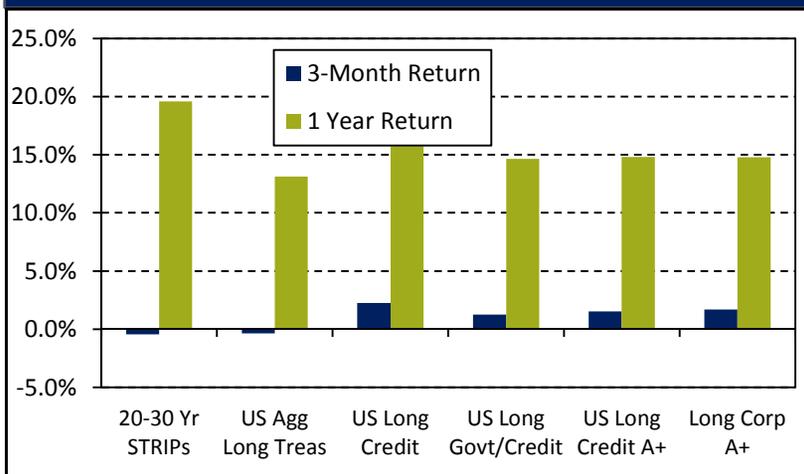
Source: Bloomberg, US Treasury, Barclays, NEPC

**Yield and spread components continue to offer modest returns**



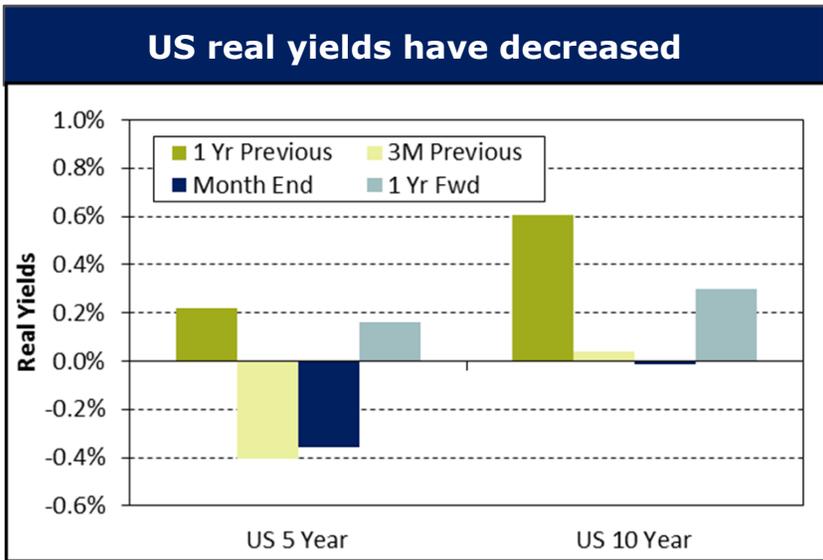
Source: Bloomberg, Barclays

**Long duration short-term returns are flat**

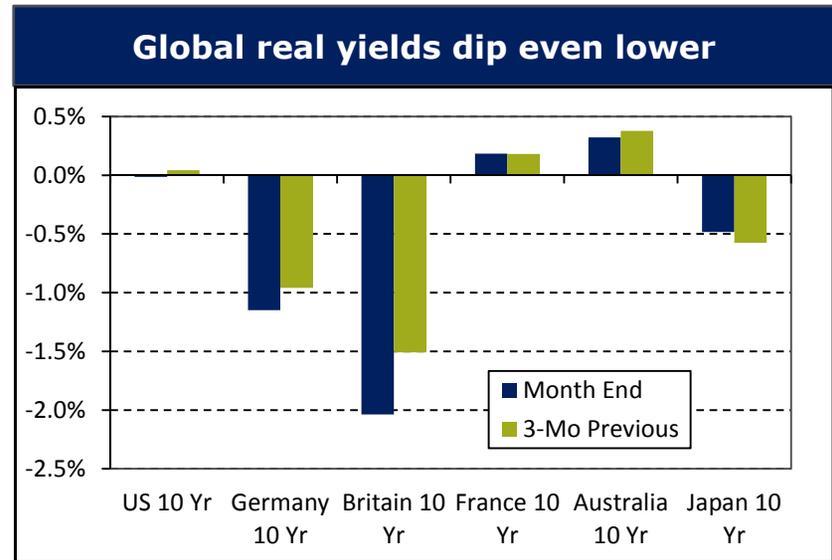


Source: Bloomberg, Barclays

**Inflation and Real Rates**



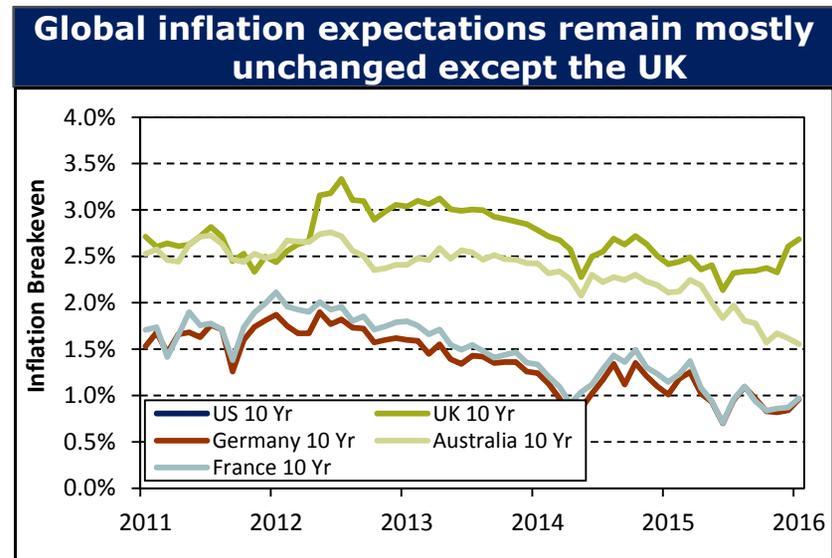
Source: Bloomberg



Source: Bloomberg



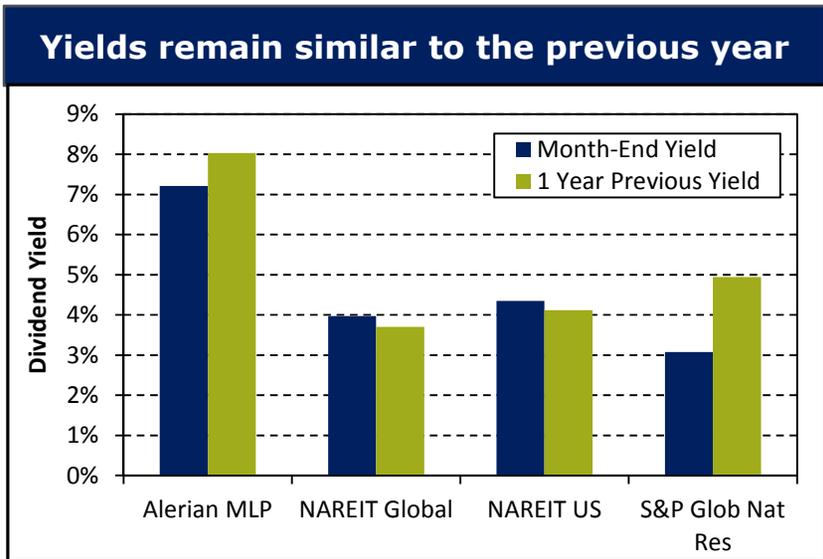
Source: Bloomberg



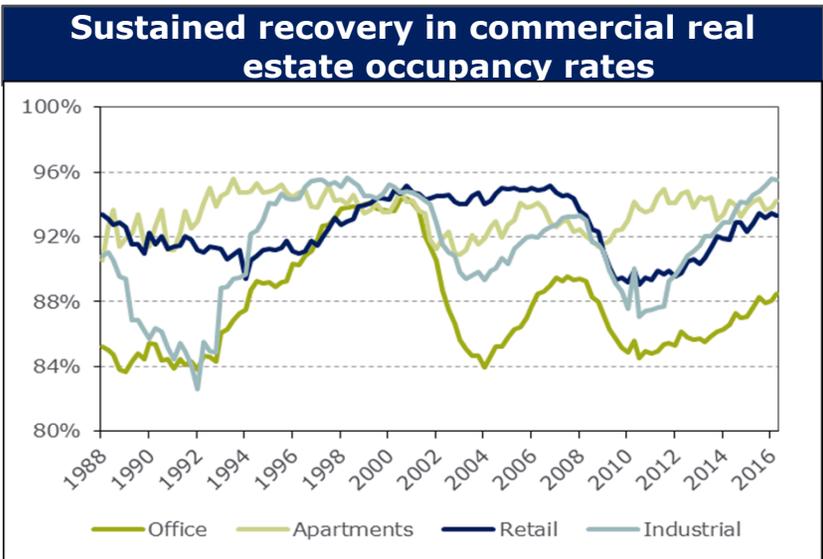
Source: Bloomberg



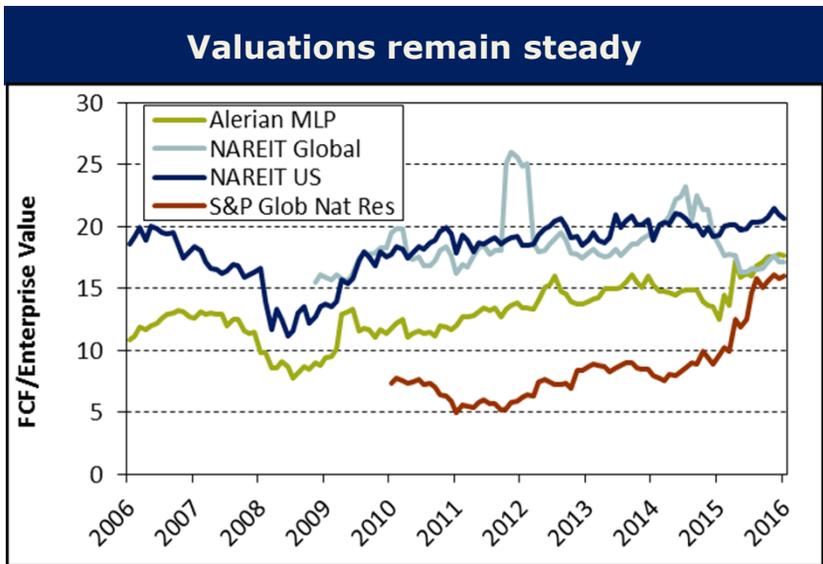
**Inflation Sensitive Growth Assets**



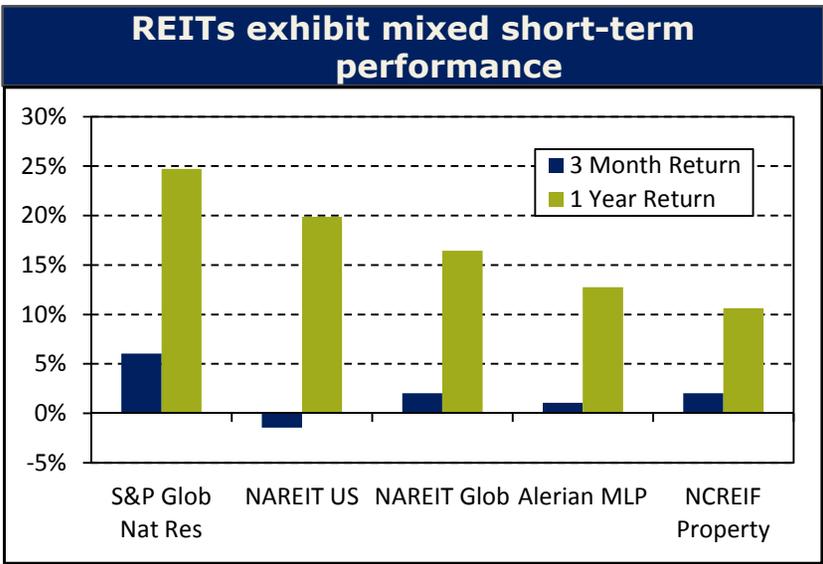
Source: Bloomberg, Alerian, Nareit, Standard and Poors



Source: NCREIF



Source: Bloomberg, US Census Bureau

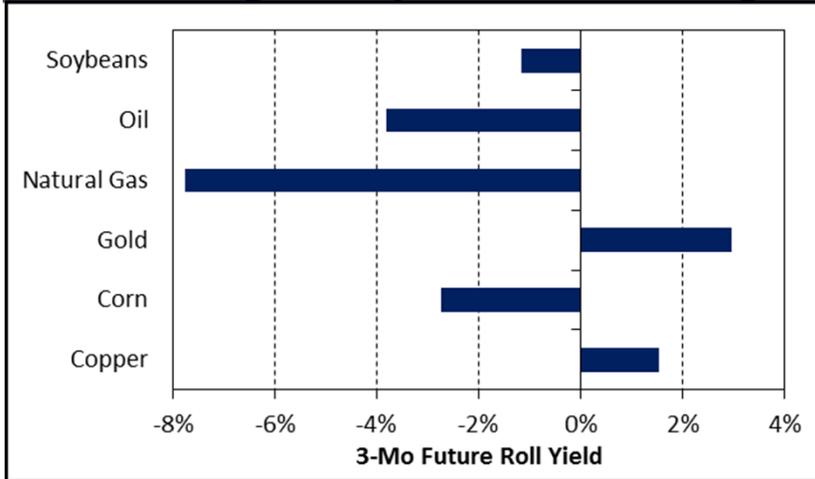


Source: Bloomberg, Alerian, Nareit, Standard and Poors



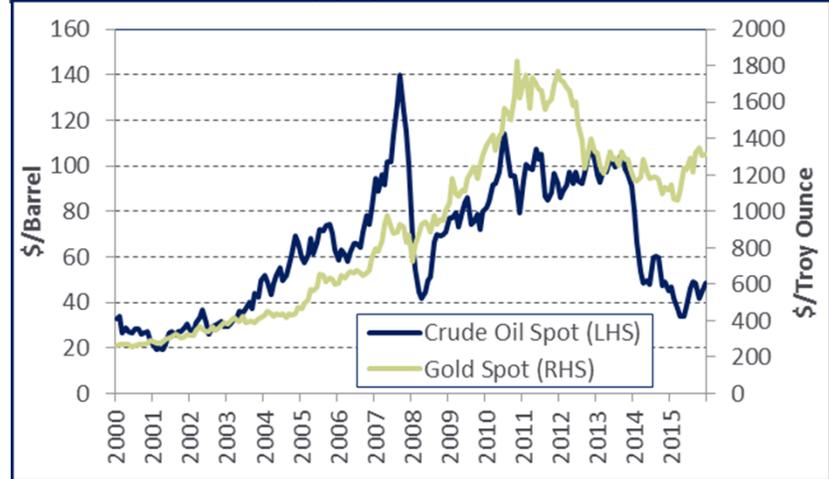
Commodities

Negative roll yields remain a hurdle for investing directly in oil and natural gas



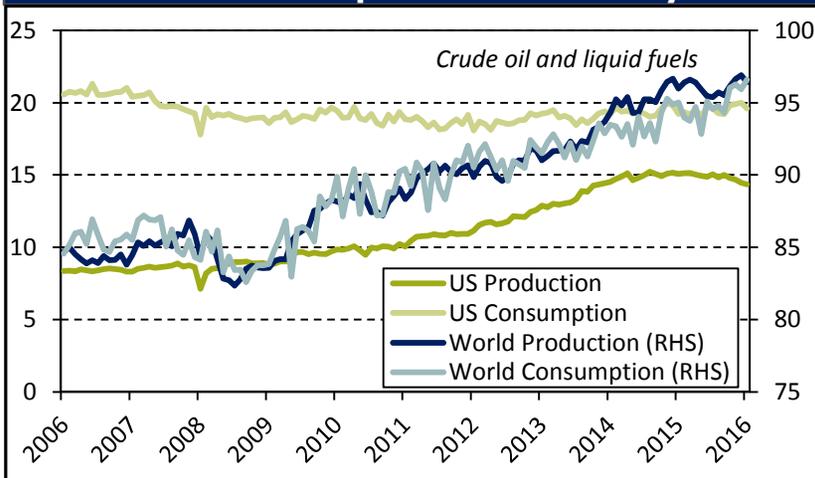
Source: Bloomberg

Recent spike in gold and decline in oil as oversupply concerns continue



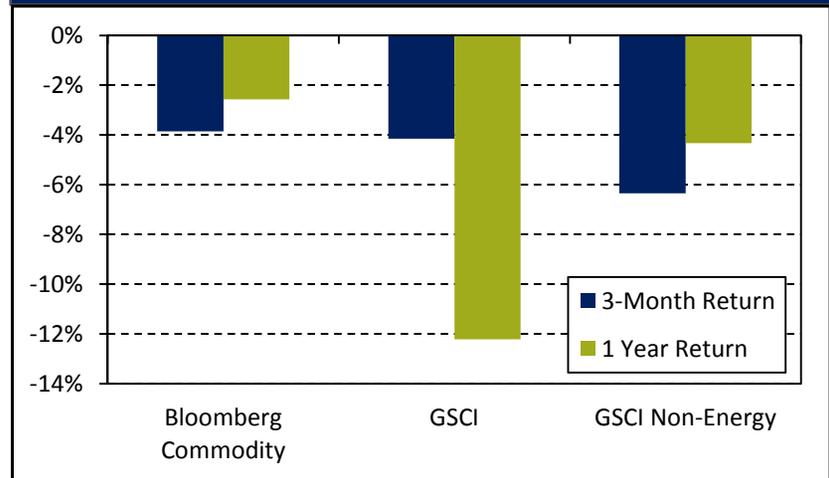
Source: Bloomberg

Recent decline in world production as consumption holds steady



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

Commodity indices continue to 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.<sup>1</sup>/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 domestic equity and fixed income; Private Debt was prorated to fixed income. Recently approved Strategic Asset Allocation Policy effective April 1, 2015.

<sup>1</sup>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.



- **The client's custodian bank is NEPC's preferred data source unless otherwise directed. NEPC reconciles custodian data to manager data. If the custodian cannot provide accurate data, manager data may be used.**
- **Trailing time period returns are determined by geometrically linking the holding period returns, from the first full month after inception to the report date. Rates of Return are annualized when the time period is longer than a year. Performance is presented gross and/or net of fees as indicated.**
- **For managers funded in the middle of a month, the 'since inception' return will start with the first full month, although actual inception dates and cash flows are included in all respective Composite calculations.**
- **This report may contain forward-looking statements that are based on NEPC's estimates, opinions and beliefs, but NEPC cannot guarantee that any plan will achieve its targeted return or meet other goals.**

- **Past performance is no guarantee of future results.**
- **All investments carry some level of risk. Diversification and other asset allocation techniques are not guaranteed to ensure profit or protect against losses.**
- **Some index returns displayed in this report or used in calculation of a policy, allocation or custom benchmark may not be available from the source or may be preliminary and subject to change.**
- **NEPC's source for portfolio pricing, calculation of accruals, and transaction information is the Plan's custodian bank. Information on market indices and security characteristics is received from other sources external to NEPC. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained herein.**
- **This report is provided as a management aid for the client's internal use only. Performance in this report does not constitute a recommendation by NEPC.**
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# Agenda Item #8

# IMD Activities

Arizona State Retirement System

October 24, 2016

# Asset Class Committee Schedule

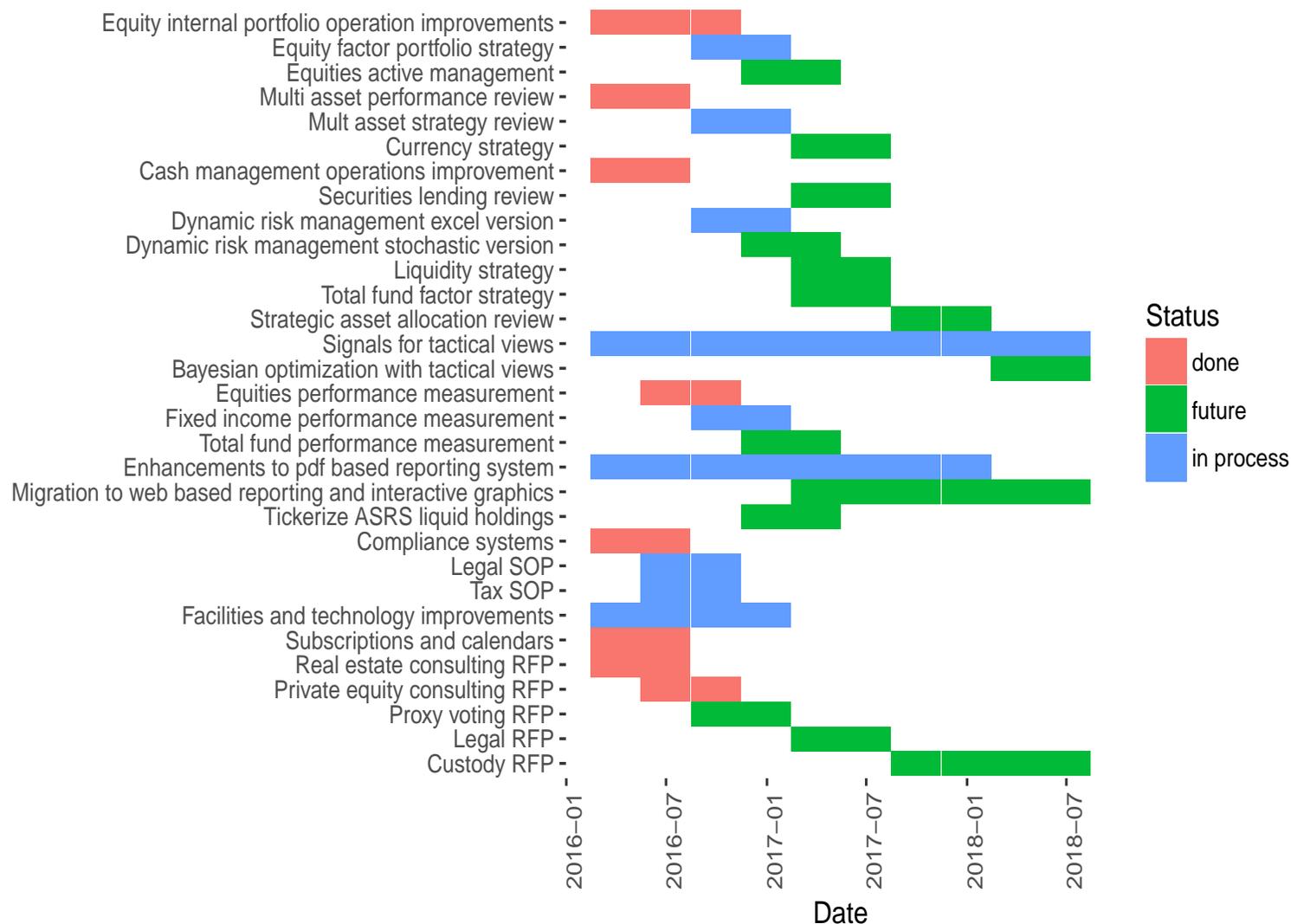
- The asset class committees met on the following days during 2016:
  - January 19 (private markets)
  - February 25 (private markets)
  - March 22 (private markets)
  - April 26 (private markets)
  - May 2 (public markets)
  - May 26 (private markets)
  - June 24 (combined public and private)
  - July 18 (combined public and private)
  - August 11 (private markets)
  - September 22 (combined public and private)
- Combined meetings of the public and private markets committee are scheduled for:
  - October 17
  - November 16
  - Future meetings anticipated monthly thereafter, or more frequently as needed

# Combined Public and Private Markets Committee – September 22, 2016

- Discussed two managers in the opportunistic fixed income portfolio and approved ending the investment period for both
- Discussed various periodic reports for the public and private markets portfolios

# Summary of IMD Working Group Projects

## ASRS Investment Management Division Projects



# Agenda Item #9

# Review of Internal Equity Portfolios

## ASRS Staff Presentation

Eric Glass, John Kwon, & Cole Smith

October 24, 2016

# Outline

- 1 Prior History
- 2 Issues Identified & Enhancements Made
- 3 Results

## Background

The ASRS internally manages \$6.8B of enhanced passive strategies across large, mid and small-cap U.S. equity, including two factor portfolios:

Portfolio	Benchmark	Inception Date	Market Value (\$mil.)	Performance						
				1 Mth	3 Mth	1 Year	3 Year	5 Year	10 Year	ITD
E2	S&P 500	04-01-1997	4,641	3.69	5.83	5.62	11.15	13.36	7.77	7.66
	<i>Excess</i>			0.00	0.01	0.00	-0.01	-0.02	0.02	0.07
E3	S&P 400 GROWTH	12-01-2000	323	4.52	8.46	3.41	10.27	11.88	10.75	8.67
	<i>Excess</i>			0.00	0.13	0.09	0.05	0.14	0.58	0.50
E4	S&P 400 VALUE	07-01-2002	316	4.14	6.16	7.80	9.28	12.63	8.69	10.09
	<i>Excess</i>			0.05	0.08	0.00	-0.08	-0.13	0.27	0.17
E6	S&P 600	02-01-2007	340	5.12	7.57	5.93	9.58	12.99		8.15
	<i>Excess</i>			0.02	0.09	-0.03	-0.04	-0.05		0.28
E7	MSCI USA High Dividend Yield Index	08-01-2012	597	2.62	7.50	15.71	12.14			14.30
	<i>Excess</i>			0.01	0.00	-0.15	-0.13			-0.03
E8	MSCI USA Minimum Volatility Index	08-01-2012	573	1.48	7.80	14.30	14.23			15.26
	<i>Excess</i>			0.00	-0.03	-0.21	0.02			0.27

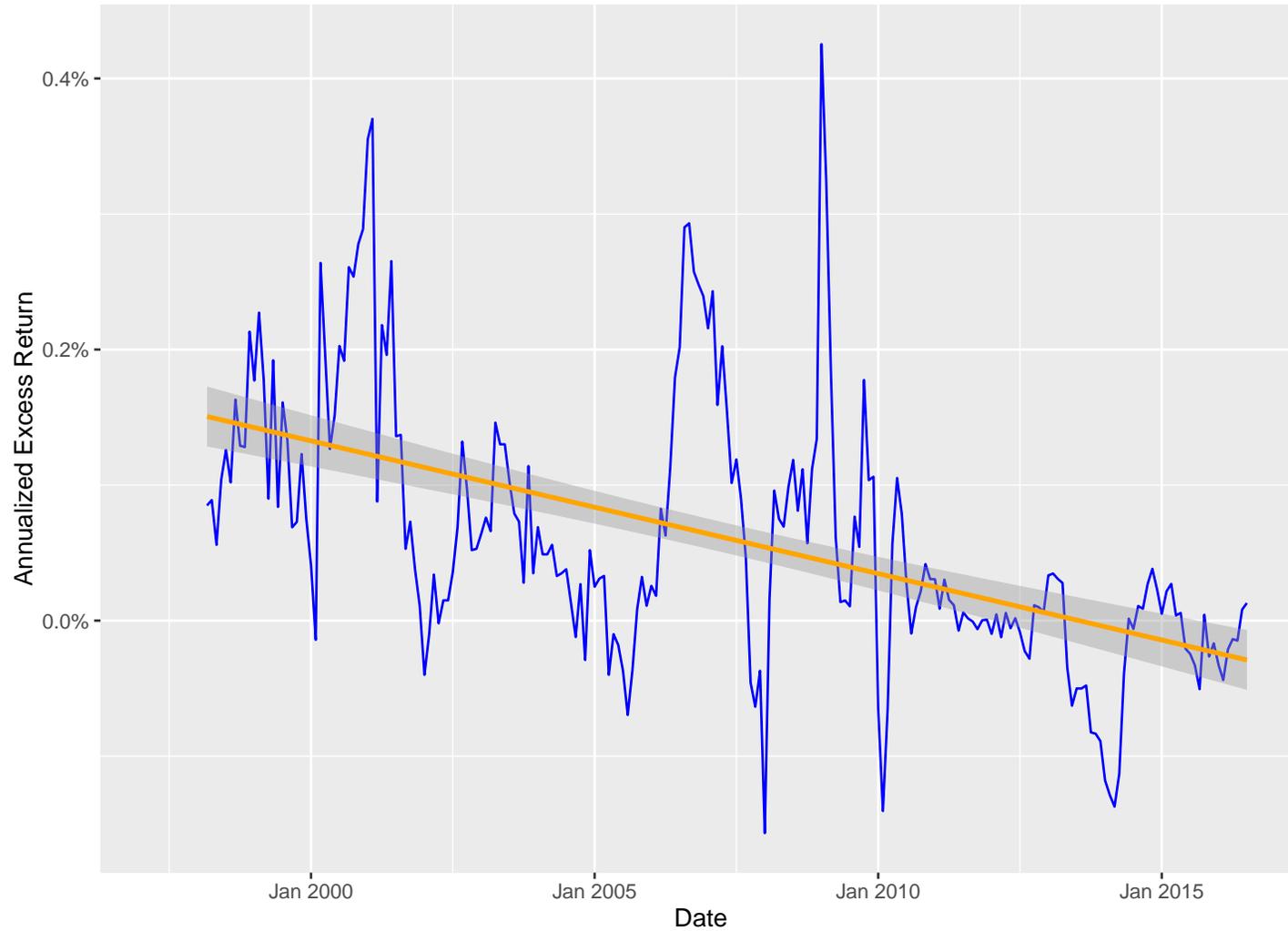
(as of July 31, 2016)

## Summary of Historical Performance

- Inception-to-date positive relative performance
  - More tracking error prior to GFC
  - Meaningful cash holdings during crisis
- Historical performance of E portfolios exhibited negative trend through April 2016
  - Recent enhancements have led to meaningful improvements

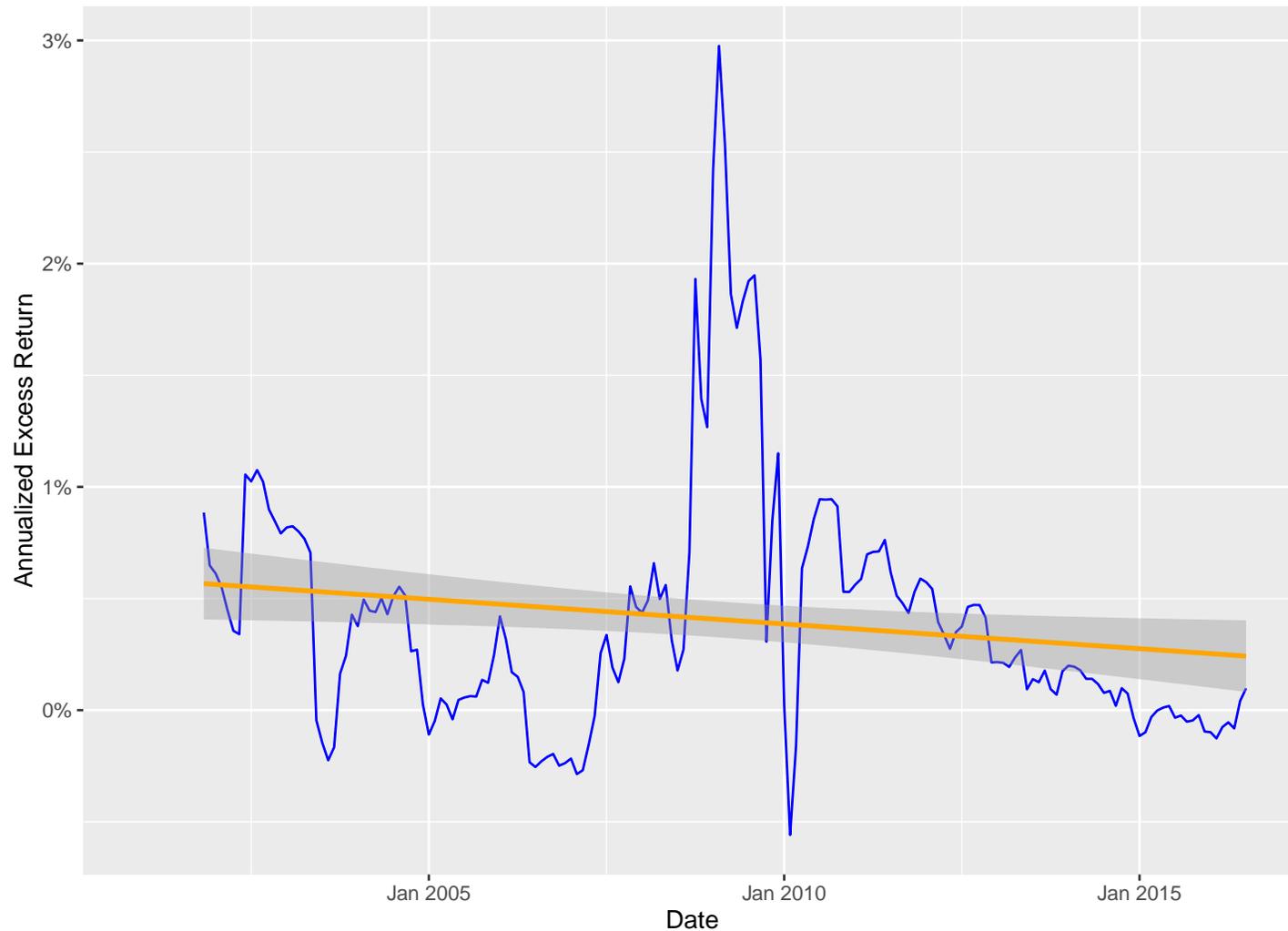
# Historical Performance: E2

E2 Rolling 1 Year Excess Return



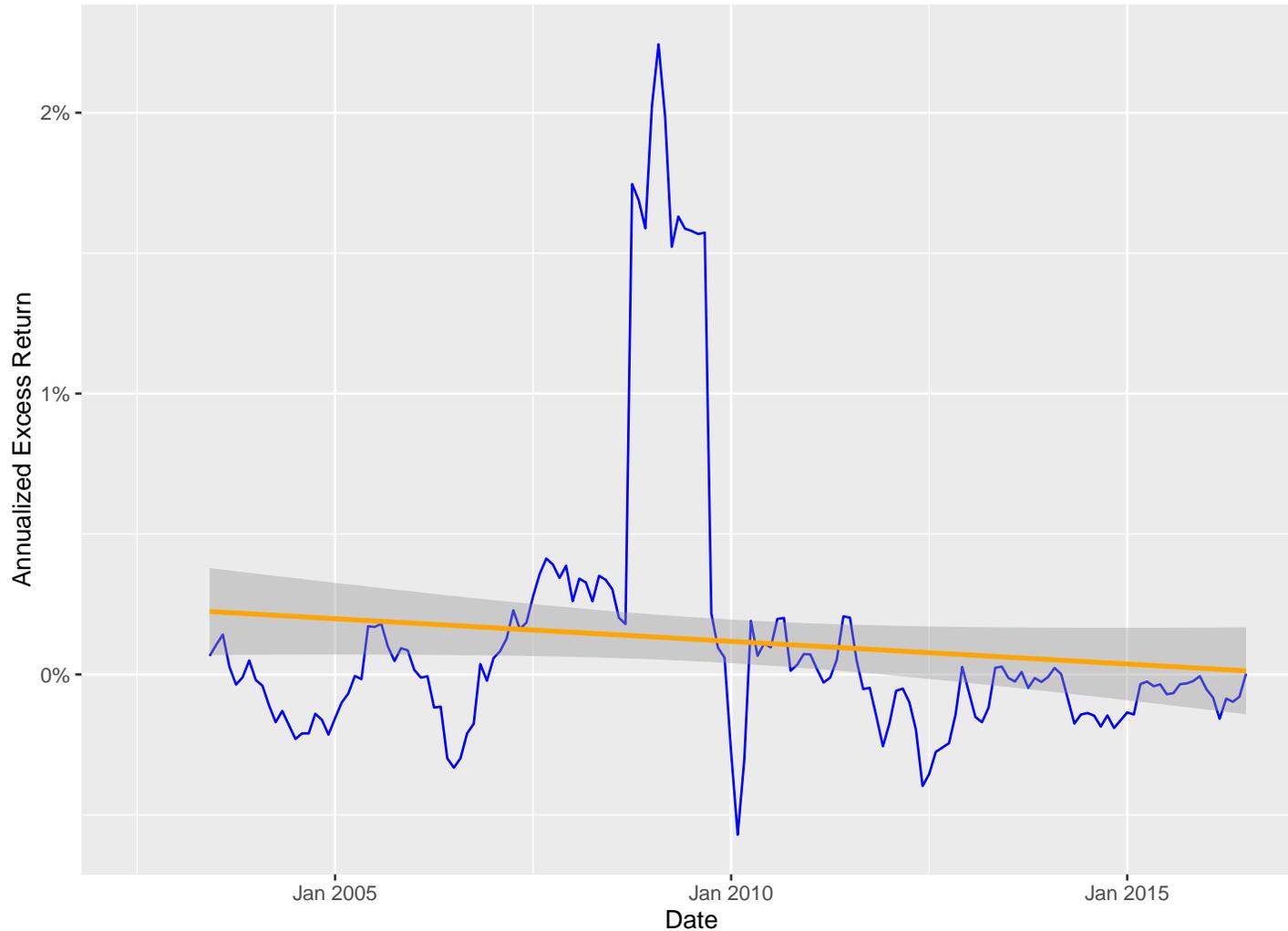
# Historical Performance: E3

E3 Rolling 1 Year Excess Return



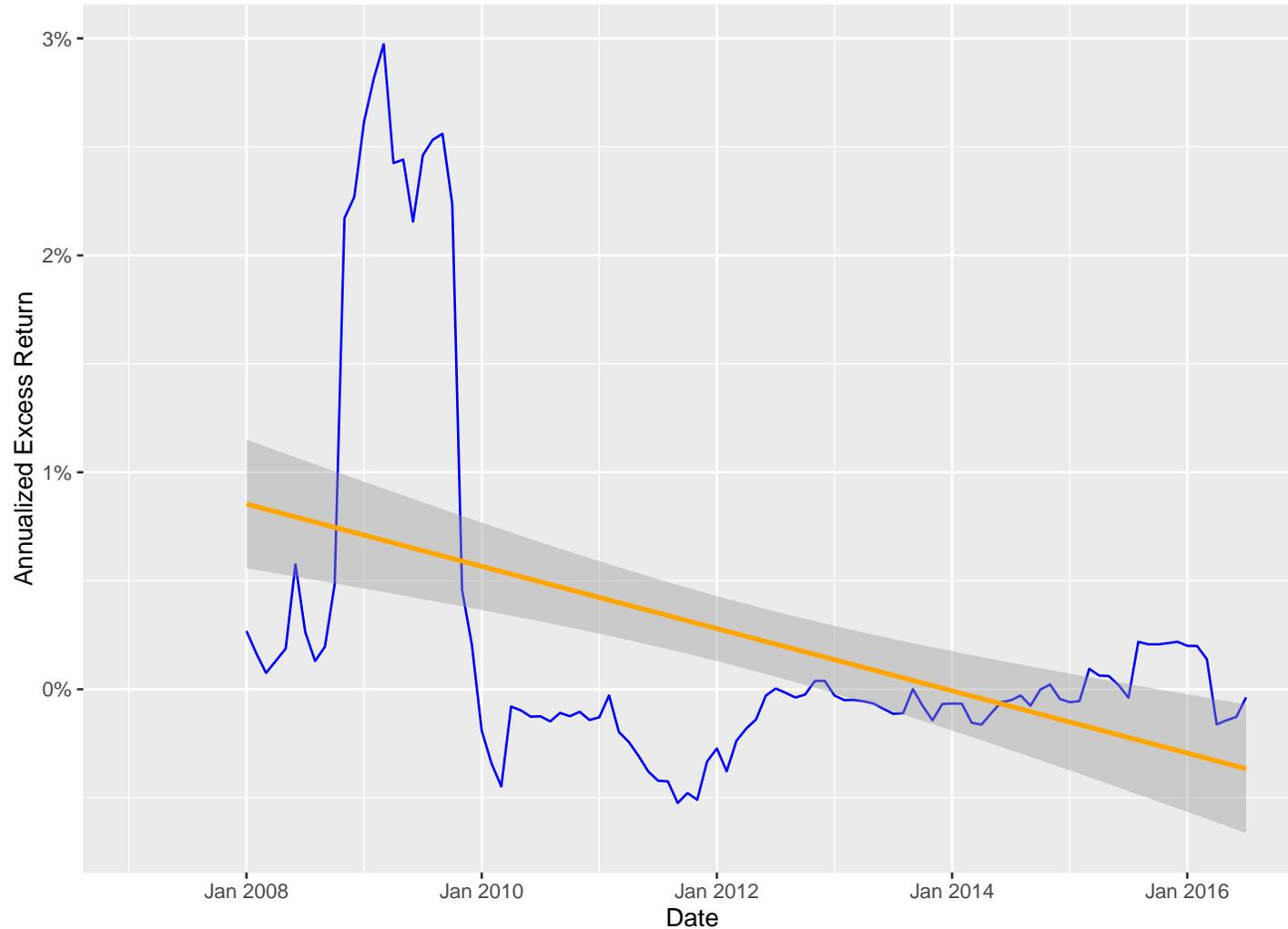
# Historical Performance: E4

E4 Rolling 1 Year Excess Return



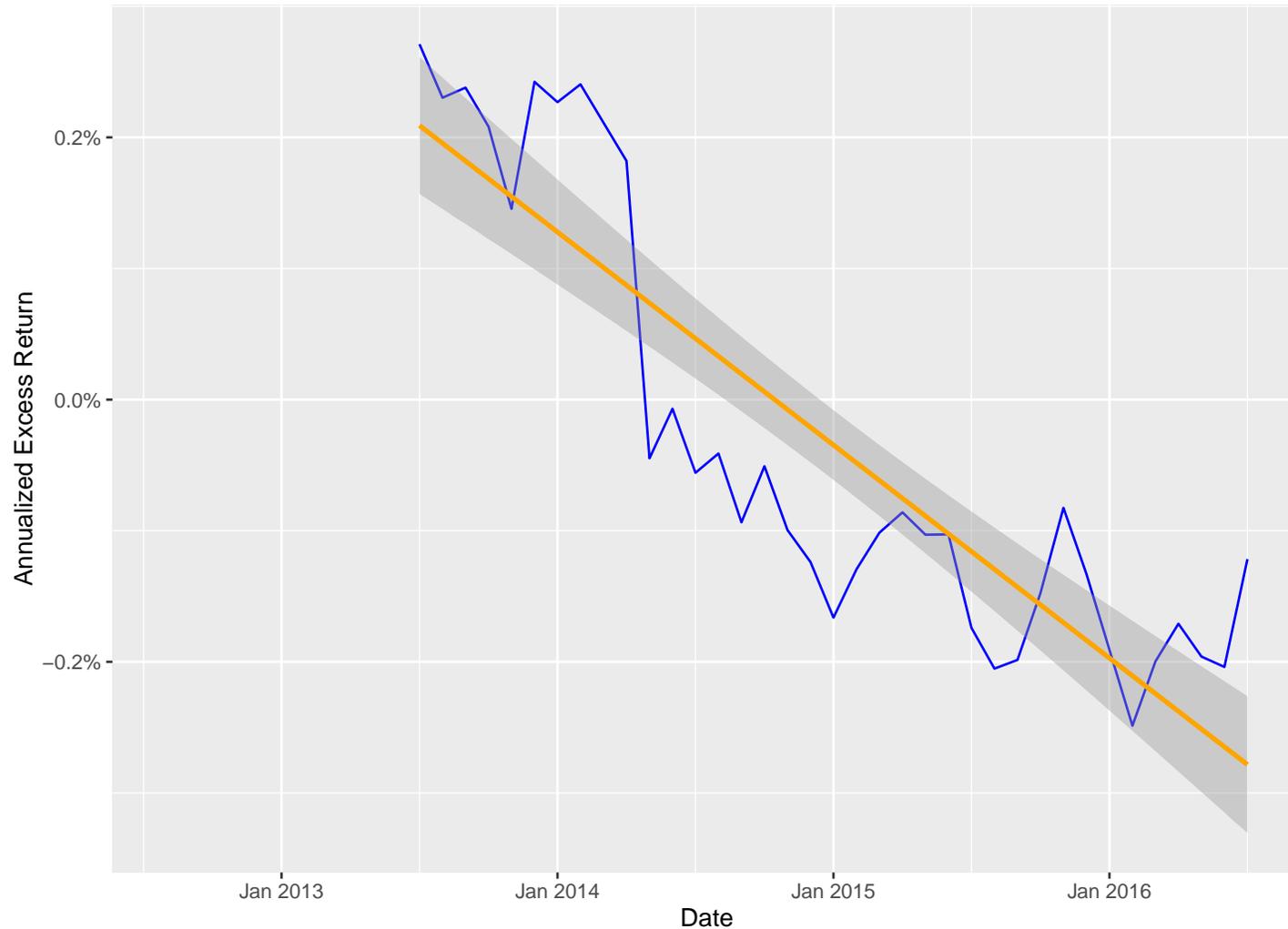
# Historical Performance: E6

E6 Rolling 1 Year Excess Return



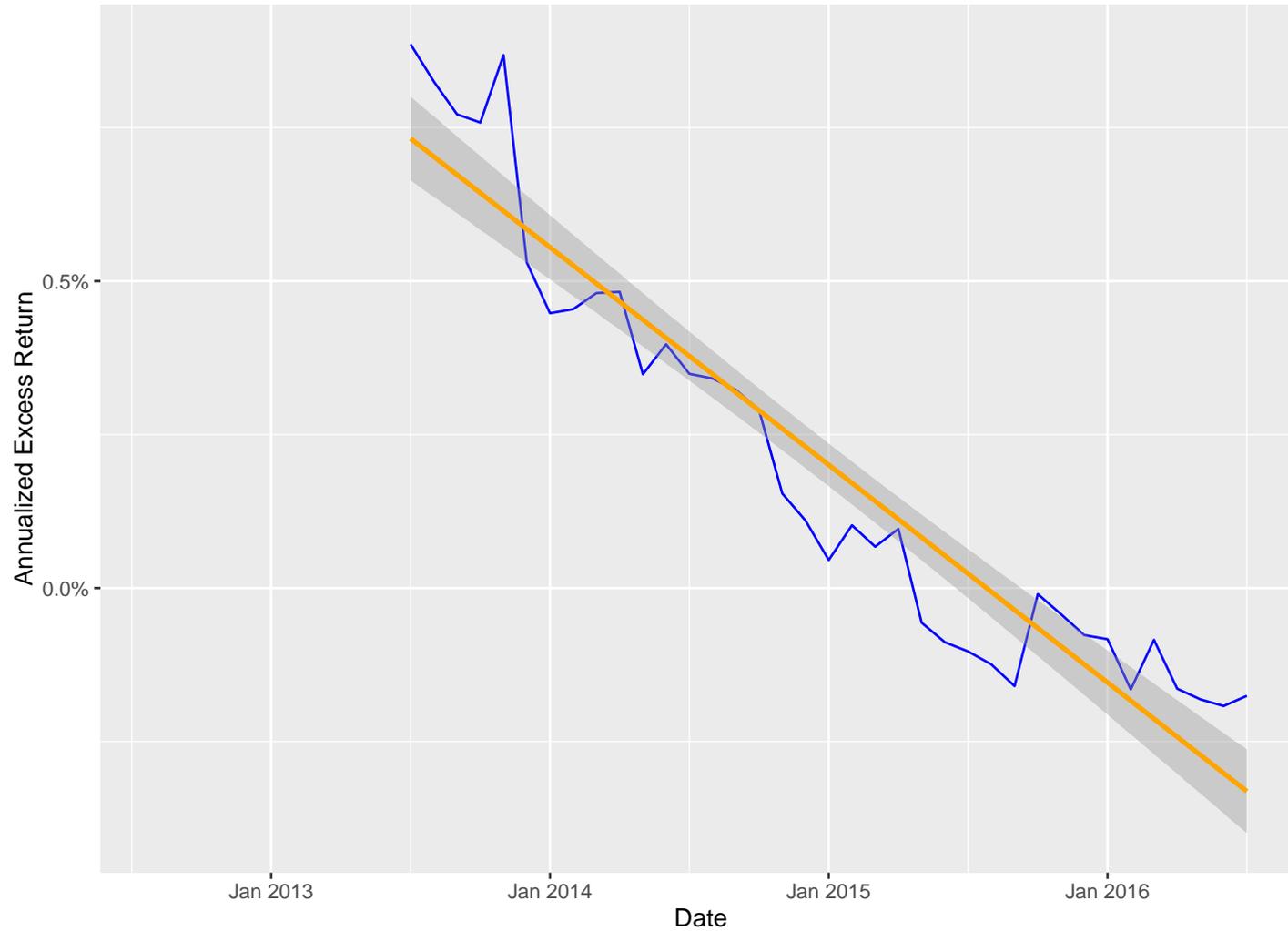
# Historical Performance: E7

E7 Rolling 1 Year Excess Return



# Historical Performance: E8

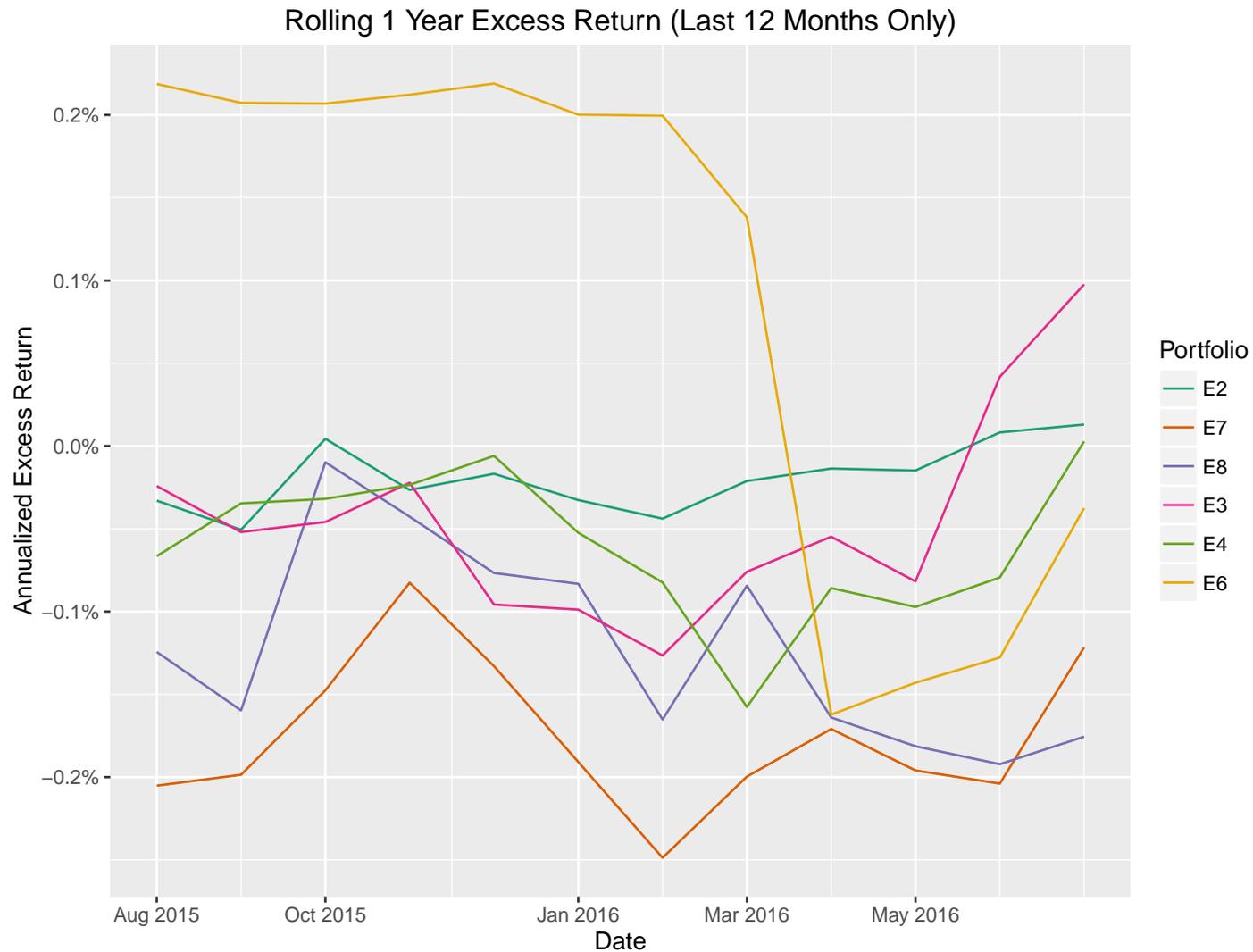
E8 Rolling 1 Year Excess Return



# Performance YTD Through April 2016

E Portfolios	Index	Excess Return
		1/1 - 4/30
<b>E2</b>	S&P 500	-0.03%
<b>E3</b>	S&P 400G	0.07%
<b>E4</b>	S&P 400V	-0.05%
<b>E6</b>	S&P 600	-0.02%
<b>E7</b>	MSCI High Div. Yield	-0.09%
<b>E8</b>	MSCI Min. Vol.	-0.06%

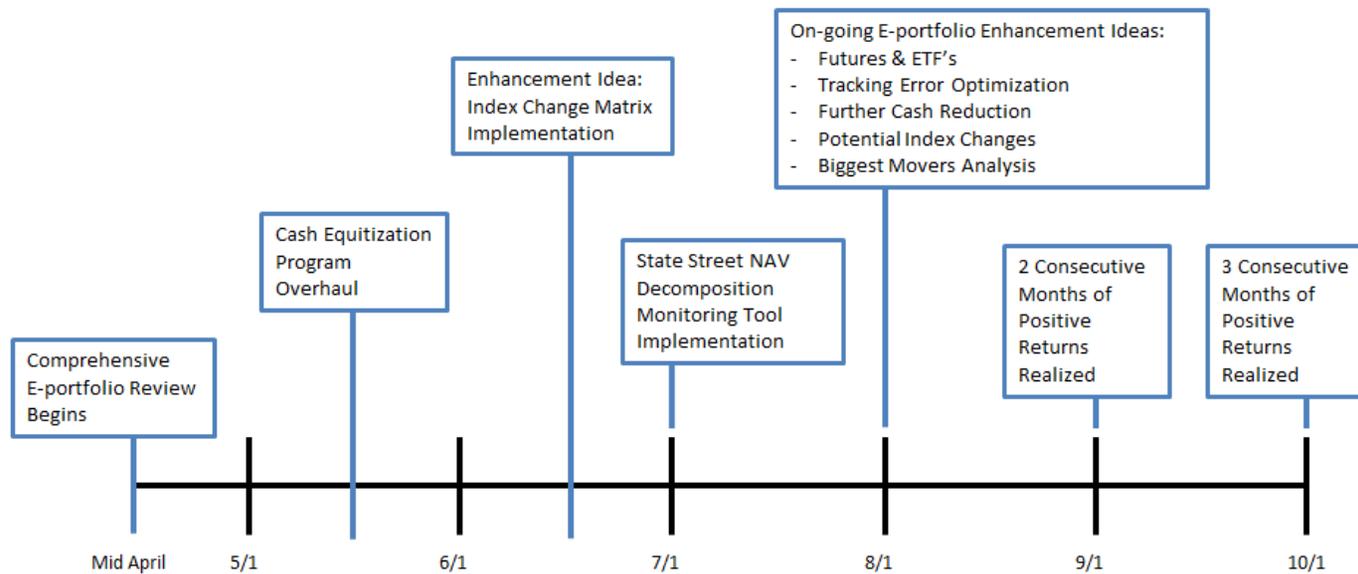
# Last 12 Months: All E Portfolios



## Issues Identified & Enhancements Made

- Inefficient equitization model – Overhauled
- Elevated cash levels – Reduced from ~100bps to ~20bps
- Cash flows – Moved to active monitoring of flows
- Futures Mismatch – Reduced exposure to futures
- Trading – Reduction of trading volume
- Passively traded the index changes – Moved to active decision trading based on our matrix

# Timeline



# Index Change Matrix

	#	Period:
Observations:	736	1/1/15 - 9/22/2016

Index	Code	Type of Change	# of Observations (Unconsolidated)	# of Observations (Consolidated)	Excess Untradeable Gap Return	Excess Inclusion Period Return	Excess Effective Day Return	Excess Day after Effective Day Return	Excess: Effective Day +2	Excess: Effective Day +3	Excess: Effective Day +4	Excess: Effective Day +5	Excess: Effective Day +10
500	1	Share Increase - 500	49	49	-0.1003%	-0.0122%	-0.3648%	-0.2455%	-0.5526%	-0.3390%	-0.0680%	0.5968%	2.1993%
	2	Share Decrease - 500	46	46	0.1427%	-0.4211%	0.6748%	0.6208%	0.5666%	1.2524%	1.3894%	1.9726%	0.9414%
	3	Addition - 500	15	15	4.2057%	-0.1483%	-0.8200%	-0.4469%	-0.6089%	-0.6401%	-0.8481%	-0.7222%	-0.3108%
	4	Addition - Spinoff - 500	7	7	1.4657%	-3.2578%	-1.9025%	2.2812%	-2.7423%	-4.7082%	-3.4350%	-3.3865%	-1.5444%
	7	Deletion - Other - 500	11	11	0.7475%	1.4777%	0.2102%	-2.3062%	8.6757%	13.2311%	29.9910%	28.8175%	80.5012%
	9	Migration Upgrade - 400 to 500*	20	28	0.3646%	-1.9205%	-1.0941%	0.6927%	0.5710%	0.8360%	0.6318%	0.7290%	0.7401%
	12	Migration Downgrade - 500* to 400	15	15	-0.5028%	0.6268%	0.1580%	-0.1588%	0.6124%	-0.2725%	-0.1526%	-0.2489%	0.3248%
	15	Dividend - 500	1	1	0.3462%	1.3352%	1.3952%	1.6068%	1.7181%	2.3891%	2.2172%	2.2441%	1.4975%
	16	Merger - 500	8	8	-0.1826%	-0.7779%	-1.1845%	0.7397%	1.9951%	2.1426%	2.8477%	3.4470%	4.3132%
400	17	Share Increase - 400	30	55	0.1467%	0.1260%	0.5177%	-0.4012%	-0.6910%	-0.5243%	-0.1983%	-0.4538%	-1.1195%
	18	Share Decrease - 400	22	32	0.0055%	-0.4406%	0.2249%	0.4848%	0.5618%	1.0705%	1.1995%	0.9746%	0.9212%
	19	Addition - 400	12	18	4.0135%	0.2189%	0.2971%	-1.2567%	-1.8740%	-2.0103%	-1.7615%	-1.9017%	-1.3501%
	20	Addition - Spinoff - 400	4	4	4.4254%	-3.2992%	-1.6058%	-1.4038%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
	21	Addition - Other - 400	7	7	0.0459%	-0.1054%	0.7477%	-0.7301%	-1.1061%	-1.5300%	-0.5614%	-0.4815%	-0.5879%
	22	Deletion - Market Cap/LOR - 400	6	6	-3.3703%	-8.5905%	-7.9503%	-9.2601%	4.8982%	11.1334%	28.4187%	26.5961%	70.0299%
	23	Deletion - Other - 400	0	1	-6.5876%	-20.2605%	-1.1479%	-0.8108%	-8.6186%	-20.8633%	-28.6350%	-21.3358%	-11.7803%
	25	Migration Upgrade - 600 to 400*	36	54	0.9168%	-0.4908%	-0.7861%	-0.0154%	0.0263%	0.4286%	0.2253%	0.0680%	-0.1555%
	26	Migration Upgrade - 400* to 500	19	31	0.3483%	-2.2811%	-1.4448%	0.6787%	0.4684%	0.8090%	0.6241%	0.6142%	0.5706%
27	Migration Downgrade - 500 to 400*	15	15	-0.5778%	0.4187%	0.0279%	-0.0960%	0.6198%	-0.1372%	0.1582%	-0.0047%	0.6642%	
28	Migration Downgrade - 400* to 600	16	20	-0.3065%	-1.6713%	0.4441%	-0.0525%	0.0861%	0.5750%	0.7440%	-0.2191%	-3.5381%	
600	59	Share Increase - 600	73	73	0.1512%	1.1217%	0.5068%	0.1443%	-0.0729%	-0.6360%	-0.6073%	-0.4456%	-0.4183%
	60	Share Decrease - 600	43	48	-0.1184%	-0.9533%	-0.2288%	0.3653%	-0.0688%	-0.1168%	-0.0600%	-0.3262%	0.0917%
	61	Addition - 600	91	91	5.2042%	1.0445%	-0.4544%	-0.7440%	-0.6998%	-0.0523%	-0.4653%	-0.3718%	-0.4167%
	62	Addition - Spinoff - 600	7	7	1.8106%	-5.2860%	0.6205%	-5.3335%	-4.3288%	-5.1688%	-8.4060%	-0.2401%	1.2207%
	63	Addition - Other - 600	3	3	4.2499%	8.7632%	5.6847%	-1.8168%	3.3877%	5.1575%	1.6095%	-0.1562%	-3.8846%
	64	Deletion - Market Cap/LOR - 600	22	22	-2.7832%	-14.6973%	-10.2345%	2.6862%	4.9826%	6.9864%	7.5811%	8.4544%	21.3944%
	65	Deletion - Other - 600	5	5	0.6761%	-20.4943%	-12.7959%	-0.8998%	-5.8415%	-9.7617%	-15.5328%	-12.7328%	-15.2830%
	67	Migration Upgrade - 600* to 400	40	50	0.8943%	-0.5363%	-0.8599%	-0.0752%	-0.0441%	0.4175%	0.2669%	0.0076%	-0.3360%
	70	Migration Downgrade - 400 to 600*	18	18	-0.3882%	-1.7920%	0.3055%	-0.0158%	-0.0180%	0.6289%	1.0562%	0.3951%	-3.1166%
73	Dividend - 600	1	1	-0.4489%	2.1253%	0.8133%	3.0698%	-0.3744%	-1.5486%	0.3532%	0.9247%	3.2031%	

# Index Change Results

As of 9-30-16	#	%	W/L
Observations:	122	0.1425%	
Winners:	84	0.2699%	69%
Losers:	38	-0.1274%	31%

Row Labels	Average of Effective Date Weight Delta	Count of Index Action	Average of REALIZED Excess Return	Average of Portfolio Impact	StdDev of REALIZED Excess Return	Index Action Information Ratio
Acquirer - Shares Received	0.233%	5	2.607%	0.006%	2.496%	1.04
Active sell from OW	0.104%	1	-2.436%	-0.003%	#DIV/0!	N/A
Addition - 400G	0.311%	3	3.574%	0.012%	3.044%	1.17
Addition - 400V	0.220%	2	5.018%	0.012%	2.581%	1.94
Addition - 500	0.294%	1	2.444%	0.007%	#DIV/0!	N/A
Addition - 600	0.104%	16	0.729%	0.000%	4.194%	0.17
Clean up trade	0.058%	9	1.011%	0.000%	2.855%	0.35
Migration Downgrade - 400 to 600*	0.218%	1	1.386%	0.003%	#DIV/0!	N/A
Migration Downgrade - 400G* to 600	0.103%	1	3.371%	0.003%	#DIV/0!	N/A
Migration Downgrade - 400V to 600*	0.521%	1	2.552%	0.013%	#DIV/0!	N/A
Migration Downgrade - 400V* to 600	0.083%	1	3.598%	0.003%	#DIV/0!	N/A
Migration Upgrade - 400G* to 500	0.838%	4	0.869%	0.006%	1.942%	0.45
Migration Upgrade - 400V* to 500	0.956%	3	-0.139%	0.003%	2.116%	-0.07
Migration Upgrade - 600 to 400G*	0.382%	1	-0.771%	-0.003%	#DIV/0!	N/A
Migration Upgrade - 600 to 400V*	0.434%	2	1.810%	0.008%	0.815%	2.22
Migration Upgrade - 600* to 400	0.476%	1	-2.343%	-0.011%	#DIV/0!	N/A
Migration Upgrade - 600* to 400G	0.481%	2	-2.413%	-0.013%	4.181%	-0.58
Migration Upgrade - 600* to 400V	0.440%	2	1.193%	0.005%	0.191%	6.23
Share Decrease - 400G	0.009%	2	1.925%	0.000%	1.319%	1.46
Share Decrease - 400V	0.018%	3	-0.227%	0.000%	1.850%	-0.12
Share Decrease - 500	0.004%	3	2.147%	0.000%	3.939%	0.55
Share Decrease - 600	0.007%	5	1.142%	0.000%	1.120%	1.02
Share Increase - 400G	0.051%	11	1.428%	0.000%	2.792%	0.51
Share Increase - 400V	0.052%	12	-1.181%	-0.001%	9.127%	-0.13
Share Increase - 500	0.010%	7	0.659%	0.000%	1.598%	0.41
Share Increase - 600	0.020%	23	0.242%	0.000%	4.739%	0.05

# Tools and Resources - NAV Decomposition Tool

- Return attribution analysis
  - Breaks down drivers of returns (i.e. Allocation, Selection, Cash Drag, Futures, etc.)

NAV DECOMPOSITION SUMMARY								Quick Picks	Custom				
Name	Benchmark Name	Ret Fund - 1 Day	Ret Benchmark - 1 Day	Ret Diff - 1 Day BP	Allocation - 1 Day BP	Selection - 1 Day BP	Cash Drag (Net of Futures) - 1 Day BP						
E2 MODEL	S&P 500 INDEX (DAILY)	0.797	0.797	0.017	0.157	(0.004)	(0.149)						
E3 MODEL	S&P 400/CITIGROUP GROWTH (DAILY)	0.772	0.768	0.400	0.808	(0.415)	(0.048)						
E4 MODEL	S&P 400/CITIGROUP VALUE (DAILY)	0.884	0.877	0.702	1.164	(0.414)	(0.100)						
E6	S&P SM 600 TR	1.066	1.062	0.333	0.428	(0.003)	(0.098)						
E7	MSCI USA High Dividend Yield Index	0.737	0.738	(0.130)	0.001	0.035	(0.167)						
E8	MSCI USA Minimum Volatility Index	0.439	0.439	0.001	0.010	0.004	(0.013)						

# Tools and Resources - Open Trade Tracker

- Created to track open index changes yet to be completed

#	Traded?	Portfolio	Side	Index	Security	Index Action	Code	Ann. Date	Effective Date	Effective Date Weight Delta	Projected Trade Date	EARNINGS RELEASE DATE	TODAY's Excess Return	TODAY's % of Portfolio	Trade now?	SINCE EFFECTIVE Excess Retu	SINCE EFFECTIVE % of Portfoli	Trade now?
155	FALSE	E3	Buy	MIDG	AMD	Share Increase - 400G	31	9/16/2016	9/23/2016	0.0378%	10/7	10/20/2016	3.2951%	0.0012%	YES	-2.0157%	-0.0008%	NO
156	FALSE	E4	Buy	MIDV	AMD	Share Increase - 400V	45	9/16/2016	9/23/2016	0.0410%	10/7	10/20/2016	3.4234%	0.0014%	YES	-0.3813%	-0.0002%	NO

# Performance Since April

E Portfolios	Index	Excess Return						
		1/1 - 4/30	May	June	July	August	September	FYTD
E2	S&P 500	-0.03%	0.00%	0.00%	0.00%	0.01%	0.02%	0.03%
E3	S&P 400G	0.07%	0.00%	0.12%	0.00%	0.01%	0.07%	0.09%
E4	S&P 400 V	-0.05%	0.01%	0.02%	0.05%	0.03%	0.03%	0.12%
E6	S&P 600	-0.02%	0.05%	0.01%	0.02%	0.02%	-0.01%	0.03%
E7	MSCI High Yield	-0.09%	0.00%	0.00%	0.01%	0.00%	0.00%	0.01%
E8	MSCI Min. Vol.	-0.06%	-0.01%	-0.03%	0.00%	0.01%	0.03%	0.04%

## Next Steps

- Futures and ETF's
- Tracking Error Optimization (Barra Portfolio Manager)
- Further Reduction of Cash Levels
- Potential Index Changes
- Biggest Movers Analysis

# Agenda Item #10



# ARIZONA STATE RETIREMENT SYSTEM

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*Paul Matson*  
Director

## MEMORANDUM

**TO:** The Arizona State Retirement System (ASRS) Investment Committee (IC)

**FROM:** Mr. Patrick Klein, Assistant Director, External Affairs Division  
Ms. Lupita Breland, Sr. Portfolio Analyst, Investment Management Division

**DATE:** October 12, 2016

**RE:** **Agenda Item #10:** Presentation, Discussion, and Appropriate Action Regarding the ASRS Supplemental Retirement Savings Plan (SRSP) and Supplemental Salary Deferral Plan (SSDP)

### Purpose

To present and discuss the status of the ASRS SRSP and SSDP defined contribution plans.

### Recommendation

Informational only; no action required.

### SRSP Background

The SRSP was originally created to serve as the savings vehicle for the Modified Deferred Retirement Option Plan (MDROP) enacted in 1999. The ASRS obtained Internal Revenue Service (IRS) approval for the plan in 2001. However, with increasing contribution rates, revised information about the likely cost of the DROP program, and unclear consequences of implementing the plan, the ASRS determined that the MDROP was not a sustainable plan feature and as such the agency should not move forward. The ASRS consequently initiated legislation to repeal authorization for the MDROP plan. As a result, the SRSP remained as an optional tax-deferred compensation vehicle for members to use to supplement retirement savings. Nationwide Retirement Solutions was initially selected through an RFP process in November 2006 and again in 2011. The SRSP is only offered voluntarily to non-state member employers of the ASRS that then adopt the plan in which eligible employees may participate.

The SRSP is offered in addition to the ASRS Defined Benefit Plan. In 2016, participants may elect to defer up to 100% of pay or \$53,000, whichever is lower. In addition, the SRSP permits loans. Due to the distinctive features and benefits of the SRSP, the IRS requires restrictions that are unique from regular 457 and 403(b) tax-deferred compensation and tax-sheltered annuity plans respectively. These restrictions include: an irrevocable election to participate with a two-year window of opportunity upon eligibility; an irrevocable election to contribute a percentage of pay, a flat-dollar amount, or a scheduled contribution over time; and, a mandate that account balances be distributed upon retirement.

<b>Governance:</b>	Internal Management Committee
<b>Plan Type:</b>	401(a)
<b>Participation:</b>	Voluntary
<b># of Employers:</b>	27
<b># of Participants:</b>	156
<b>Total Assets:</b>	\$8,059,292 (as of 6-30-16)
<b>Administrator:</b>	Nationwide Retirement Solutions
<b># of Investment Options:</b>	18 including the Schwab self-directed option
<b>Investment Option Types:</b>	Asset Allocation, International, Small Cap, Mid Cap, Large Cap, Balanced, Bonds, Short Term, Self-Directed Option, Global Real Estate Fund

Attachments:

- SRSP Investment Options Performance History for the Period Ending June 30, 2016
- Nationwide Administrators Report, 2<sup>nd</sup> Quarter 2016
- 401(a) (SRSP) Plan Review as of June 30, 2016

### **SSDP Background**

In 2009, the Legislature permitted the Arizona State Retirement System (ASRS) to establish a supplemental salary deferral plan offering both 403(b) and 457 plans, as a supplement to the ASRS Defined Benefit (DB) Plan for public employees other than State employees, as a means to save additional tax-deferred compensation for retirement.

Senate Bill (SB) 1196 allowed the ASRS to:

- employ services for the operation and administration of the plan;
- administer the plan through contracts with vendors;
- perform all acts necessary for the operation and protection of the plan; and,
- enter into intergovernmental agreements.

SB 1196 further clarified that the plan is in addition to the DB Plan provided by the ASRS, and:

- allows any employee of a participating employer to join the plan;
- provides that employee participation allows the employer to make payroll deductions;
- clarifies that compensation deferred under the plan is compensation for the purposes of ASRS retirement benefits;
- states the employee contributions and earnings are immediately vested and employer contributions, if any, are vested according to the plan; and,
- provides an immunity clause for the State, the ASRS Board, and the ASRS.

The plan is qualified under Sections 403(b) and 457 of the Internal Revenue Code.

In 2016, participants may elect to defer up to \$18,000 and, for those age 50 and older, an additional \$6,000. Unlike the ASRS SRSP 401(a) plan, there are no restrictions as to participation, amount contributed (except for the maximums mentioned), or how often the contribution amount may change.

**Of Special Note:** The SSDP administrator's services agreement previously with TIAA-CREF was awarded to Nationwide Retirement Solutions through an RFP process in 2015. Nationwide's sole offering of its 457 plan administration and marketing was determined to be a better fit for the ASRS SSDP offering as most, if not all, of the state's public school districts already had 403(b) plans in effect.

**Governance:** Internal Management Committee  
**Plan Type:** 457  
**Participation:** Voluntary  
**# of Employers:** 52  
**# of Participants:** 414  
**Total Assets:** \$8,136,719 (as of 6-30-16)  
**Administrator:** Nationwide Retirement Solutions  
**# of Investment Options:** 18 including the Schwab self-directed option  
**Investment Option Types:** Asset Allocation, International, Small Cap, Mid Cap, Large Cap, Balanced, Bonds, Short Term, Self-Directed Option, Global Real Estate Fund

Attachments:

- SSDP Investment Options Performance History as of June 30, 2016
- Nationwide Administrator's Report – 2<sup>nd</sup> Quarter 2016
- 457 Plan Review as of June 30, 2016

**Arizona State Retirement System  
Defined Contribution Plans – SRSP & SSDP  
Growth in Assets and Participation**

**Supplemental Retirement Savings Plan (SRSP)**

<b>Year</b>	<b>Assets</b>	<b># of Employers</b>	<b># of Participants</b>
June 30, 2016	\$8,059,292	27	156
June 30, 2015	7,716,041	27	163
June 30, 2014	6,848,605	26	182
June 30, 2013	5,939,425	22	168
June 30, 2012	4,646,212	20	164
June 30, 2011	3,869,876	19	172
June 30, 2010	2,040,429	17	148

**Supplemental Salary Deferral Plan (SSDP)\***

June 30, 2016	\$ 8,136,719*	52	414
June 30, 2015	14,979,024	97	649
June 30, 2014	10,738,005	94	540
June 30, 2013	6,603,323	47	439
June 30, 2012	3,307,447	29	179
June 30, 2011	521,953	16	31

\*Effective December 31, 2015, administration of the SSDP transitioned to Nationwide Retirement Solutions (NRS) from TIAA-CREF after the issuance and evaluation of an agency RFP. Some 403(b) monies remained at TIAA-CREF because of their investment in a fixed interest bearing account that required financial penalties if the monies were moved prematurely.



# Arizona State Retirement System

## Supplemental Retirement Savings Plan Investment Options

### Performance History for Period Ending June 30 2016

The following are the percentage changes in Net Assets (with capital gains and income dividends reinvested) without reduction for Plan Charges for the respective periods ended June 30, 2016, The results shown represent past performance and do not represent expected future performance or experience. Past performance does not guarantee future results. Investment return and principal value of an investment will fluctuate so that an investor's units or shares, when redeemed, may be worth more or less than their original cost. Current performance may be lower or higher than the data quoted.

Performance data current to the most recent month-end may be obtained by visiting [www.azsrsp.com](http://www.azsrsp.com).

**Please consider the fund's investment objectives, risks, charges, and expenses carefully before investing. The underlying fund prospectuses contain this and other information about the investment company. Prospectuses are available by calling 602-266-2733 or by visiting [www.azsrsp.com](http://www.azsrsp.com). Read carefully before investing. Please see other important disclosures at the end of this report. Investment options are subject to change.**

The Average Annual Returns indicated below are net of Gross Expense Ratios but not net of plan administrative fees (i.e., the returns do reflect Gross Expense Ratios but do not reflect the deduction of Plan Charges assessed to Plan Participants). The Plan charges the following administrative fees: (1) 0.30% for tier 1 funds, and (2) 0.20% for tier 2 funds. The administrative fee should be added to the fund's Gross Expense Ratio to determine the total cost for the fund. For example, a tier 1 fund with a Gross Expense Ratio of 0.70% would have a total cost of 1.00% (0.30% + 0.70% = 1.00%).

#### INVESTMENT TYPE

Fund Name (Tier) • Index	Morningstar® Category	Ticker	Gross Expense Ratio	Average Annual Return			Return Since Inception <sup>‡</sup>	Inception Date
				1-year	5-year	10-year		
<b>STABLE VALUE FUND</b>								
Morley Stable Value Retirement Fund (2)	N/A	N/A	N/A	0.93%	0.82%	1.83%	3.56%	12/31/93
• Barclays Capital 1-3 Year Government Index				1.31%	0.84%	2.54%		
<b>BOND FUNDS</b>								
Vanguard Total Bond Market Index Fund (1)*	Intermediate-Term Bond	VBMFX	0.16%	6.02%	3.61%	5.01%	6.23%	12/11/86
• Barclays Capital US Aggregate Float Adjusted Bond Index				6.12%	3.81%	N/A		
Metropolitan West Total Return Bond Fund M (2)	Intermediate-Term Bond	MWTRX	0.67%	4.48%	4.75%	6.56%	6.71%	03/31/97
• Barclays Capital US Aggregate Bond Index				6.00%	3.76%	5.13%		
<b>ASSET ALLOCATION FUND: ACTIVE</b>								
Ivy Asset Strategy Fund A (2)*	World Allocation	WASAX	0.99%	-12.54%	1.27%	5.32%	6.81%	07/10/00
• World Allocation <sup>^</sup>				-2.28%	3.32%	4.43%		
• S&P 500 TR USD				3.99%	12.10%	7.42%		
<b>ASSET ALLOCATION FUNDS: RISK PROFILE</b>								
Nationwide Investor Destinations Conservative Fund Svc (2)*	Conservative Allocation	NDCSX	0.88%	2.90%	3.26%	3.68%	3.59%	03/30/00
• Conservative Index (10% S&P 500+5% S&P 400+5% MSCI EAFE Index Net Dividends +40% BC Agg+40% 3Mo Tbill) <sup>^</sup>				1.88%	3.37%	3.96%		
• Barclays Capital US Aggregate Bond Index				6.00%	3.76%	5.13%		
Nationwide Investor Destinations Moderate Fund Svc (2)*	Moderate Allocation	NSDMX	0.89%	-0.16%	5.32%	4.58%	3.91%	03/30/00
• Moderate Index (30% S&P 500+10% S&P 400+5% Russell 2000+15% MSCI EAFE Index Net Dividends+25% BC Agg+15% 3Mo Tbill) <sup>^</sup>				-0.13%	6.14%	5.24%		
• Russell 3000				2.14%	11.60%	7.40%		
Nationwide Investor Destinations Aggressive Fund Svc (2)*	Aggressive Allocation	NDASX	0.89%	-2.94%	6.72%	4.73%	3.56%	03/30/00
• Aggressive Allocation <sup>^</sup>				-3.22%	6.87%	4.66%		
• Russell 3000				2.14%	11.60%	7.40%		
<b>LARGE CAP EQUITY FUNDS</b>								
Vanguard 500 Index Fund (1)*	Large Cap Blend	VFINX	0.16%	3.84%	11.93%	7.30%	10.80%	08/31/76
PRIMECAP Odyssey Stock	Large Cap Blend	POSKX	0.65%	-1.10%	11.21%	7.85%	8.84%	11/01/04
• Standard & Poor's 500 Stock Index				3.99%	12.10%	7.42%		

## INVESTMENT TYPE

Fund Name (Tier) Index	Morningstar® Category	Ticker	Gross Expense Ratio	Average Annual Return			Return Since Inception <sup>‡</sup>	Inception Date
				1-year	5-year	10-year		
<b>MID CAP EQUITY FUNDS</b>								
Vanguard Mid Cap Index Fund - Investor Shares (1)* • CRSP US Mid Cap	Mid Cap Blend	VIMSX	0.20%	-1.01% -0.87%	10.41% 10.77%	7.66% 7.87%	9.35%	05/21/98
Dreyfus Premier Structured Mid Cap Fund I (2) • S&P MidCap 400 TR	Mid Cap Blend	DPSRX	1.05%	-2.86% 1.33%	10.57% 10.55%	7.25% 8.55%	8.20%	06/29/01
<b>SMALL CAP EQUITY FUNDS</b>								
Vanguard Small Cap Index Fund (1)* • CRSP US Small Cap	Small Cap Blend	NAESX	0.20%	-3.01% -2.91%	9.75% 10.04%	7.61% 8.20%	10.52%	10/03/60
JP Morgan Small Cap Equity Fund A (2) • Russell 2000	Small Cap Blend	VSEAX	1.42%	1.10% -6.73%	11.35% 8.35%	9.85% 6.20%	12.83%	12/20/94
<b>INTERNATIONAL EQUITY FUNDS</b>								
Vanguard Total International Stock Index Fund (1)* • FTSE Global All Cap ex USA	Foreign Large Blend	VGTSX	0.19%	-9.21% -9.44%	0.52% 0.57%	1.90% 2.55%	4.04%	04/29/96
American Funds EuroPacific Growth Fund R4 (2) • MSCI ACWI Ex USA	Foreign Large Growth	RREX	0.85%	-9.88% -10.24%	2.14% 0.10%	3.61% 1.87%	6.83%	06/07/02
Lazard Emerging Markets Fund - Open Class (2) • MSCI EMF Index Net Dividends	Diversified Emerging	LZOEX	1.37%	-8.29% -12.03%	-2.96% -3.78%	4.31% 3.54%	6.06%	01/08/97
<b>REAL ESTATE FUND</b>								
INVESCO Global Real Estate Fund A (2) • MSCI World Index	Specialty-Real Estate	AGREX	1.43%	7.09% -2.78%	6.61% 6.63%	3.74% 4.43%	5.99%	04/29/05
<b>CHARLES SCHWAB SELF-DIRECTED BROKERAGE OPTION</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

\* Denotes passively managed fund

^ An additional Index has been provided for this fund that may be more representative of the underlying asset allocation than the index shown that is listed in the fund's prospectus. Market indices have been provided for comparison purposes only; they are unmanaged and no fees and expenses have been reflected here. Individuals cannot invest directly in an index.

‡ The return since inception dates shown are calculated from the inception of the oldest share class to the present. The number will differ from Morningstar, which lists a load adjusted return for the same period.

Bond funds: Bond funds have the same interest rate, inflation and credit risks that are associated with the underlying bonds owned by the fund.

International/emerging markets funds: Investing internationally involves risks not associated with investing solely in the U.S., such as currency fluctuation, political risk, differences in accounting and the limited availability of information.

Real estate funds: Real estate investing entails the risks of real estate business generally, including sensitivity to economic and business cycles, changing demographic patterns and government actions.

Asset Allocation funds: The Asset Allocation Funds are designed to provide diversification and asset allocation across several types of investments and asset classes, primarily by

investing in underlying funds. Therefore, in addition to the expenses of the funds, you are indirectly paying a proportionate share of the applicable fees and expenses of the underlying funds.

Small company funds: Stocks of small or emerging companies may have less liquidity than those of larger, established companies and may be subject to greater price volatility and risk than the overall stock market.

Gross expense ratios represent the fund's total operating expenses expressed as a percentage of the assets held in the fund. For more information about gross expense ratios, read the fund's prospectus.

Nationwide Retirement Solutions, Inc. and its affiliates (Nationwide) offer a variety of investment options to public sector retirement plans through variable annuity contracts, trust or custodial accounts. Nationwide may receive payments from mutual funds or their affiliates in connection with those investment options. For more detail about the payments Nationwide receives, please visit [www.nrsforu.com](http://www.nrsforu.com).

Inception date is the date the underlying fund was established. Some mutual funds may impose a short term trade fee. Some funds may be subject to a trade restriction policy. Please read the underlying prospectus carefully.

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(3) is not warranted to be accurate, complete or timely. Neither Morningstar nor its content providers are responsible for any damages or losses arising from any use of this information. Although data is gathered from reliable sources, including the fund houses, data accuracy and completeness cannot be guaranteed.

Investing involves market risk, including the possible loss of principal. Retirement Specialists are Registered Representatives of Nationwide Investment Services Corporation, member FINRA.

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**Nationwide Administrators Report  
2<sup>nd</sup> Quarter 2016  
SRSP 401(a) Information**

# Nationwide Update

## 2<sup>nd</sup> Quarter 2016

### SRSP Plan Review

#### Summary of the employers who have adopted the plan to date:

Current Employers	Adoption Date	Effective Date	Eligibility Age	Loans	Employer Matching Contributions	In-Service Withdrawals
Tourism and Sports Authority	6/15/2007	8/22/2007	None	Y	E-2	F-2
Arizona Prosecuting Attorney's Advisory Council	7/31/2007	7/1/2008	40	Y	E-1	F-2
San Carlos Irrigation Drain District	8/7/2007	8/7/2009	40	Y	E-2	F-2
City of Goodyear	10/22/2007	1/1/2008	30	Y	E-2	F-1 (No)
Southeastern Arizona Government Organization	10/27/2007	1/1/2008	21	Y	E-2	F-1 (No)
Pima County	11/6/2007	1/1/2008	40/30 PS	Y	No	F-2
Flagstaff Jr Academy	1/28/2008	2/1/2008	26	Y	E-2	F-2
Verde Valley Fire District	2/26/2008	3/1/2008	45	Y	E-1	F-1 (No)
Mohave County	4/7/2008	7/1/2008	Age at Hire	Y	E-1	F-2
Coconino County CCRASD #99	6/3/2008	8/1/2008	40	Y	E-1	F-2
Maricopa Water District	6/17/2008	1/1/2009	40	Y	E-1	F-1 (No)
East Valley Institute of Technology	6/25/2008	7/1/2008	40	Y	E-1	F-2
City of Surprise	6/26/2008	7/1/2008	30	Y	E-2	F-2
Maricopa County Special Health Care District	7/1/2008	1/1/2009	40	Y	No	F-2
City of Kingman	7/1/2008	7/1/2008	18	Y	E-2	F-1 (No)
Superstition Mountains Community Facilities Dist # 1	8/19/2008	9/1/2008	40	Y	E-2	F-2
Town of Buckeye	10/7/2008	10/22/2008	18	Y	E-1	F-1 (No)
Lake Havasu City	6/26/2009	7/1/2009	Age at Hire	Y	E-4	F-2
Northwest Fire District	7/27/2010	10/1/2010	40	Y	E-1	F-1 (No)
Avra Valley Fire District	5/25/2012	6/1/2012	40	Y	E-1	F-1 (No)
Arizona Counties Insurance Pool	11/13/2012	12/15/2012	33	Y	E-2	F-1 (No)
City of Tempe	11/13/2012	1/1/2013	40	y	E-1	F-1 (No)
Success School / AZ Charter Academy	6/10/2013	8/1/2013	40	Y	E-1	F-1 (No)
Ft Mojave Mesa Fire	7/30/2013	8/1/2013	40	Y	E-1	F-1 (No)
Chino Valley Fire District	9/19/2013	9/19/2013	30	N	E-1	F-1 (No)
Maricopa Assoc of Government	10/25/2013	11/22/2013	21	Y	E-1	F-1 (No)
City of El Mirage	10/2/2014	11/1/2014	45	N	E1	F1 (No)

E-1 Regardless of whether the Participant is making contributions pursuant to a Retirement Savings Agreement.

E-2 Only if the Participant is making, has made, or will make contributions during the Plan Year pursuant to a Retirement Savings Agreement.

E-4 Only if outlined in the participant employment contract.

F-1 Shall not be allowed.

F-2 Rollover Account contributions, vested Employer Matching Account contributions and after-tax contributions to the Retirement Savings Account may be withdrawn at any time after the Participant has made Retirement Savings Contributions to the Plan for at least 24 months.

# Nationwide Update

## 2<sup>nd</sup> Quarter 2016

### SRSP Plan Review

#### Summary of employee activity:

Current Employers	# of Employees Meeting 20/20 Requirement	# of Enrollments 2nd Quarter 2016	# of Participants	Deferrals	Withdrawals/ Transfers Out	Transfers In	Total Assets as of 06/30/2016
Arizona Counties Insurance Pool	9	0	4	\$ 27,300.00	\$ .00	\$ .00	\$ 200,650.50
Arizona Prosecuting Attorney's Advisory Council	4	0	1	\$ .00	\$ .00	\$ .00	\$ 57,199.78
Avra Valley Fire District	7	0	1	\$ 3,461.52	\$ .00	\$ .00	\$ 39,249.02
Chino Valley Fire District	47	0	1	\$ 5,073.42	\$ .00	\$ .00	\$ 56,869.06
City of El Mirage	200	0	1	\$ 4,099.56	\$ .00	\$ .00	\$ 31,370.03
City of Goodyear	335	0	3	\$ 850.01	\$ .00	\$ .00	\$ 76,251.30
City of Kingman	371	0	2	\$ 4,003.86	\$ 13,228.18	\$ .00	\$ 156,452.85
City of Surprise	700	0	20	\$ 24,363.77	\$ .00	\$ .00	\$ 537,512.14
City of Tempe	1211	0	1	\$ 2,957.76	\$ 2,900.00	\$ .00	\$ 1,084.37
Coconino County RASD #99	16	0	0	\$ .00	\$ .00	\$ .00	\$ .00
Flagstaff Jr Academy	22	0	4	\$ 938.84	\$ .00	\$ .00	\$ 46,301.19
Ft Mojave Mesa Fire	2	0	0	\$ .00	\$ .00	\$ .00	\$ .00
Lake Havasu City	478	0	3	\$ 1,153.30	\$ .00	\$ .00	\$ 29,529.52
Maricopa Assoc of Government	102	0	0	\$ .00	\$ .00	\$ .00	\$ .00
Maricopa County Integrated Health Care System	2302	1	30	\$ 72,087.56	\$ .00	\$ .00	\$ 2,929,884.34
Maricopa Water District	19	0	0	\$ .00	\$ .00	\$ .00	\$ .00
Mohave County	1134	0	7	\$ 10,474.76	\$ .00	\$ .00	\$ 373,056.50
Northwest Fire District	40	0	2	\$ .00	\$ .00	\$ .00	\$ 11,828.58
Pima County	6500	0	50	\$ 63,888.58	\$ 95,000.00	\$ .00	\$ 1,960,252.85
San Carlos Irrigation Drain District	2	0	0	\$ .00	\$ .00	\$ .00	\$ .00
Southeastern Arizona Government Organization	6	0	0	\$ .00	\$ .00	\$ .00	\$ .00
Success School / AZ Charter Academy	47	0	2	\$ 2,584.32	\$ .00	\$ .00	\$ 23,541.75
Superstition Mountain Community Facilities District #1	28	0	0	\$ .00	\$ .00	\$ .00	\$ .00
Tourism and Sports Authority	3	0	0	\$ .00	\$ .00	\$ .00	\$ .00
Town of Buckeye	277	0	23	\$ 20,094.50	\$ .00	\$ .00	\$ 917,138.75
Verde Valley Fire District	4	0	1	\$ .00	\$ .00	\$ .00	\$ 26,626.80
<b>TOTAL</b>	<b>13866</b>	<b>1</b>	<b>156</b>	<b>\$ 243,331.76</b>	<b>\$ 111,128.18</b>	<b>\$ .00</b>	<b>\$ 7,474,799.33</b>
						<b>SDO</b>	<b>\$ 495,369.31</b>
						<b>Loan</b>	<b>\$ 89,123.40</b>
						<b>Grand Total</b>	<b>\$ 8,059,292.04</b>

# Nationwide Update

## 2<sup>nd</sup> Quarter 2016

### SRSP Plan Review

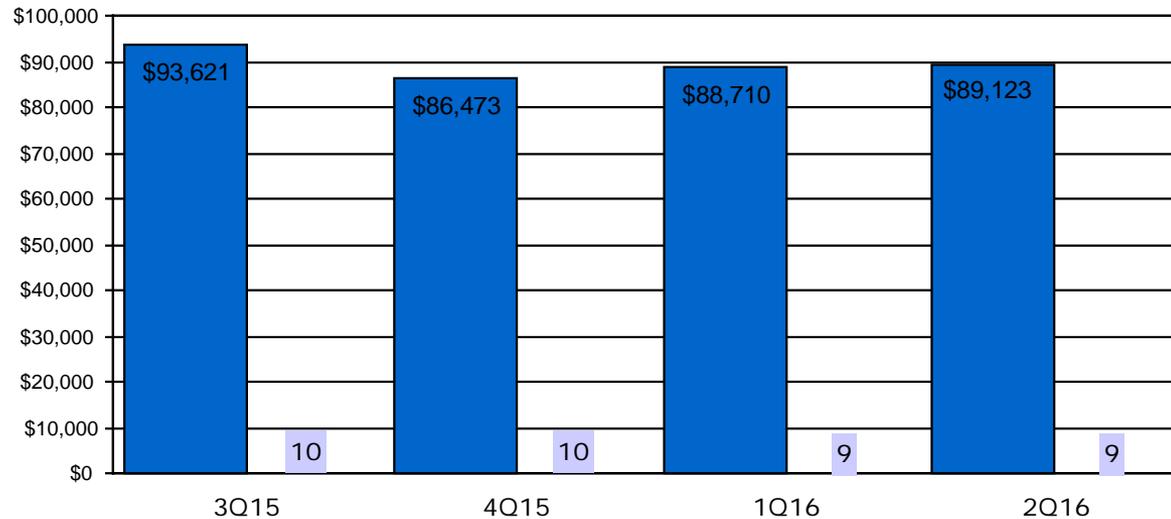
#### Key Features of the Plan:

- Enrollment Period = 2 years from start date of plan or hire date (whichever is later) and upon meeting age requirement of municipality.
- Financial hardship withdrawals are not available.
- Loans are available if adopted by the individual employer.
- Employee contribution amounts may not be changed.
- Rollovers are permitted into the SRSP Plan.
- Self Directed Brokerage Option (SDBO) is available.
- Fees
  - No annual fee.
  - Tiered asset fee of 0.30/0.20 charge on each investment option. Asset fee is applied monthly See investment options for details.
  - Underlying mutual fund fees.
- Vesting
  - Employee contributions are fully vested immediately.
  - Employer matching contributions, if any, are vested according to the following schedule.
    - Less than 1 year = 0%
    - 1 year but less than 2 years = 20%
    - 2 years but less than 3 years = 40%
    - 3 years but less than 4 years = 60%
    - 4 years but less than 5 years = 80%
    - Over 5 years = 100%

# Nationwide Update

## 2<sup>nd</sup> Quarter 2016

### 401(a) Loan Statistics



	3Q15	4Q15	1Q16	2Q16
Total Balance of Loan Fund	\$93,621	\$86,473	\$88,710	\$89,123
Total Participants With Loan Balance	10	10	9	9
Total Loans Paid Off	3	0	2	1
\$ Amount of Loans Defaulted This Quarter	\$0	\$0	\$0	\$0
Total Loan Dollars This Quarter	\$21,500	\$0	\$13,000	\$10,500
Participants Taking New Loans	2	0	1	1



# Gauging Success

## PLAN REVIEW

### Arizona State Retirement System SRSP, AZ

As of June 30, 2016



# WELCOME

Our goal is to help you objectively evaluate your plan's performance and how it performed against other plans like yours. Since Nationwide Retirement Solutions is one of the largest 457 providers in the industry we are in the unique position of being able to compare your plan to many others.

By comparing the current year information to previous years, you can see how your plan is performing, where your educational efforts are working, and what areas offer opportunities for additional improvement.

The "Peer Group" comparisons used in this report are based on NRS cases, within your state, with assets of:

**\$5 million - \$20 million**

## Table of Contents

3	Executive Summary
4	Plan Participation
5	Plan Assets
6	Plan Contributions
7-8	Summary
9-20	Appendix

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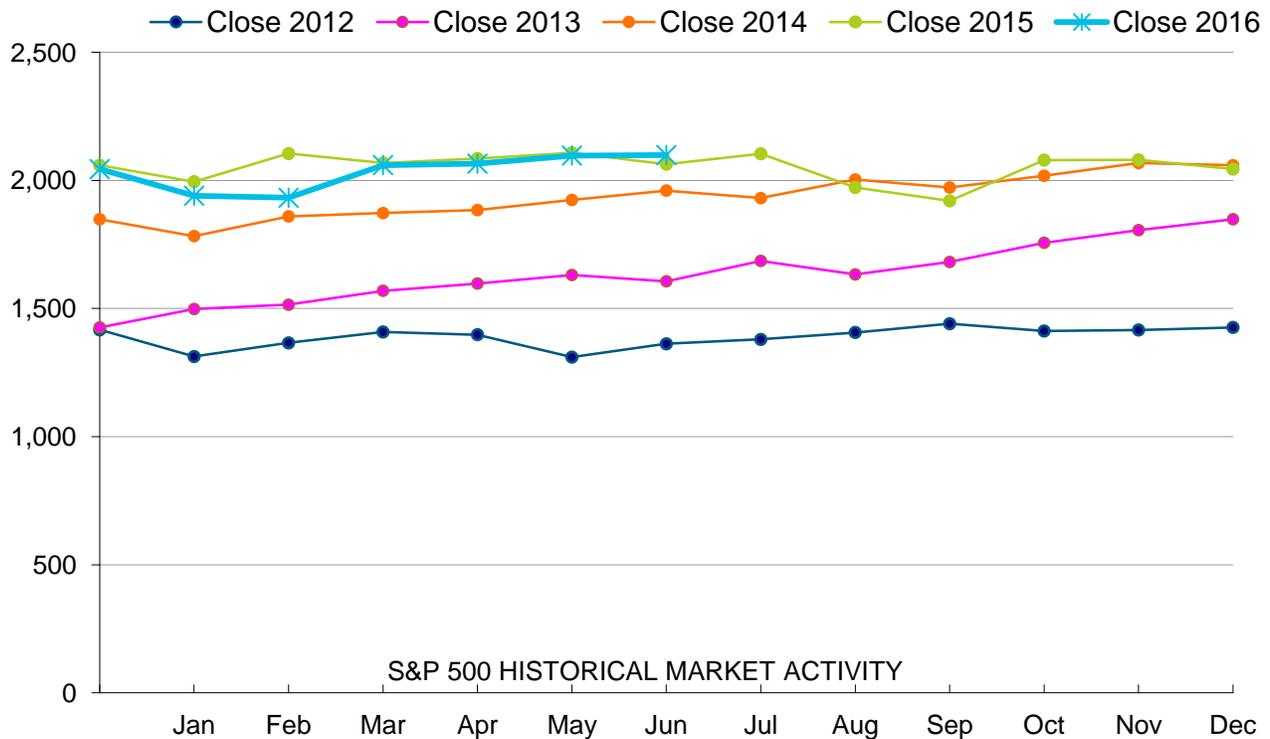
# EXECUTIVE SUMMARY

## Quick Plan Facts

	Actual as of 06/30/16	% Chng from 1 year ago
Total Participant Count	156	-4.3%
Total New Enrollments YTD Count	0	NA
Total Plan Assets (millions)	\$8.06	4.4%
Total Deferrals YTD (thousands)	\$486.01	-16.3%
Total Rollovers-In YTD	\$0.00	-100.0%

## Market Activity

S&P 500 CHANGE YTD: 2.7%



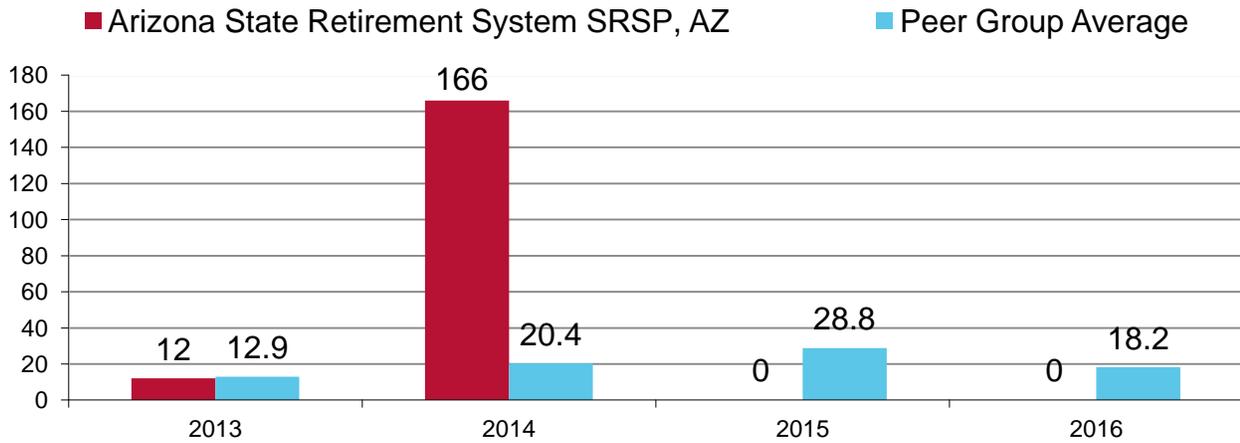
The 500 companies included in this index are selected by the S&P Index committee; a few of the mitigating factors are market size, industry representation and liquidity. This index is designed to be an overall indication of the United States stock market. The 500 securities represent approximately 75% of the total market value of all U.S. stocks.

# PLAN PARTICIPATION

Participant Status	12/31/13	12/31/14	12/31/15	6/30/16	% Chng from 1 year ago
# of Participants Actively Deferring	113	111	100	94	-10.5%
# of Inactive Participants*	51	73	54	58	3.6%
# of Participants in Payout	0	1	3	4	100.0%
<b>Total Participants</b>	<b>164</b>	<b>185</b>	<b>157</b>	<b>156</b>	<b>-4.3%</b>

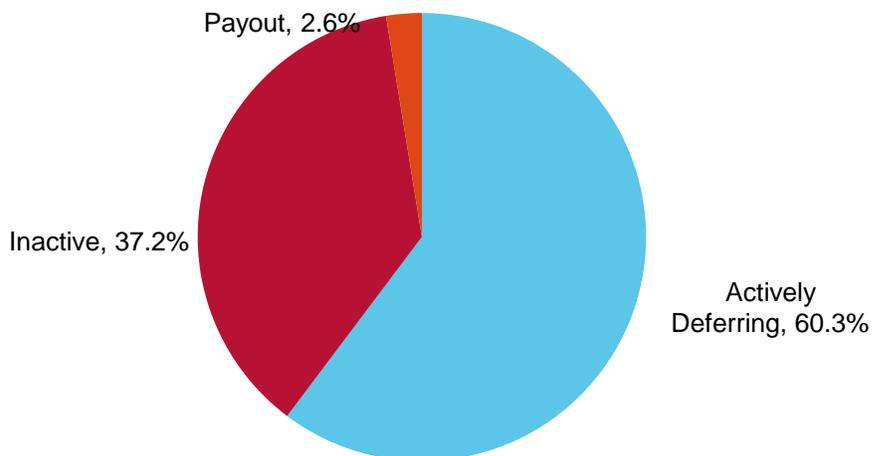
\* Inactive participants are those with a balance, not deferring and not in payout

## New Participant Count



2016 numbers are annualized

## Total Participants as of 06/30/16

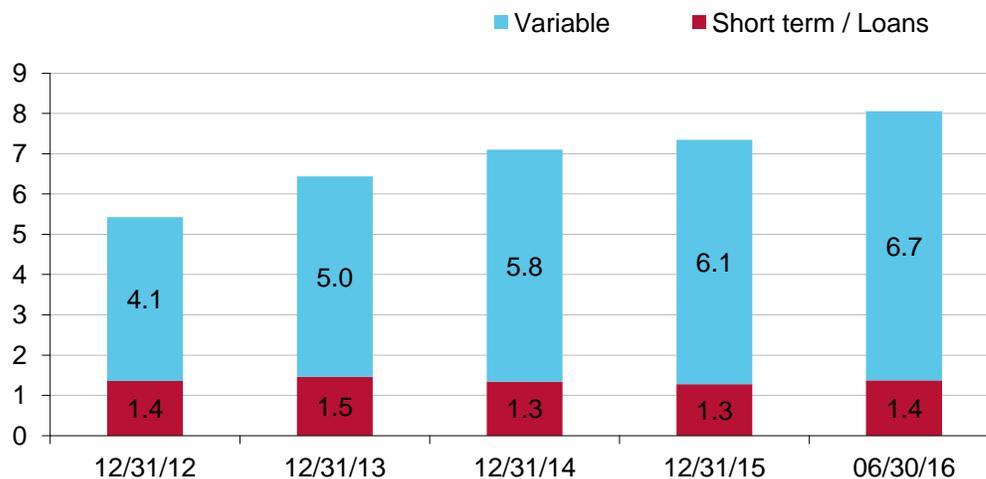


# PLAN ASSETS

## Total Plan Assets (Millions)

12/31/12	12/31/13	12/31/14	12/31/15	6/30/16	% Chng from 1 year ago
\$5.4	\$6.4	\$7.1	\$7.3	\$8.1	4.4%

## Plan Assets Summary (Millions)



## Plan Assets by Investment Class (Thousands)

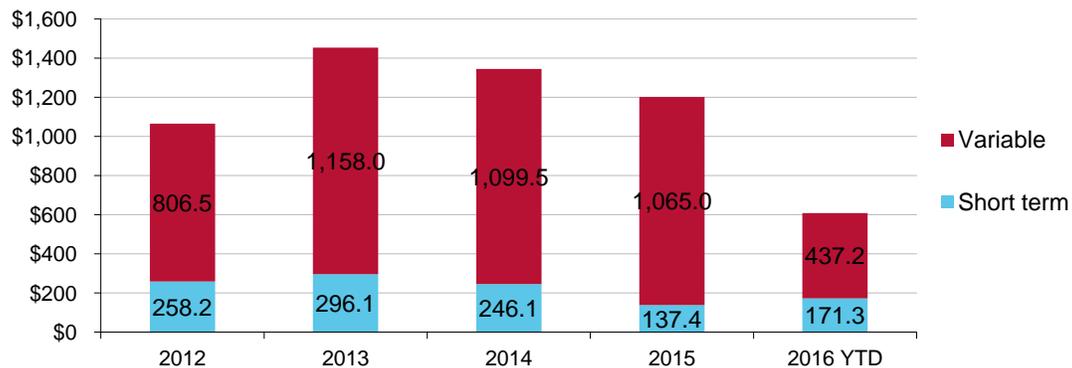
Investment Class	12/31/14	12/31/15	06/30/16	% of Total
Asset Allocation	\$1,460.77	\$1,590.13	\$1,628.36	20.2%
International	\$1,215.60	\$1,107.39	\$1,151.06	14.3%
Small Cap	\$591.02	\$568.84	\$615.67	7.6%
Mid Cap	\$651.76	\$559.61	\$626.14	7.8%
Large Cap	\$1,062.62	\$1,351.04	\$1,519.29	18.9%
Balanced	\$0.00	\$0.00	\$0.00	0.0%
Bonds	\$261.28	\$376.45	\$542.11	6.7%
Short term	\$1,258.22	\$1,189.62	\$1,279.45	15.9%
SDO	\$415.33	\$414.12	\$495.37	6.1%
Specialty	\$97.36	\$106.25	\$112.72	1.4%
Loan	\$85.45	\$86.47	\$89.12	1.1%
<b>Total</b>	<b>\$7,099.42</b>	<b>\$7,349.93</b>	<b>\$8,059.29</b>	<b>100.0%</b>

# PLAN CONTRIBUTIONS

## Total Contributions by Year (Thousands)

	2012	2013	2014	2015	2016 YTD	% Chng from 1 year ago
Deferrals	\$1,050.2	\$1,344.5	\$1,281.4	\$1,151.8	\$486.0	-16.3%
Rollovers-In	\$14.5	\$109.5	\$13.3	\$0.4	\$0.0	-100.0%
Other	\$0.0	\$0.0	\$50.9	\$50.0	\$122.5	344.5%
<b>Total</b>	<b>\$1,064.7</b>	<b>\$1,454.1</b>	<b>\$1,345.5</b>	<b>\$1,202.3</b>	<b>\$608.5</b>	<b>0.0%</b>

## Plan Contributions Summary (Thousands)



## Plan Contributions by Investment Class (Thousands)

Investment Class	2014	2015	2016 YTD	% Total
Asset Allocation	\$332.91	\$355.81	\$116.80	19.2%
International	\$217.80	\$192.35	\$73.09	12.0%
Small Cap	\$151.60	\$100.83	\$42.67	7.0%
Mid Cap	\$110.70	\$85.80	\$39.56	6.5%
Large Cap	\$217.68	\$252.18	\$120.48	19.8%
Balanced	\$0.00	\$0.00	\$0.00	0.0%
Bonds	\$52.97	\$59.69	\$35.90	5.9%
Short term	\$246.05	\$137.37	\$171.30	28.2%
SDO	\$0.00	\$0.00	\$0.00	0.0%
Specialty	\$15.83	\$18.31	\$8.70	1.4%
Loan	\$0.00	\$0.00	\$0.00	0.0%
<b>Total</b>	<b>\$1,345.55</b>	<b>\$1,202.34</b>	<b>\$608.49</b>	<b>100.0%</b>

# IN SUMMARY

This report contains valuable information and insights about your plan. Now it is time to take action! Here are some suggestions to get you started:

1. Identify your top three areas of focus.
2. Consider which of the following suggestions would work best for your plan:

- Educational Workshops for your employees
- Additional 1-on-1 meetings with your Representative
- Benefit Fairs
- Open Enrollment
- Employer communication options  
(e.g. emails, staff meetings...)
- Other \_\_\_\_\_

3. Discuss your plan with your Nationwide Representative.

We look forward to working with you to bring even greater value to your employees through deferred compensation.

# YOUR PROVEN PARTNER

When you're one of the leaders in the industry, you're called to a higher standard. Nationwide's position as an industry leader stems from nearly 40 years in service to public sector retirement plan administrators like you.

Over the years, we have maintained our industry leadership position by being one of the top providers of record-keeping, sales and marketing services to public sector retirement plans in terms of number of clients served and range of assets under management. Here's why:

- Our average client tenure is 19 years
- We partner with more than 7,700 clients \* and have a 99% plan retention rate
- We provide education and service to more than 1.6 million participants \*
- We manage over \$74 billion in assets \*
- We have been featured in the top 10 most trusted companies for privacy by TRUSTe and Ponemon Institute *for the past nine years.*
- We offer recordkeeping, administration and investment products for:
  - 457(b) Deferred compensation plans serving city, county, special district and state employees
  - 401(a) and grandfathered 401(k) Defined employer-contribution plans serving city, county, special district and state employees
  - PEHP® Tax-free investment plan for post-employment health care expenses

Most importantly, *we are proud to serve you and your plan* through our representatives in the field and in our home office.

What does all this mean to you? Our tenure, our legacy, our service and our people make us uniquely qualified to handle your retirement plan needs. This **Gauging Success** report is just one of the ways that we work with you to understand both your needs as an administrator and your employees' needs for planning for their retirement.

\*As of 06/30/16

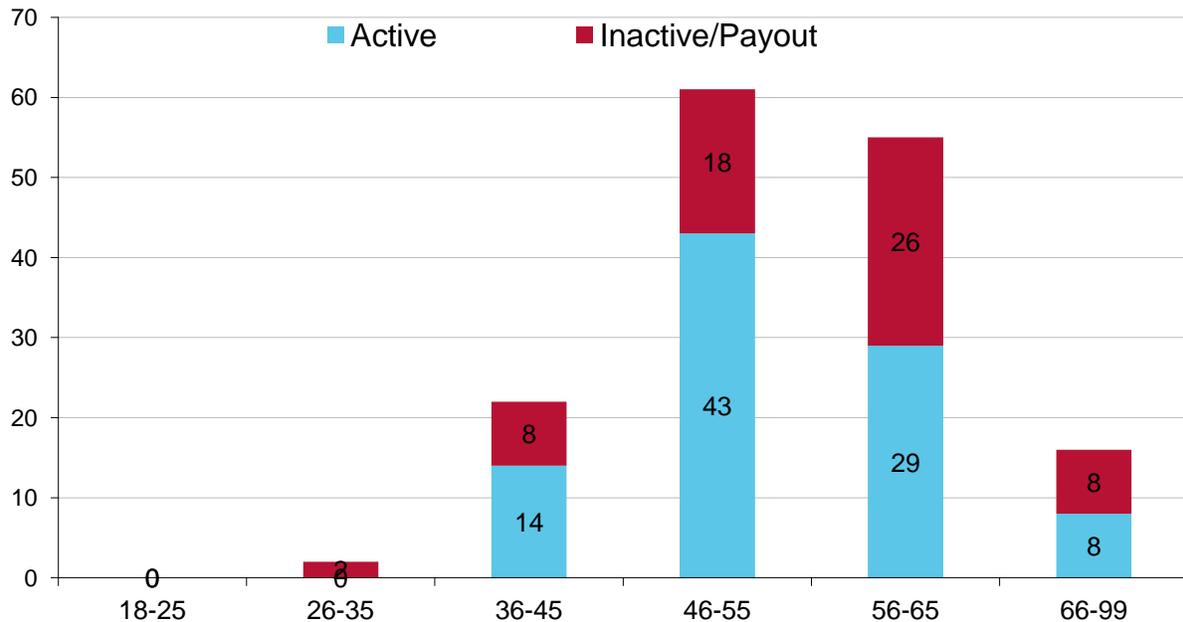
# APPENDIX

# PLAN PARTICIPATION

## Participant Counts by Age as of 06/30/16

Age Group	Total Participant Count	Male Participant Count	Female Participant Count	Actively Def Participant Count	Inactive / Payout Count
18-25	0	0	0	0	0
26-35	2	2	0	0	2
36-45	22	19	3	14	8
46-55	61	37	24	43	18
56-65	55	23	32	29	26
66-99	16	13	3	8	8
<b>Total</b>	<b>156</b>	<b>94</b>	<b>62</b>	<b>94</b>	<b>62</b>

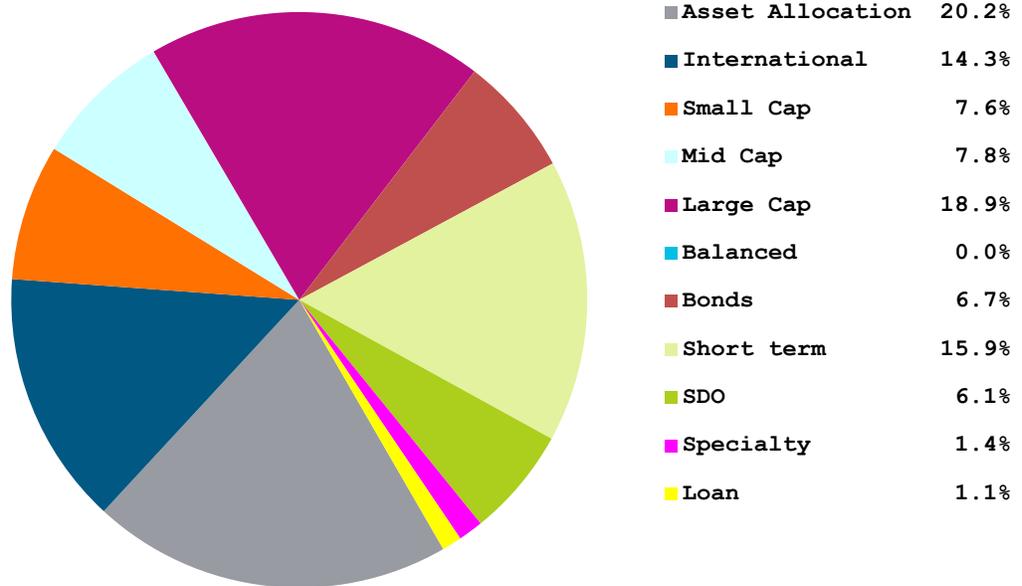
## Participant Counts by Age as of 06/30/16



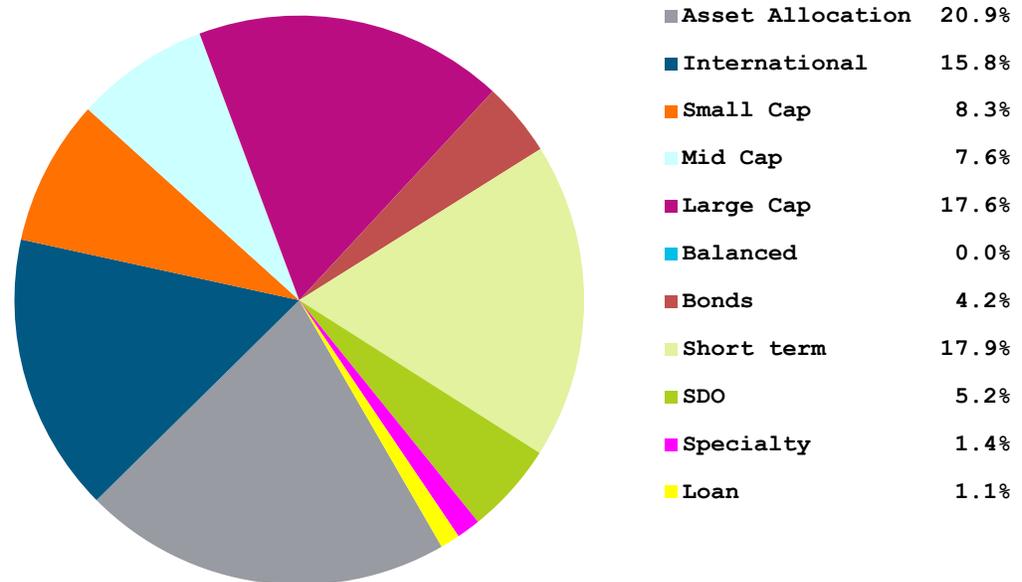
# PLAN ASSETS

The use of asset allocation does not guarantee returns or insulate you from potential losses.

## Arizona State Retirement System SRSP , AZ Asset Allocation as of 06/30/16

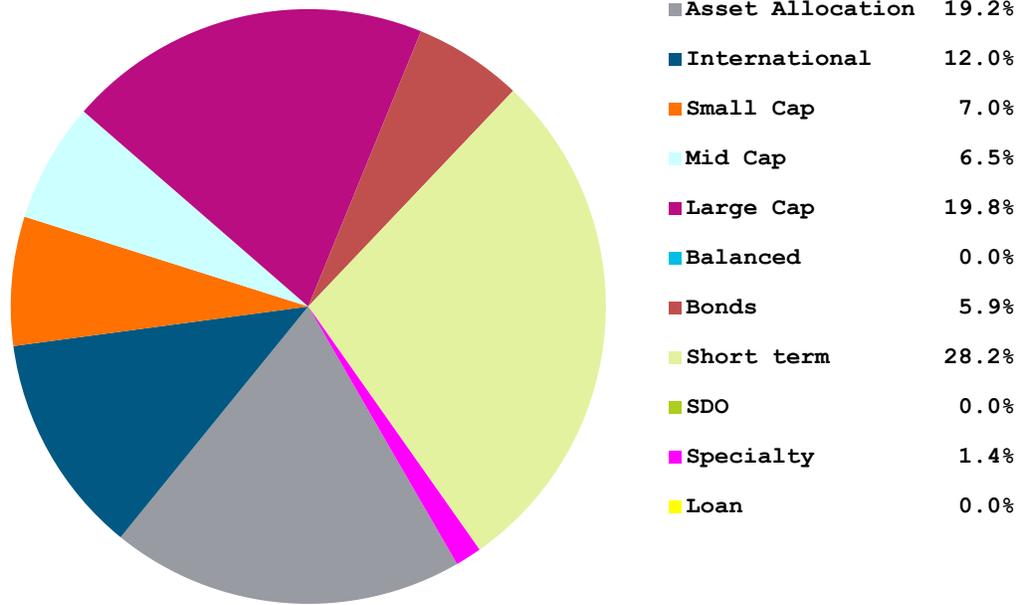


## Arizona State Retirement System SRSP , AZ Asset Allocation as of 06/30/15

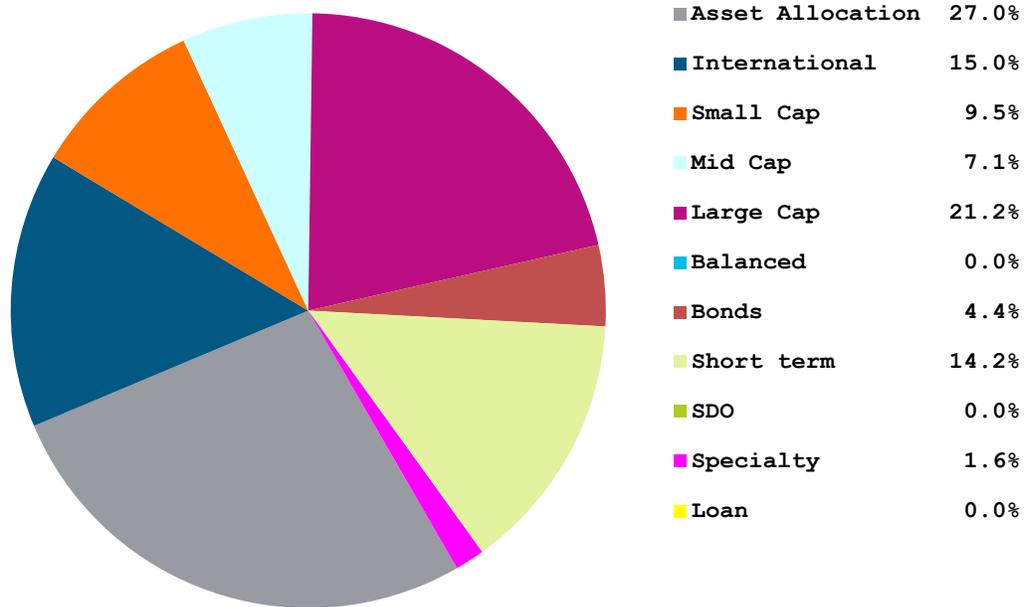


# PLAN CONTRIBUTIONS

## Arizona State Retirement System SRSP , AZ Contribution Allocation 2016 YTD



## Arizona State Retirement System SRSP, AZ Contribution Allocation 2015 YTD



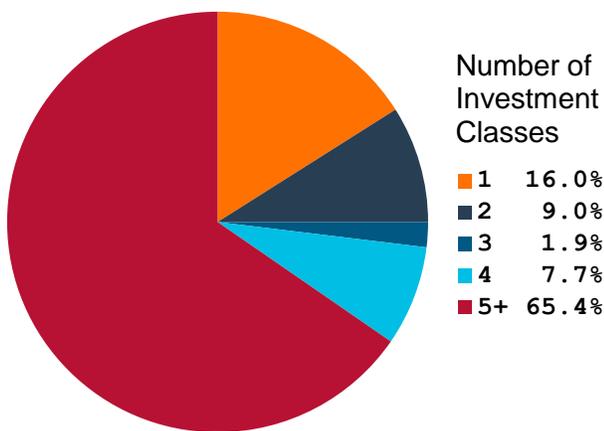
# PEER COMPARISONS

Your Peer Group is NRS cases, within your state, with assets of \$5 million - \$20 million. The peer group consists of 22 NRS cases.

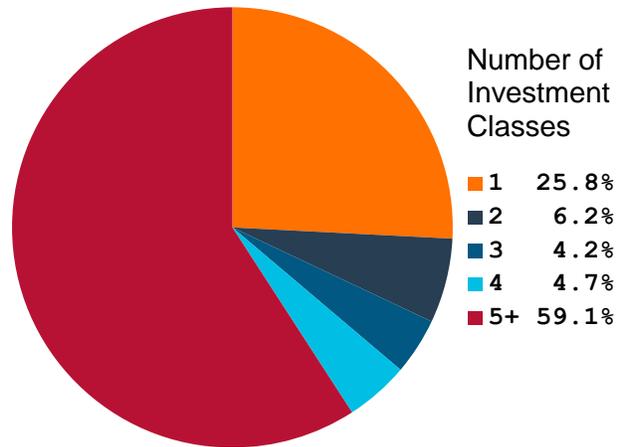
	Arizona State Retirement System SRSP, AZ	Peer Group	Ibbotson Recommended
Average # of asset classes	4.0	3.8	5.0
Average annualized deferrals	\$8,561	\$4,033	
Average assets	\$51,662	\$35,568	

## Asset Allocation Summary as of 06/30/16

percentage of participants by number of investment classes



Arizona State Retirement System SRSP, AZ



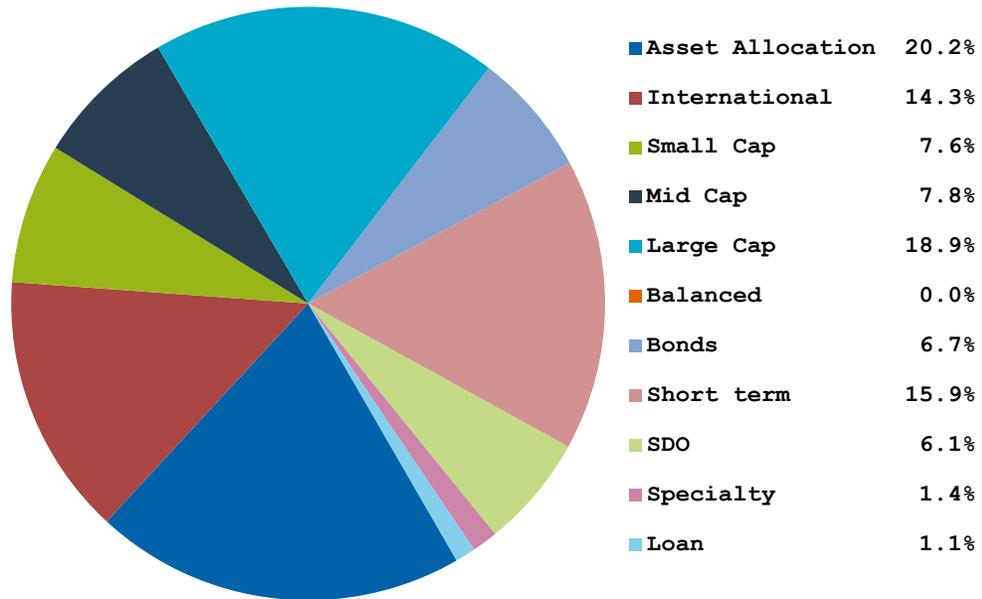
Peer Group

## Average Account Balance and Annualized Deferrals by Age Group as of 06/30/16

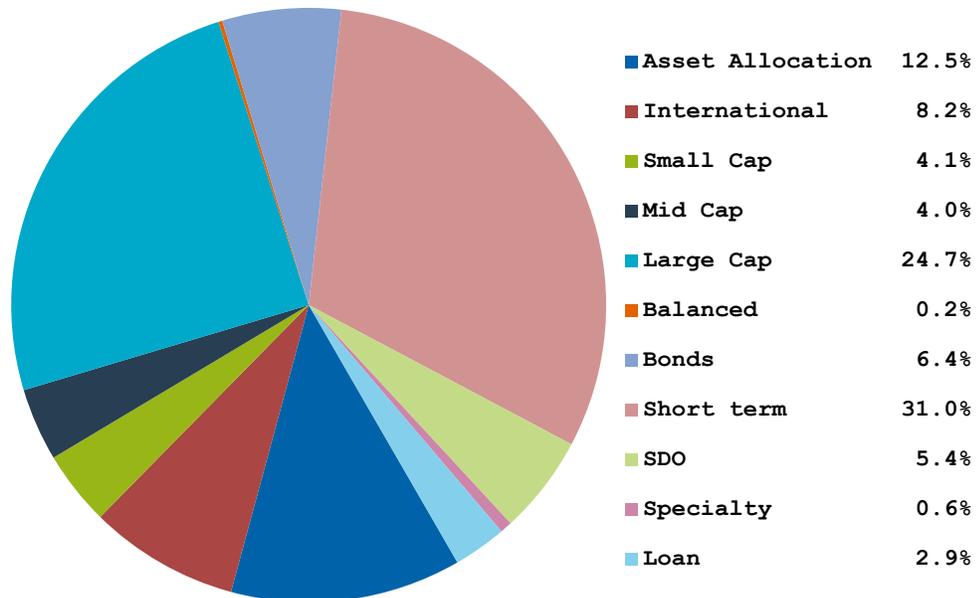
Age Group	Arizona State Retirement System SRSP, AZ	Peer Group	Arizona State Retirement System SRSP, AZ	Peer Group
	Account Balance		Annualized Deferrals	
18-25	NA	\$1,993	NA	\$2,006
26-35	\$11,014	\$13,960	NA	\$3,047
36-45	\$13,593	\$28,067	\$2,897	\$3,420
46-55	\$51,817	\$36,465	\$9,046	\$4,248
56-65	\$46,548	\$50,944	\$7,919	\$5,078
66-99	\$126,080	\$50,359	\$18,193	\$8,315

# PEER COMPARISONS

## Arizona State Retirement System SRSP , AZ Asset Allocation as of 06/30/16

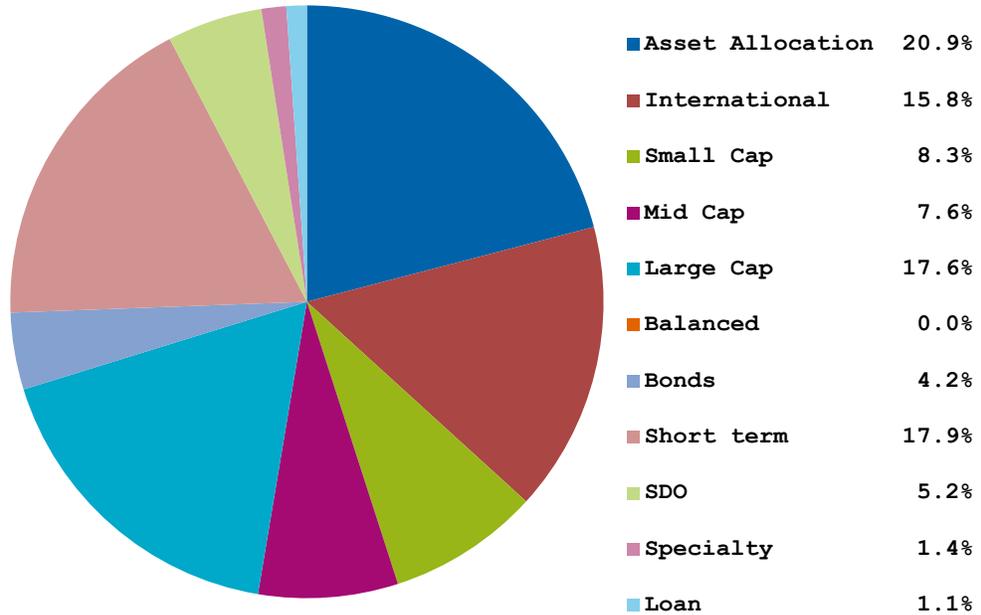


## Peer Group Asset Allocation as of 06/30/16

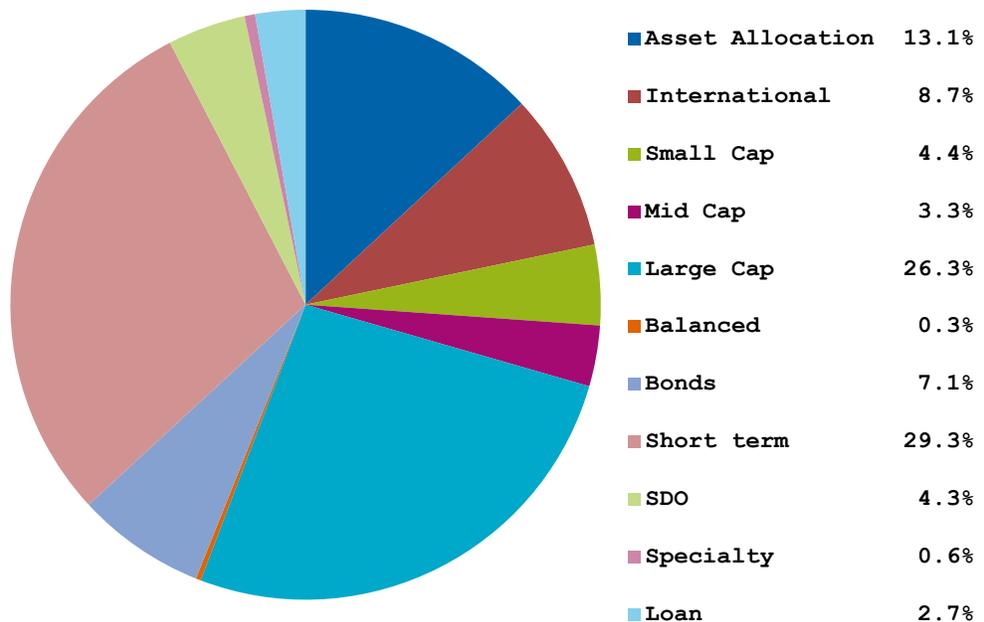


# PEER COMPARISONS

Arizona State Retirement System SRSP , AZ Asset Allocation as of 06/30/15

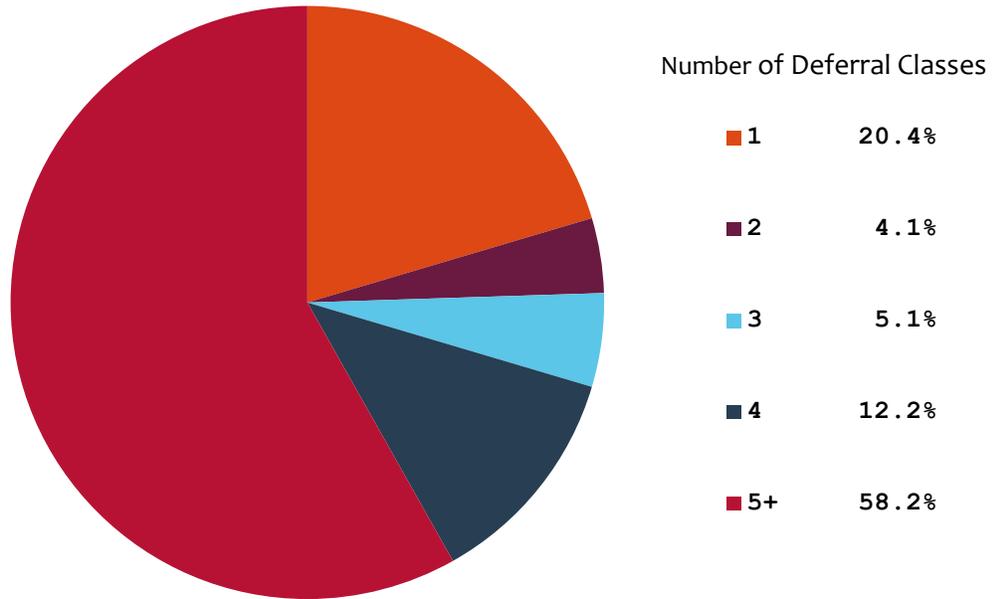


Peer Group Asset Allocation as of 06/30/15

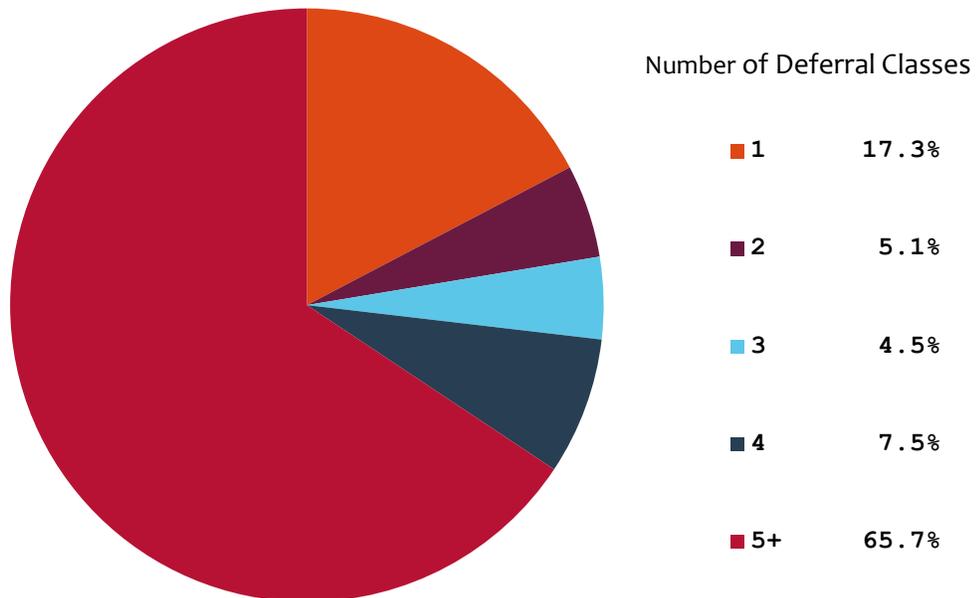


# PEER COMPARISONS

*Deferral allocation summary: percentage of participants by number of deferral investment classes*  
Arizona State Retirement System SRSP , AZ 2016 YTD

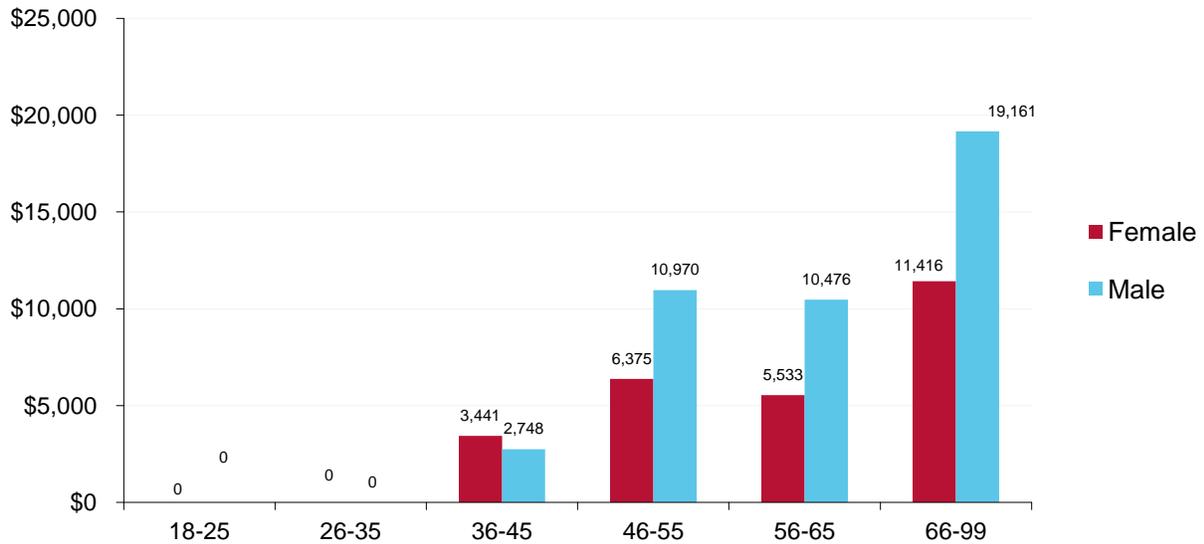


Peer Group 2016 YTD

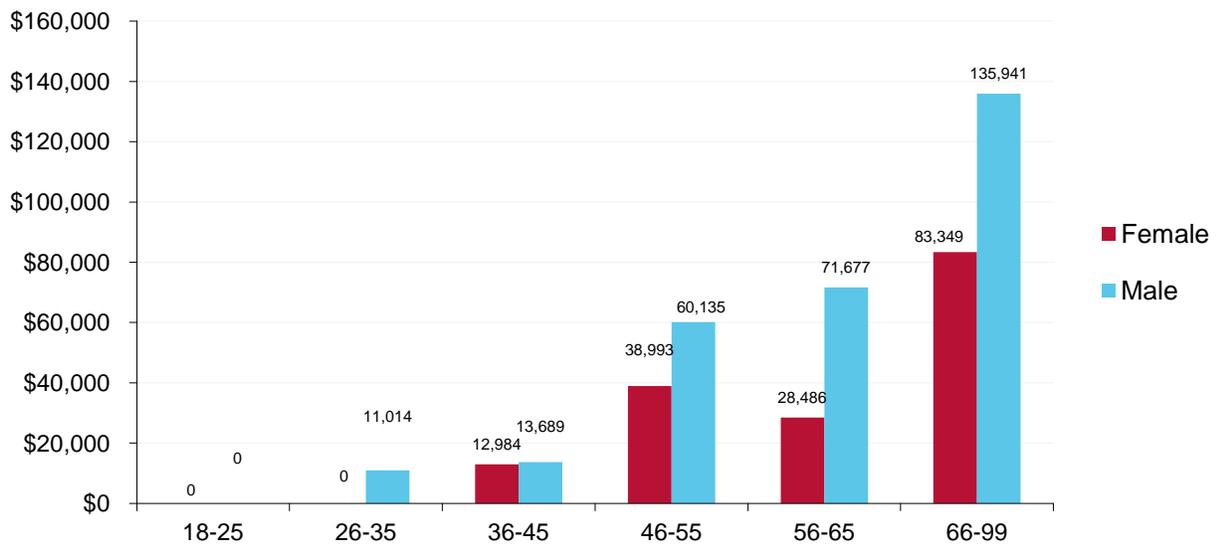


# PARTICIPANT DEMOGRAPHICS

## Male/Female Average Deferrals by Age

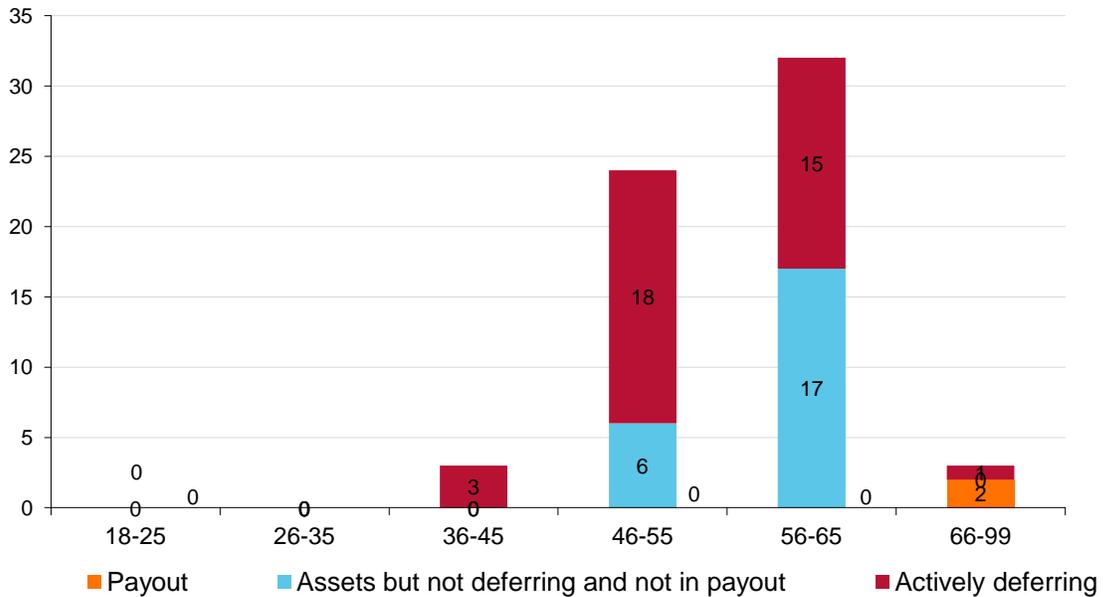


## Male/Female Average Account Balance by Age as of 06/30/16

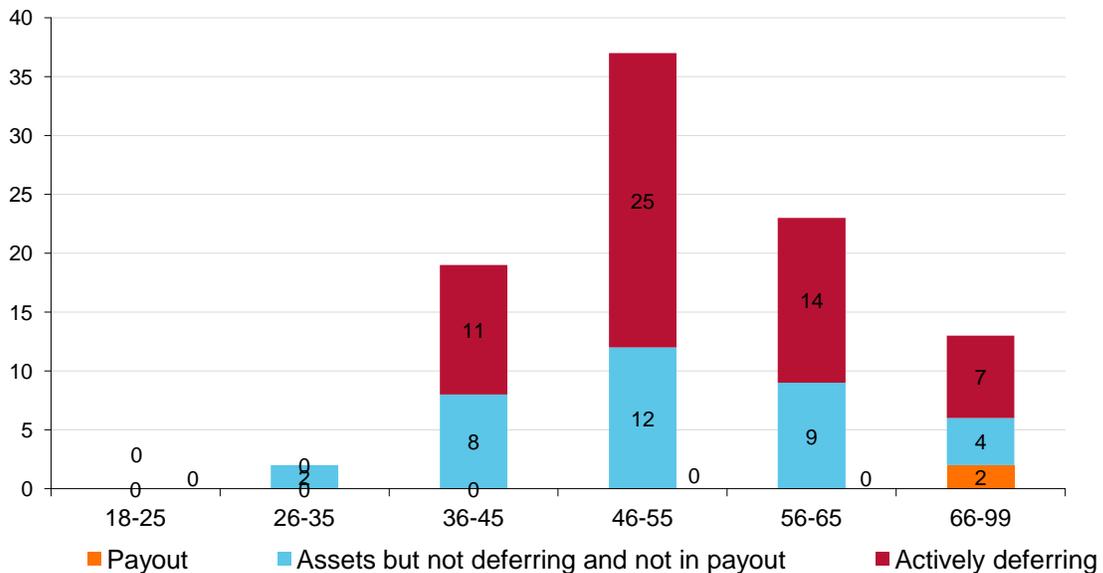


# PARTICIPANT DEMOGRAPHICS

Female Participant Count by Age and Status as of 06/30/16



Male Participant Count by Age and Status as of 06/30/16



# PLAN ASSETS

as of 06/30/16

<b>Fund</b>	<b>Asset Value</b>	<b>% of Assets</b>	<b>Count / % of Participants</b>	
<b>Asset Allocation</b>				
Ivy Asset Strategy Fund - Class A	172,929.25	2.1%	10	6.4%
Nationwide Investor Destinations Aggressive Fund: Service Class	462,998.79	5.7%	34	21.8%
Nationwide Investor Destinations Conservative Fund: Service Class	338,822.62	4.2%	18	11.5%
Nationwide Investor Destinations Moderate Fund: Service Class	653,613.49	8.1%	38	24.4%
<b><u>Sub-Total Asset Allocation</u></b>	<b>1,628,364.15</b>	<b>20.2%</b>		
<b>Bonds</b>				
Metropolitan West Total Return Bond Fund - Class M	232,019.67	2.9%	24	15.4%
Vanguard Total Bond Market Index Fund - Admiral Shares	310,089.53	3.8%	24	15.4%
<b><u>Sub-Total Bonds</u></b>	<b>542,109.20</b>	<b>6.7%</b>		
<b>International</b>				
EuroPacific Growth Fund(R) - Class R4	235,872.53	2.9%	26	16.7%
Lazard Emerging Markets Equity Portfolio - Open Shares	225,036.68	2.8%	35	22.4%
Vanguard Total International Stock Index Fund Admiral	690,147.39	8.6%	24	15.4%
<b><u>Sub-Total International</u></b>	<b>1,151,056.60</b>	<b>14.3%</b>		
<b>Large Cap</b>				
PRIMECAP Odyssey Stock Fund	292,636.46	3.6%	21	13.5%
Vanguard 500 Index Fund - Admiral Shares	1,226,654.90	15.2%	43	27.6%
<b><u>Sub-Total Large Cap</u></b>	<b>1,519,291.36</b>	<b>18.9%</b>		
<b>Loan</b>				
Loan Outstanding Principal Balance	89,123.40	1.1%	9	5.8%
<b><u>Sub-Total Loan</u></b>	<b>89,123.40</b>	<b>1.1%</b>		
<b>Mid Cap</b>				
Dreyfus Structured Midcap Fund - Class I	192,307.28	2.4%	16	10.3%
Vanguard Mid-Cap Index Fund - Admiral Shares	433,828.40	5.4%	32	20.5%
<b><u>Sub-Total Mid Cap</u></b>	<b>626,135.68</b>	<b>7.8%</b>		

***Please consider the funds' investment objectives, risks, and charges and expenses carefully before investing. The prospectus contains this and other important information about the investment company. Read the prospectus carefully before investing. Prospectuses may be obtained from your plan's website or by calling your plan's toll-free customer service phone number.***

The use of diversification and asset allocation as part of an overall investment strategy does not assure a profit or protect against loss in a declining market.

Asset allocation funds are designed to provide diversification and asset allocation across several types of investments and asset classes, primarily by investing in underlying funds. Therefore, in addition to the expenses of the asset allocation fund itself, you are indirectly paying a proportionate share of the applicable fees and expenses of the underlying funds.

# PLAN ASSETS

as of 06/30/16

<b>Fund</b>	<b>Asset Value</b>	<b>% of Assets</b>	<b>Count / % of Participants</b>	
<b>SDO</b>				
Schwab Personal Choice Retirement Account	495,369.31	6.1%	5	3.2%
<b><u>Sub-Total SDO</u></b>	<b>495,369.31</b>	<b>6.1%</b>		
<b>Short Term Investments</b>				
Morley Stable Value Fund II	1,279,449.87	15.9%	33	21.2%
<b><u>Sub-Total Short Term Investments</u></b>	<b>1,279,449.87</b>	<b>15.9%</b>		
<b>Small Cap</b>				
JPMorgan Small Cap Equity Fund - Class A	290,214.63	3.6%	31	19.9%
Vanguard Small-Cap Index Fund - Admiral Shares	325,460.08	4.0%	26	16.7%
<b><u>Sub-Total Small Cap</u></b>	<b>615,674.71</b>	<b>7.6%</b>		
<b>Specialty</b>				
Invesco Global Real Estate Fund - Class A	112,717.76	1.4%	21	13.5%
<b><u>Sub-Total Specialty</u></b>	<b>112,717.76</b>	<b>1.4%</b>		
<b>Total</b>	<b>8,059,292.04</b>			

***Please consider the funds' investment objectives, risks, and charges and expenses carefully before investing. The prospectus contains this and other important information about the investment company. Read the prospectus carefully before investing. Prospectuses may be obtained from your plan's website or by calling your plan's toll-free customer service phone number.***

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## Arizona State Retirement System

### Supplemental Salary Deferral Plan Investment Options Performance History for Period Ending June 30, 2016

The following are the percentage changes in Net Assets (with capital gains and income dividends reinvested) without reduction for Plan Charges for the respective periods ended June 30 2016, The results shown represent past performance and do not represent expected future performance or experience. Past performance does not guarantee future results. Investment return and principal value of an investment will fluctuate so that an investor's units or shares, when redeemed, may be worth more or less than their original cost. Current performance may be lower or higher than the data quoted.

Performance data current to the most recent month-end may be obtained by visiting [www.azssdp.com](http://www.azssdp.com).

**Please consider the fund's investment objectives, risks, charges, and expenses carefully before investing. The underlying fund prospectuses contain this and other information about the investment company. Prospectuses are available by calling 602-266-2733 or by visiting [www.azssdp.com](http://www.azssdp.com). Read carefully before investing. Please see other important disclosures at the end of this report. Investment options are subject to change.**

The Average Annual Returns indicated below are net of Gross Expense Ratios but not net of plan administrative fees (i.e., the returns do reflect Gross Expense Ratios but do not reflect the deduction of Plan Charges assessed to Plan Participants). The Plan charges the following administrative fees: tier 1 funds - .27% and tier 2 - .18%. The administrative fee should be added to the fund's Gross Expense Ratio to determine the total cost for the fund. For example, a tier 1 fund with a Gross Expense Ratio of 0.73% would have a total cost of 1.00% (0.27% + 0.73% = 1.00%).

INVESTMENT TYPE Fund Name (Tier) • Index	Morningstar* Category	Ticker	Gross Expense Ratio	Average Annual Return			Return Since Inception*	Inception Date
				1-year	5-year	10-year		
<b>STABLE VALUE FUND</b>								
Morley Stable Value Retirement Fund (2) • Barclays Capital 1-3 Year Government Index	N/A	N/A	N/A	0.93% 1.31%	0.82% 0.84%	1.83% 2.54%	3.56%	12/31/93
<b>BOND FUNDS</b>								
Vanguard Total Bond Market Index Fund (1)* • Barclays Capital US Aggregate Float Adjusted Bond Index	Intermediate-Term Bond	VBMFX	0.16%	6.02% 6.12%	3.61% 3.81%	5.01% N/A	6.23%	12/11/86
Metropolitan West Total Return Bond Fund M (2) • Barclays Capital US Aggregate Bond Index	Intermediate-Term Bond	MWTRX	0.67%	4.48% 6.00%	4.75% 3.76%	6.56% 5.13%	6.71%	03/31/97
<b>ASSET ALLOCATION FUND: ACTIVE</b>								
Ivy Asset Strategy Fund A (2)* • World Allocation^ • S&P 500 TR USD	World Allocation	WASAX	0.99%	-12.54% -2.28% 3.99%	1.27% 3.32% 12.10%	5.32% 4.43% 7.42%	6.81%	07/10/00
<b>ASSET ALLOCATION FUNDS: RISK PROFILE</b>								
Nationwide Investor Destinations Conservative Fund Svc (2)* • Conservative Index (10% S&P 500+5% S&P 400+5% MSCI EAFE Index Net Dividends +40% BC Agg+40% 3Mo Tbill)^ • Barclays Capital US Aggregate Bond Index	Conservative Allocation	NDCSX	0.88%	2.90% 1.88% 6.00%	3.26% 3.37% 3.76%	3.68% 3.96% 5.13%	3.59%	03/30/00
Nationwide Investor Destinations Moderate Fund Svc (2)* • Moderate Index (30% S&P 500+10% S&P 400+5% Russell 2000+15% MSCI EAFE Index Net Dividends+25% BC Agg+15% 3Mo Tbill)^ • Russell 3000	Moderate Allocation	NSDMX	0.89%	-0.16% -0.13% 2.14%	5.32% 6.14% 11.60%	4.58% 5.24% 7.40%	3.91%	03/30/00
Nationwide Investor Destinations Aggressive Fund Svc (2)* • Aggressive Allocation^ • Russell 3000	Aggressive Allocation	NDASX	0.89%	-2.94% -3.22% 2.14%	6.72% 6.87% 11.60%	4.73% 4.66% 7.40%	3.56%	03/30/00
<b>LARGE CAP EQUITY FUNDS</b>								
Vanguard 500 Index Fund (1)* PRIMECAP Odyssey Stock • Standard & Poor's 500 Stock Index	Large Cap Blend Large Cap Blend	VFINX POSKX	0.16% 0.65%	3.84% -1.10% 3.99%	11.93% 11.21% 12.10%	7.30% 7.85% 7.42%	10.80% 8.84%	08/31/76 11/01/04

INVESTMENT TYPE Fund Name (Tier) Index	Morningstar® Category	Ticker	Gross Expense Ratio	Average Annual Return			Return Since Inception†	Inception Date
				1-year	5-year	10-year		
<b>MID CAP EQUITY FUNDS</b>								
Vanguard Mid Cap Index Fund - Investor Shares (1)* • CRSP US Mid Cap	Mid Cap Blend	VMSX	0.20%	-1.01% -0.87%	10.41% 10.77%	7.66% 7.87%	9.35%	05/21/98
Dreyfus Premier Structured Mid Cap Fund I (2) • S&P MidCap 400 TR	Mid Cap Blend	DPSRX	1.05%	-2.86% 1.33%	10.57% 10.55%	7.25% 8.55%	8.20%	06/29/01
<b>SMALL CAP EQUITY FUNDS</b>								
Vanguard Small Cap Index Fund (1)* • CRSP US Small Cap	Small Cap Blend	NAESX	0.20%	-3.01% -2.91%	9.75% 10.04%	7.61% 8.20%	10.52%	10/03/60
JP Morgan Small Cap Equity Fund A (2) • Russell 2000	Small Cap Blend	VSEAX	1.42%	1.10% -6.73%	11.35% 8.35%	9.85% 6.20%	12.83%	12/20/94
<b>INTERNATIONAL EQUITY FUNDS</b>								
Vanguard Total International Stock Index Fund (1)* • FTSE Global All Cap ex USA	Foreign Large Blend	VGTSX	0.19%	-9.21% -9.44%	0.52% 0.57%	1.90% 2.55%	4.04%	04/29/96
American Funds EuroPacific Growth Fund R4 (2) • MSCI ACWI Ex USA	Foreign Large Growth	REREX	0.85%	-9.88% -10.24%	2.14% 0.10%	3.61% 1.87%	6.83%	06/07/02
Lazard Emerging Markets Fund - Open Class (2) • MSCI EMF Index Net Dividends	Diversified Emerging	LZOEX	1.37%	-8.29% -12.03%	-2.96% -3.78%	4.31% 3.54%	6.06%	01/08/97
<b>REAL ESTATE FUND</b>								
INVESCO Global Real Estate Fund A (2) • MSCI World Index	Specialty-Real Estate	AGREX	1.43%	7.09% -2.78%	6.61% 6.63%	3.74% 4.43%	5.99%	04/29/05
CHARLES SCHWAB SELF-DIRECTED BROKERAGE OPTION	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

\* Denotes passively managed fund

^ An additional Index has been provided for this fund that may be more representative of the underlying asset allocation than the index shown that is listed in the fund's prospectus. Market indices have been provided for comparison purposes only; they are unmanaged and no fees and expenses have been reflected here. Individuals cannot invest directly in an index.

‡ The return since inception dates shown are calculated from the inception of the oldest share class to the present. The number will differ from Morningstar, which lists a load adjusted return for the same period.

Bond funds: Bond funds have the same interest rate, inflation and credit risks that are associated with the underlying bonds owned by the fund.

International/emerging markets funds: Investing internationally involves risks not associated with investing solely in the U.S., such as currency fluctuation, political risk, differences in accounting and the limited availability of information.

Real estate funds: Real estate investing entails the risks of real estate business generally, including sensitivity to economic and business cycles, changing demographic patterns and government actions.

Asset Allocation funds: The Asset Allocation Funds are designed to provide diversification and asset allocation across several types of investments and asset classes, primarily by

investing in underlying funds. Therefore, in addition to the expenses of the funds, you are indirectly paying a proportionate share of the applicable fees and expenses of the underlying funds.

Small company funds: Stocks of small or emerging companies may have less liquidity than those of larger, established companies and may be subject to greater price volatility and risk than the overall stock market.

Gross expense ratios represent the fund's total operating expenses expressed as a percentage of the assets held in the fund. For more information about gross expense ratios, read the fund's prospectus.

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Inception date is the date the underlying fund was established. Some mutual funds may impose a short term trade fee. Some funds may be subject to a trade restriction policy. Please read the underlying prospectus carefully.

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NRX-0227AZ-AS.0816.2 (08/16)



**Nationwide Administrators Report**  
**2<sup>nd</sup> Quarter 2016**  
**SSDP 457 Information**

# Nationwide Update

## 2<sup>nd</sup> Quarter 2016

### SSDP 457 Plan Review

#### Summary of employee activity:

Current Employers	# of Enrollments 2nd Quarter 2016	# of Participants	Contributions	Withdrawals		Total Assets as of 06/30/2016
				/Transfers Out	Transfers In	
APACHE COUNTY	0	1	\$ 2,850.00	\$ 54,461.36	\$ .00	\$ 1,536.92
ARIZONA HEALTH FACILITIES AUTHORITY	0	1	\$ 11,075.39	\$ .00	\$ .00	\$ 91,754.58
BALL CHARTER SCHOOL DOBSON	1	5	\$ 7,200.00	\$ .00	\$ .00	\$ 7,316.98
BALL CHARTER SCHOOLS HEARN	0	5	\$ 18,773.30	\$ .00	\$ .00	\$ 164,333.75
BALL CHARTER SCHOOLS VAL VISTA	1	1	\$ 300.00	\$ .00	\$ .00	\$ 304.44
BLACKWATER COMMUNITY SCHOOL	0	2	\$ 2,500.00	\$ .00	\$ 449.09	\$ 35,848.50
CENTRAL ARIZONA ASSOCIATION OF GOVERNMENTS	1	2	\$ 700.00	\$ .00	\$ 236.73	\$ 8,692.57
CITY OF BENSON	0	5	\$ 900.00	\$ .00	\$ 1.75	\$ 47,865.31
CITY OF COTTONWOOD	0	1	\$ .00	\$ .00	\$ .00	\$ 62,181.45
CITY OF DOUGLAS	0	15	\$ 4,069.87	\$ 33,023.65	\$ 8,781.49	\$ 188,927.38
CITY OF GLOBE	0	4	\$ 20.00	\$ .00	\$ 6,253.26	\$ 8,534.08
CITY OF HOLBROOK	0	2	\$ 175.00	\$ .00	\$ 198.21	\$ 4,062.16
CITY OF MARICOPA	0	17	\$ 24,248.24	\$ .00	\$ 4,391.93	\$ 234,743.88
CITY OF PAGE	1	2	\$ 5,638.48	\$ .00	\$ 5,343.51	\$ 20,714.90
CITY OF SAFFORD	0	12	\$ 7,710.00	\$ .00	\$ 5,163.23	\$ 431,392.25
CITY OF SAN LUIS	0	24	\$ 5,820.00	\$ 4,130.00	\$ 525.00	\$ 161,554.16
CITY OF SEDONA	0	4	\$ 5,112.00	\$ .00	\$ 348.63	\$ 97,873.08
CITY OF WILCOX	0	9	\$ 1,380.40	\$ .00	\$ .00	\$ 16,530.94
CITY OF WILLIAMS	0	5	\$ 930.00	\$ .00	\$ 350.63	\$ 13,851.91
CITY OF WINSLOW	0	2	\$ 1,800.00	\$ .00	\$ 379.51	\$ 195,458.65
COCHISE COUNTY	0	33	\$ 22,222.00	\$ 35,125.16	\$ 37,927.11	\$ 977,852.76
COCONINO COUNTY	0	17	\$ 2,250.00	\$ 20,000.00	\$ 16,015.41	\$ 375,602.28
FLAGSTAFF ARTS AND LEADERSHIP ACADEMY	0	1	\$ .00	\$ .00	\$ 17.38	\$ 862.48
FLOWING WELLS SCHOOLS	0	1	\$ .00	\$ .00	\$ .00	\$ 11,268.74
GRAHAM COUNTY	0	21	\$ 8,165.00	\$ 19,404.24	\$ 61,784.42	\$ 462,938.85
GREEN VALLEY WATER DISTRICT	0	4	\$ .00	\$ .00	\$ .00	\$ 10,353.36

# Nationwide Update

## 2<sup>nd</sup> Quarter 2016

### SSDP 457 Plan Review

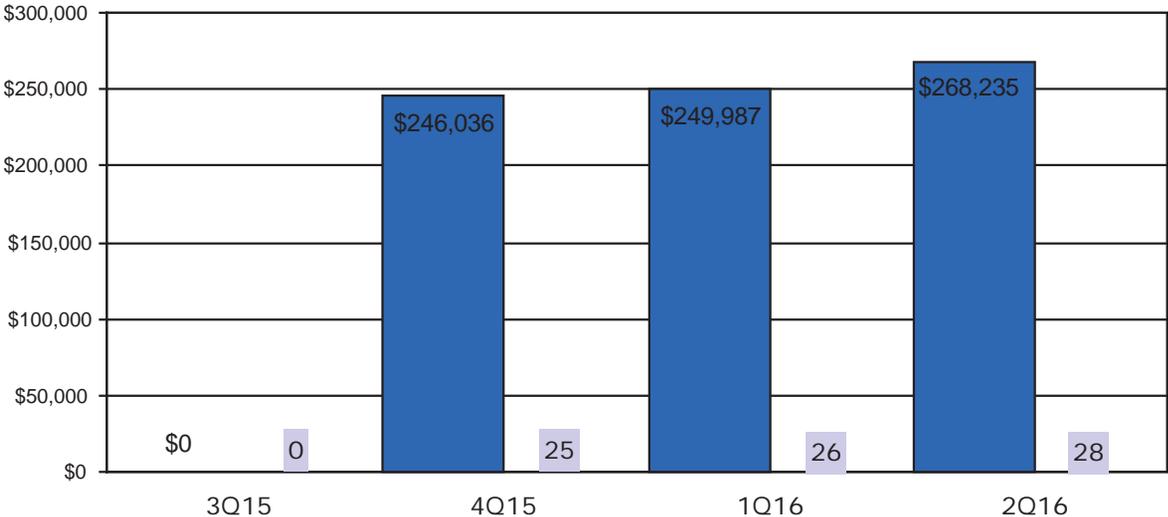
#### Summary of employee activity:

Current Employers	# of Enrollments	# of Participants	Contributions	Withdrawals		Total Assets as of 06/30/2016
	2nd Quarter 2016			/Transfers Out	Transfers In	
HACKBERRY ELEMENTARY SCHOOL DISTRICT 3	0	1	\$ 1,400.00	\$ 54,461.36	\$ .00	\$ 2,717.37
HIGLEY UNIFIED SCHOOL DISTRICT	0	5	\$ .00	\$ .00	\$ 4,998.11	\$ 132,117.96
LAKE HAVASU CITY	2	11	\$ 5,990.00	\$ .00	\$ 96.56	\$ 53,578.44
MADISON SCHOOL DISTRICT 38	0	1	\$ .00	\$ .00	\$ .00	\$ 4,457.61
MARICOPA ASSOCIATION OF GOVERNMENTS	2	29	\$ 42,962.50	\$ .00	\$ 31,610.01	\$ 1,223,614.58
NAIPTA	0	2	\$ .00	\$ .00	\$ 97.16	\$ 9,677.54
NORTHERN ARIZONA COUNCIL OF GOVERNMENTS	0	13	\$ 7,621.24	\$ .00	\$ 1,231.91	\$ 81,807.08
PAINTED ROCK ACADEMY	0	2	\$ 3,400.00	\$ .00	\$ 283.47	\$ 38,464.09
PIMA COUNTY COMMUNITY COLLEGE DISTRICT	1	10	\$ 10,222.00	\$ .00	\$ 27,589.48	\$ 203,537.85
PIMA PREVENTION PARTNERSHIP	3	2	\$ 70.00	\$ 33,023.65	\$ .00	\$ 71.31
SANTA CRUZ COUNTY	1	5	\$ 2,250.00	\$ .00	\$ 14,758.74	\$ 49,580.53
SKYVIEW SCHOOL INC	0	8	\$ 1,540.00	\$ .00	\$ .00	\$ 7,729.13
SUNNYSIDE UNIFIED SCHOOL DIST 12	0	1	\$ .00	\$ .00	\$ 46.48	\$ 4,157.63
SUPERSTITION MOUNTAINS COMM FAC DIST 1	0	5	\$ 1,400.00	\$ .00	\$ .00	\$ 22,788.32
TOWN OF CAMP VERDE	0	3	\$ 9,477.26	\$ .00	\$ 21.19	\$ 25,530.36
TOWN OF CAVE CREEK	0	11	\$ 2,085.00	\$ 4,130.00	\$ 68,963.97	\$ 188,977.63
TOWN OF CLARKDALE	0	4	\$ 750.00	\$ .00	\$ 12,530.40	\$ 48,527.59
TOWN OF FLORENCE	0	14	\$ 8,308.00	\$ .00	\$ 1,119.40	\$ 209,000.19
TOWN OF GUADALUPE	0	2	\$ 220.00	\$ .00	\$ 22.19	\$ 2,685.98
TOWN OF QUEEN CREEK	0	7	\$ 3,535.61	\$ .00	\$ 586.59	\$ 228,982.47
TOWN OF THATCHER	0	15	\$ 7,175.00	\$ 35,125.16	\$ 938.35	\$ 160,092.50
TRI CITY FIRE DISTRICT	0	1	\$ .00	\$ 20,000.00	\$ 3.59	\$ 3,601.91
TUCSON COUNTRY DAY SCHOOL	0	3	\$ 630.00	\$ .00	\$ 31.14	\$ 2,019.61
VALLEY ACADEMY	0	6	\$ 1,110.00	\$ .00	\$ 321.44	\$ 15,571.54
YAVAPAI COLLEGE	0	15	\$ 6,233.21	\$ 19,404.24	\$ 1,630.82	\$ 307,787.33
YUMA COUNTY	0	42	\$ 24,861.00	\$ .00	\$ 221,189.02	\$ 1,131,078.84
<b>TOTAL</b>	<b>13</b>	<b>414</b>	<b>\$ 275,080.50</b>	<b>\$ 332,288.82</b>	<b>\$ 536,237.31</b>	<b>\$ 7,790,511.75</b>
					<b>SDO</b>	<b>\$ 77,872.11</b>
					<b>LOAN</b>	<b>\$ 268,335.48</b>
					<b>Grand Total</b>	<b>\$ 8,136,719.34</b>

# Nationwide Update

2<sup>nd</sup> Quarter 2016

457 Loan Statistics



	3Q15	4Q15	1Q16	2Q16
Total Balance of Loan Fund	N/A	\$246,036	\$249,987	\$268,235
Total Participants With Loan Balance	N/A	25	26	28
Total Loans Paid Off	N/A	0	1	0
\$ Amount of Loans Defaulted This Quarter	N/A	0	0	\$0
Total Loan Dollars This Quarter	N/A	0	26500	\$35,000
Participants Taking New Loans	N/A	0	2	2



# Gauging Success

## PLAN REVIEW

### Arizona State Retirement System SSDP, AZ

As of June 30, 2016



# WELCOME

Our goal is to help you objectively evaluate your plan's performance and how it performed against other plans like yours. Since Nationwide Retirement Solutions is one of the largest 457 providers in the industry we are in the unique position of being able to compare your plan to many others.

By comparing the current year information to previous years, you can see how your plan is performing, where your educational efforts are working, and what areas offer opportunities for additional improvement.

The "Peer Group" comparisons used in this report are based on NRS cases, within your state, with assets of:

**\$5 million - \$20 million**

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5	Plan Assets
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# EXECUTIVE SUMMARY

## Plan Contribution Limits for 2016

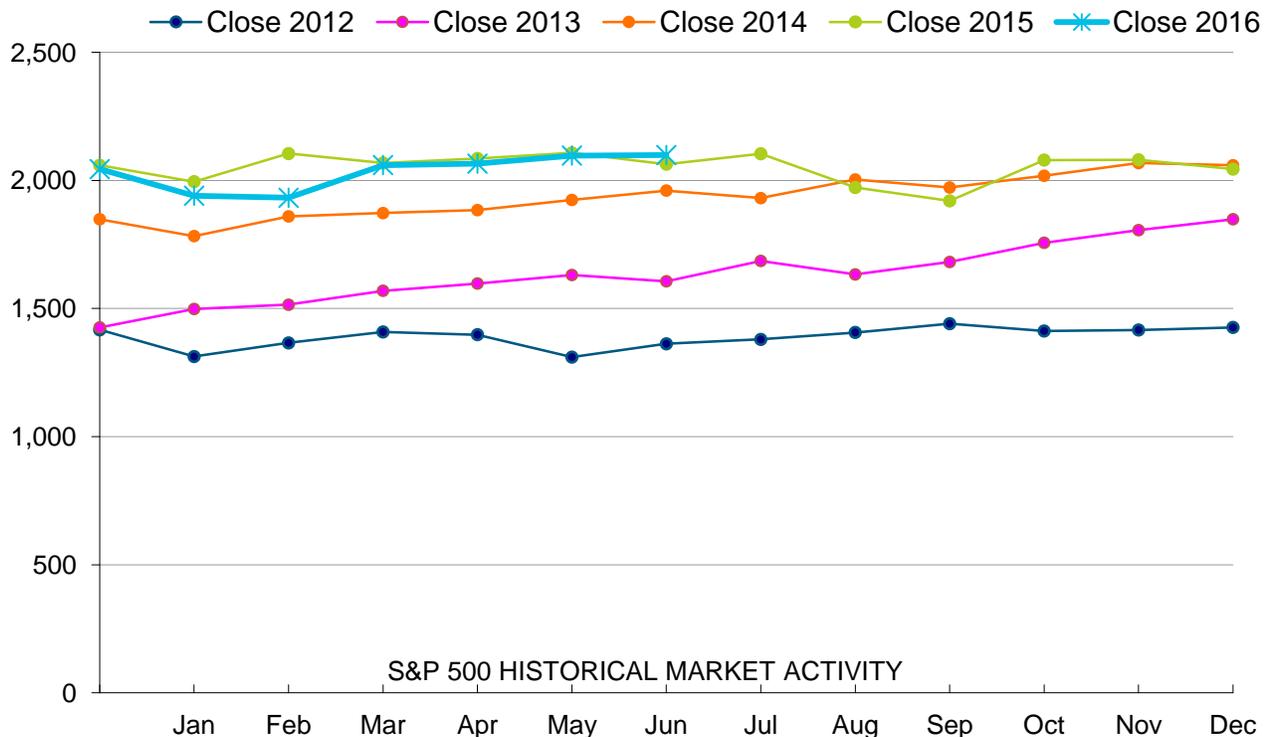
Regular Limit:	\$18,000
50+ Catch-Up:	\$24,000
3-Year Catch-Up:	\$36,000

## Quick Plan Facts

	Actual as of 06/30/16	% Chng from 1 year ago
Total Participant Count	414	NA
Total New Enrollments YTD Count	72	NA
Total Plan Assets (millions)	\$8.14	NA
Total Deferrals YTD (thousands)	\$537.20	NA
Total Rollovers-In YTD (thousands)	\$849.03	NA

## Market Activity

S&P 500 CHANGE YTD: 2.7%



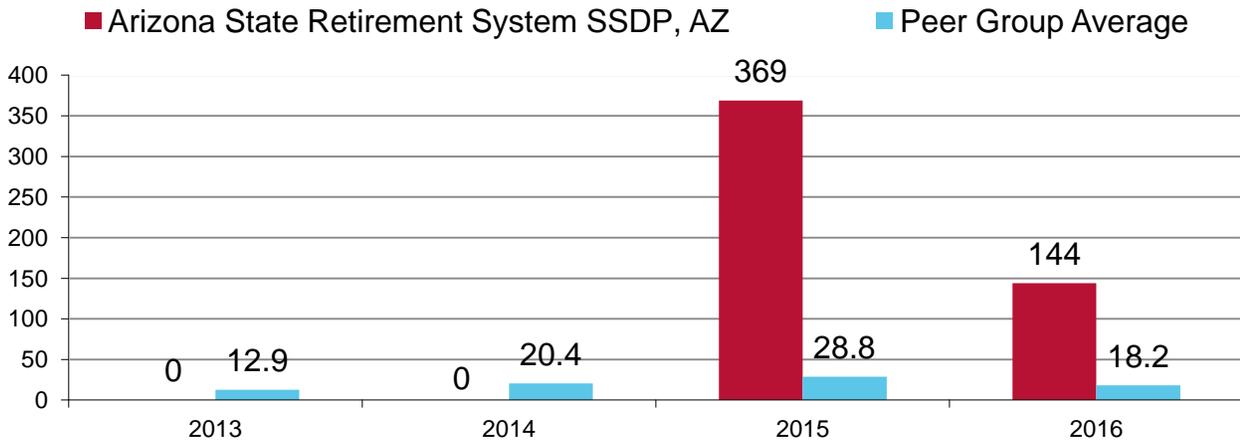
The 500 companies included in this index are selected by the S&P Index committee; a few of the mitigating factors are market size, industry representation and liquidity. This index is designed to be an overall indication of the United States stock market. The 500 securities represent approximately 75% of the total market value of all U.S. stocks.

# PLAN PARTICIPATION

Participant Status	12/31/13	12/31/14	12/31/15	6/30/16	% Chng from 1 year ago
# of Participants Actively Deferring	0	0	117	261	NA
# of Inactive Participants*	0	0	252	153	NA
# of Participants in Payout	0	0	0	0	NA
<b>Total Participants</b>	<b>0</b>	<b>0</b>	<b>369</b>	<b>414</b>	<b>NA</b>

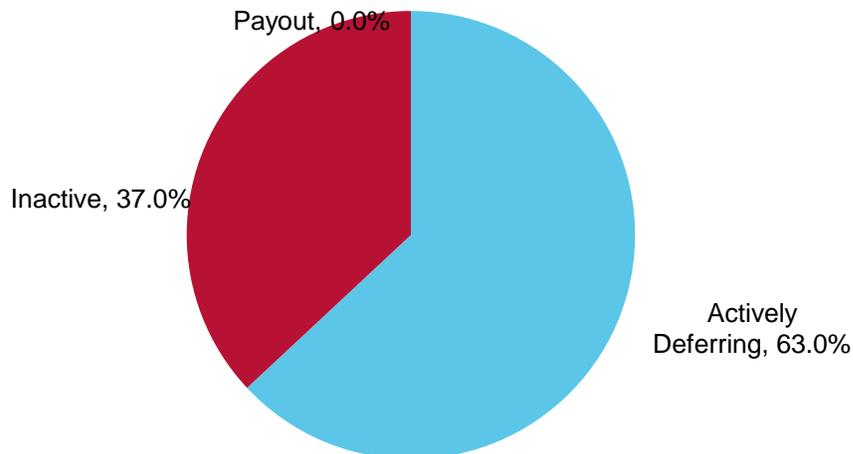
\* Inactive participants are those with a balance, not deferring and not in payout

## New Participant Count



2016 numbers are annualized

## Total Participants as of 06/30/16

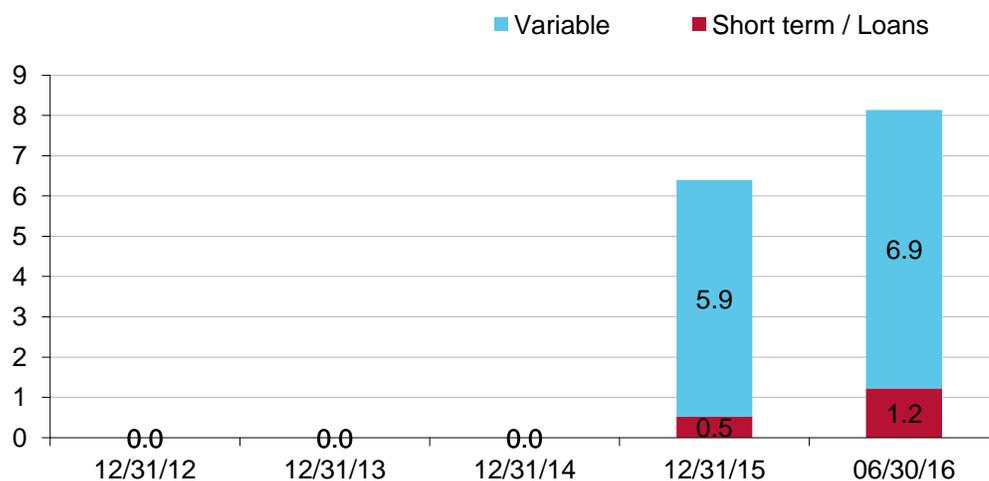


# PLAN ASSETS

## Total Plan Assets (Millions)

12/31/12	12/31/13	12/31/14	12/31/15	6/30/16	% Chng from 1 year ago
\$0.0	\$0.0	\$0.0	\$6.4	\$8.1	NA

## Plan Assets Summary (Millions)



## Plan Assets by Investment Class (Thousands)

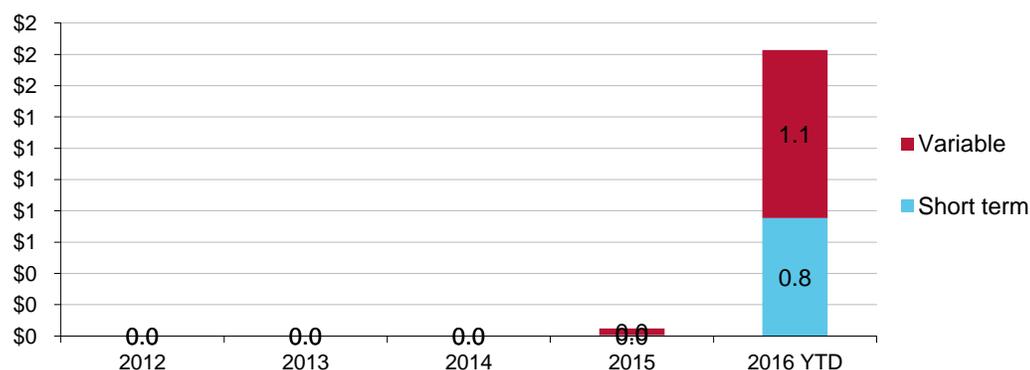
Investment Class	12/31/14	12/31/15	06/30/16	% of Total
Asset Allocation	\$0.00	\$742.32	\$750.62	9.2%
International	\$0.00	\$819.99	\$869.47	10.7%
Small Cap	\$0.00	\$532.69	\$688.32	8.5%
Mid Cap	\$0.00	\$854.95	\$1,057.80	13.0%
Large Cap	\$0.00	\$2,255.65	\$2,390.34	29.4%
Balanced	\$0.00	\$0.00	\$0.00	0.0%
Bonds	\$0.00	\$589.75	\$986.59	12.1%
Short term	\$0.00	\$271.77	\$954.54	11.7%
SDO	\$0.00	\$0.00	\$77.87	1.0%
Specialty	\$0.00	\$85.64	\$92.83	1.1%
Loan	\$0.00	\$246.04	\$268.34	3.3%
<b>Total</b>	<b>\$0.00</b>	<b>\$6,398.79</b>	<b>\$8,136.72</b>	<b>100.0%</b>

# PLAN CONTRIBUTIONS

## Total Contributions by Year (Millions)

	2012	2013	2014	2015	2016 YTD	% Chng from 1 year ago
Deferrals	\$0.0	\$0.0	\$0.0	\$0.0	\$0.5	NA
Rollovers-In	\$0.0	\$0.0	\$0.0	\$0.0	\$0.8	NA
Other	\$0.0	\$0.0	\$0.0	\$0.0	\$0.4	NA
<b>Total</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$1.8</b>	<b>NA</b>

## Plan Contributions Summary (Millions)



## Plan Contributions by Investment Class (Thousands)

Investment Class	2014	2015	2016 YTD	% Total
Asset Allocation	\$0.00	\$4.28	\$83.38	4.6%
International	\$0.00	\$4.88	\$147.71	8.1%
Small Cap	\$0.00	\$2.50	\$102.19	5.6%
Mid Cap	\$0.00	\$5.69	\$138.74	7.6%
Large Cap	\$0.00	\$16.07	\$381.04	20.9%
Balanced	\$0.00	\$0.00	\$0.00	0.0%
Bonds	\$0.00	\$7.40	\$210.24	11.5%
Short term	\$0.00	\$6.46	\$753.46	41.2%
SDO	\$0.00	\$0.00	\$0.00	0.0%
Specialty	\$0.00	\$0.74	\$10.65	0.6%
Loan	\$0.00	\$0.00	\$0.00	0.0%
<b>Total</b>	<b>\$0.00</b>	<b>\$48.02</b>	<b>\$1,827.43</b>	<b>100.0%</b>

# IN SUMMARY

This report contains valuable information and insights about your plan. Now it is time to take action! Here are some suggestions to get you started:

1. Identify your top three areas of focus.
2. Consider which of the following suggestions would work best for your plan:

- Educational Workshops for your employees
- Additional 1-on-1 meetings with your Representative
- Benefit Fairs
- Open Enrollment
- Employer communication options  
(e.g. emails, staff meetings...)
- Other \_\_\_\_\_

3. Discuss your plan with your Nationwide Representative.

We look forward to working with you to bring even greater value to your employees through deferred compensation.

# YOUR PROVEN PARTNER

When you're one of the leaders in the industry, you're called to a higher standard. Nationwide's position as an industry leader stems from nearly 40 years in service to public sector retirement plan administrators like you.

Over the years, we have maintained our industry leadership position by being one of the top providers of record-keeping, sales and marketing services to public sector retirement plans in terms of number of clients served and range of assets under management. Here's why:

- Our average client tenure is 19 years
- We partner with more than 7,700 clients \* and have a 99% plan retention rate
- We provide education and service to more than 1.6 million participants \*
- We manage over \$74 billion in assets \*
- We have been featured in the top 10 most trusted companies for privacy by TRUSTe and Ponemon Institute *for the past nine years.*
- We offer recordkeeping, administration and investment products for:
  - 457(b) Deferred compensation plans serving city, county, special district and state employees
  - 401(a) and grandfathered 401(k) Defined employer-contribution plans serving city, county, special district and state employees
  - PEHP® Tax-free investment plan for post-employment health care expenses

Most importantly, *we are proud to serve you and your plan* through our representatives in the field and in our home office.

What does all this mean to you? Our tenure, our legacy, our service and our people make us uniquely qualified to handle your retirement plan needs. This **Gauging Success** report is just one of the ways that we work with you to understand both your needs as an administrator and your employees' needs for planning for their retirement.

\*As of 06/30/16

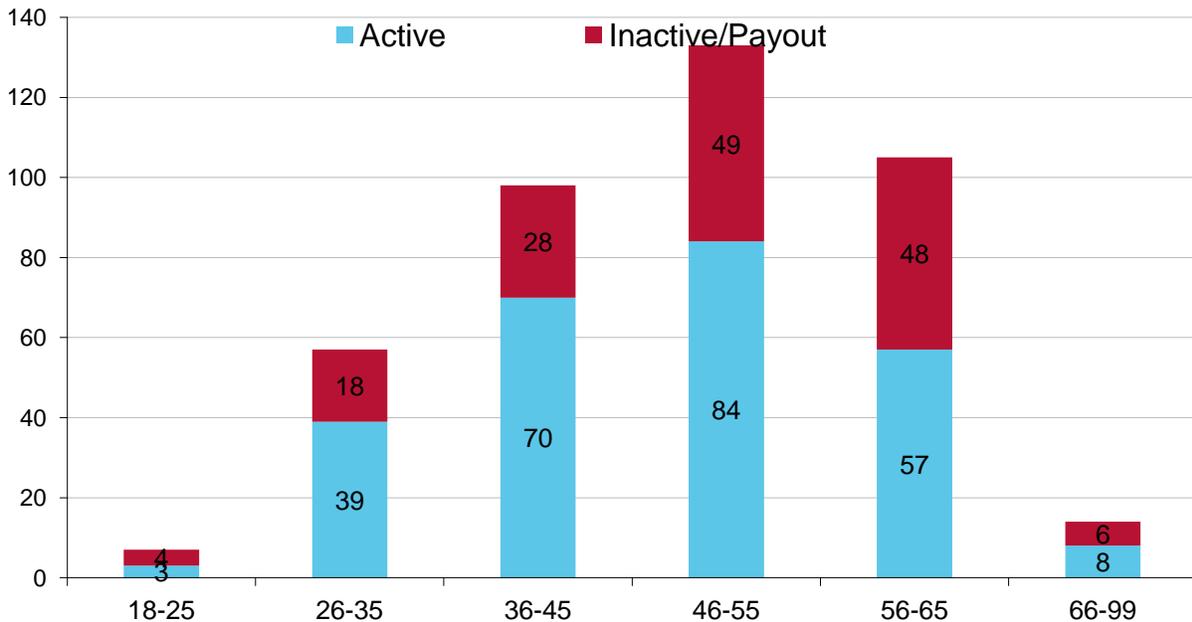
# APPENDIX

# PLAN PARTICIPATION

## Participant Counts by Age as of 06/30/16

Age Group	Total Participant Count	Male Participant Count	Female Participant Count	Actively Def Participant Count	Inactive / Payout Count
18-25	7	5	2	3	4
26-35	57	43	14	39	18
36-45	98	65	33	70	28
46-55	133	66	67	84	49
56-65	105	43	62	57	48
66-99	14	4	10	8	6
<b>Total</b>	<b>414</b>	<b>226</b>	<b>188</b>	<b>261</b>	<b>153</b>

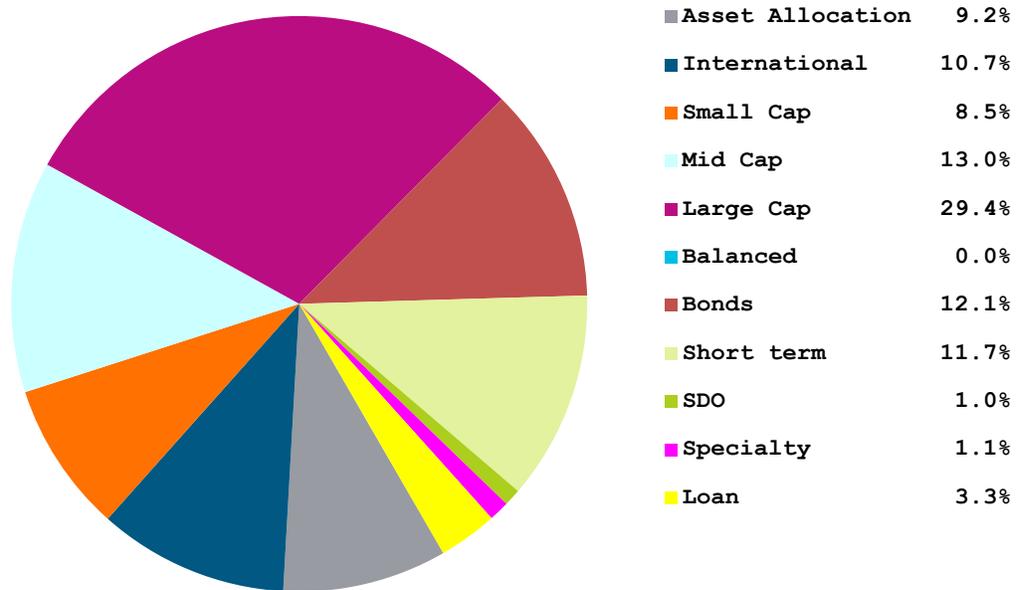
## Participant Counts by Age as of 06/30/16



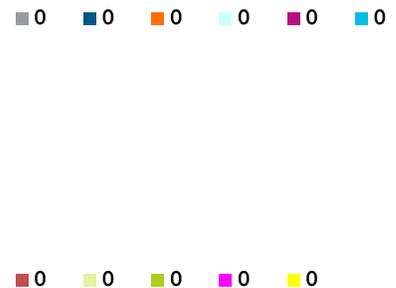
# PLAN ASSETS

The use of asset allocation does not guarantee returns or insulate you from potential losses.

## Arizona State Retirement System SSDP, AZ Asset Allocation as of 06/30/16

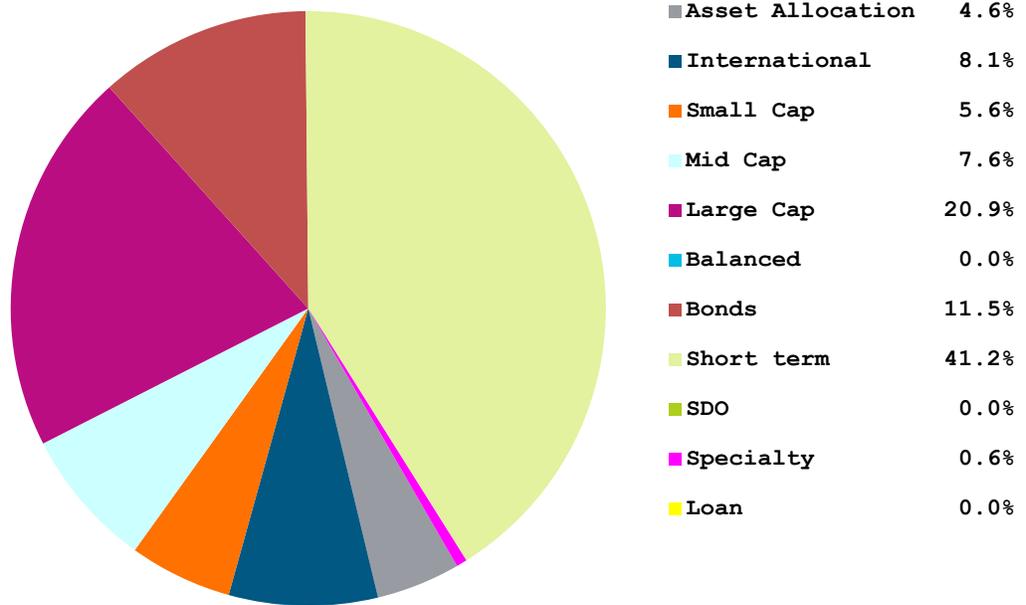


## Arizona State Retirement System SSDP , AZ Asset Allocation as of 06/30/15

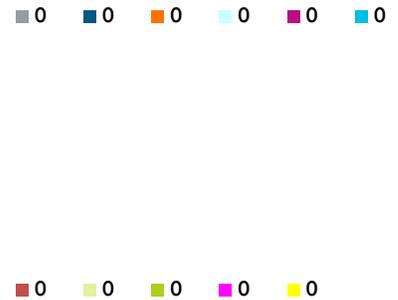


# PLAN CONTRIBUTIONS

Arizona State Retirement System SSDP , AZ Contribution Allocation 2016 YTD



Arizona State Retirement System SSDP , AZ Contribution Allocation 2015 YTD



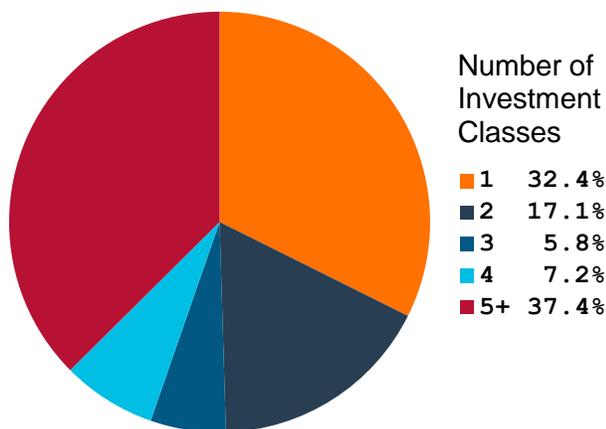
# PEER COMPARISONS

Your Peer Group is NRS cases, within your state, with assets of \$5 million - \$20 million. The peer group consists of 22 NRS cases.

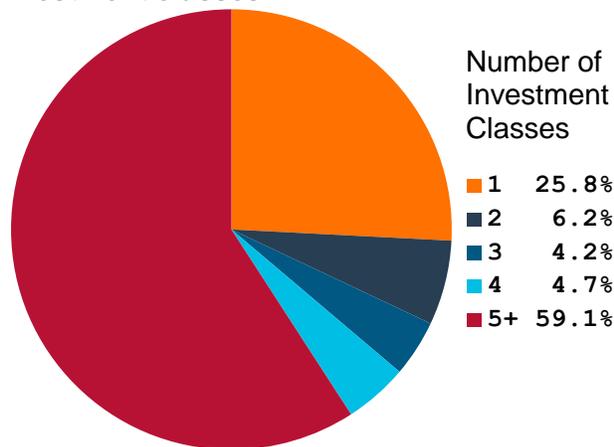
	Arizona State Retirement System SSDP , AZ	Peer Group	Ibbotson Recommended
Average # of asset classes	3.0	3.8	5.0
Average annualized deferrals	\$4,011	\$4,033	
Average assets	\$19,654	\$35,568	

## Asset Allocation Summary as of 06/30/16

percentage of participants by number of investment classes



Arizona State Retirement System SSDP , AZ



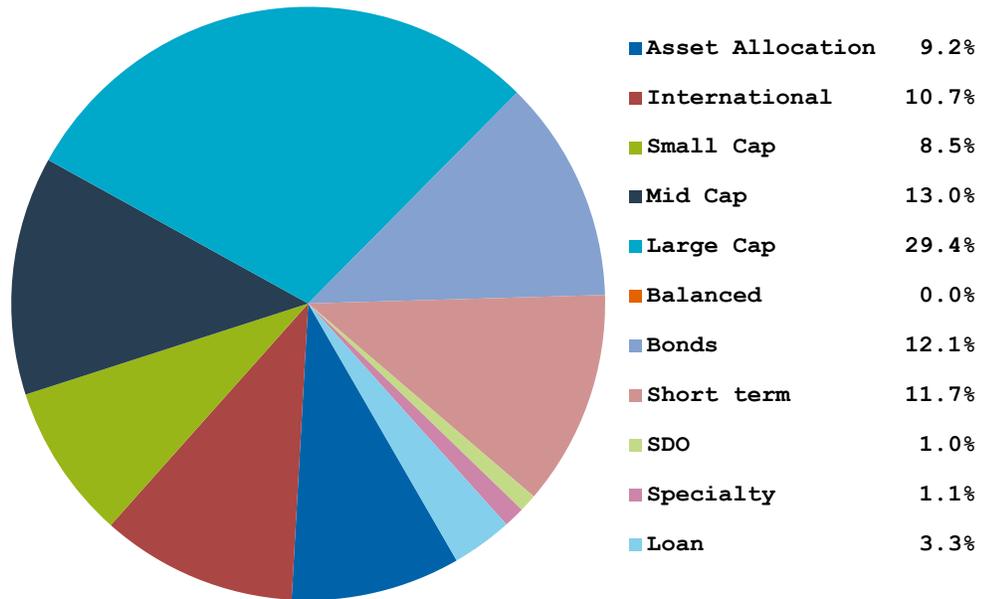
Peer Group

## Average Account Balance and Annualized Deferrals by Age Group as of 06/30/16

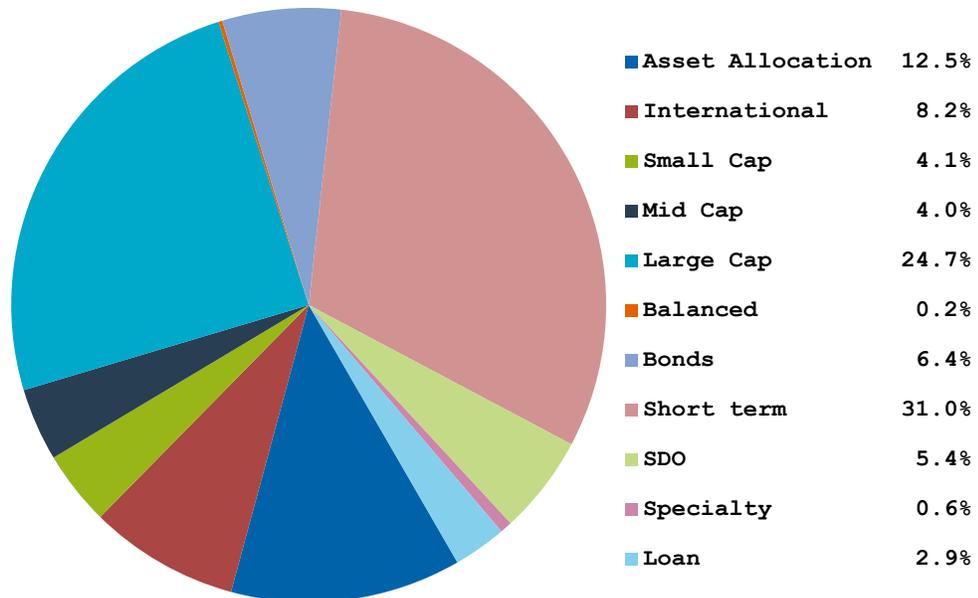
Age Group	Arizona State Retirement System SSDP , AZ	Peer Group	Arizona State Retirement System SSDP , AZ	Peer Group
	Account Balance		Annualized Deferrals	
18-25	\$598	\$1,993	\$1,267	\$2,006
26-35	\$4,315	\$13,960	\$1,709	\$3,047
36-45	\$17,942	\$28,067	\$3,642	\$3,420
46-55	\$18,990	\$36,465	\$4,526	\$4,248
56-65	\$31,342	\$50,944	\$5,376	\$5,078
66-99	\$22,264	\$50,359	\$4,379	\$8,315

# PEER COMPARISONS

## Arizona State Retirement System SSDP , AZ Asset Allocation as of 06/30/16



## Peer Group Asset Allocation as of 06/30/16



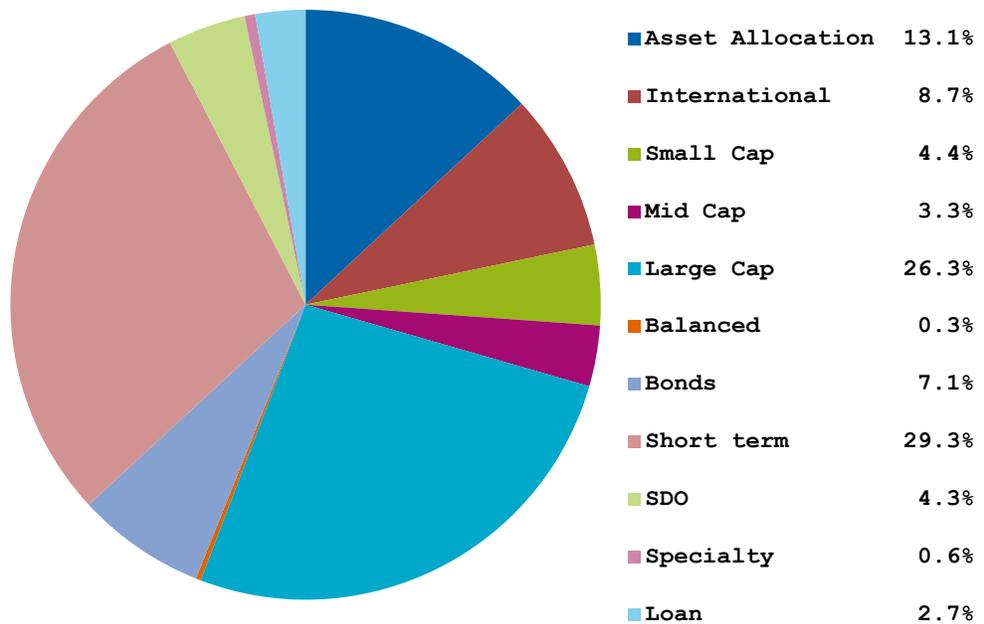
# PEER COMPARISONS

Arizona State Retirement System SSDP, AZ Asset Allocation as of 06/30/15

■ 0 ■ 0 ■ 0 ■ 0 ■ 0 ■ 0

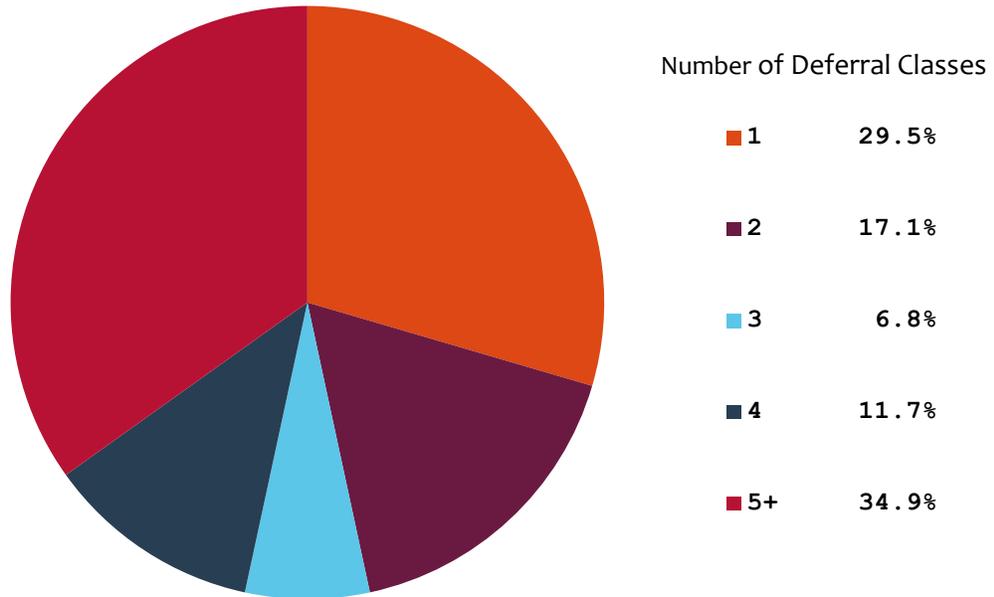
■ 0 ■ 0 ■ 0 ■ 0 ■ 0

Peer Group Asset Allocation as of 06/30/15

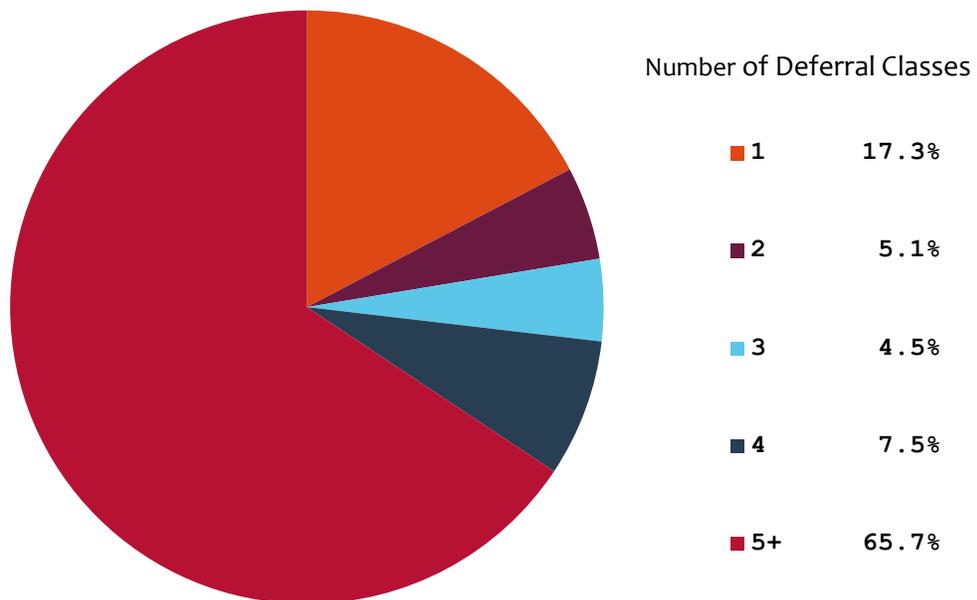


# PEER COMPARISONS

*Deferral allocation summary: percentage of participants by number of deferral investment classes*  
Arizona State Retirement System SSDP, AZ 2016 YTD

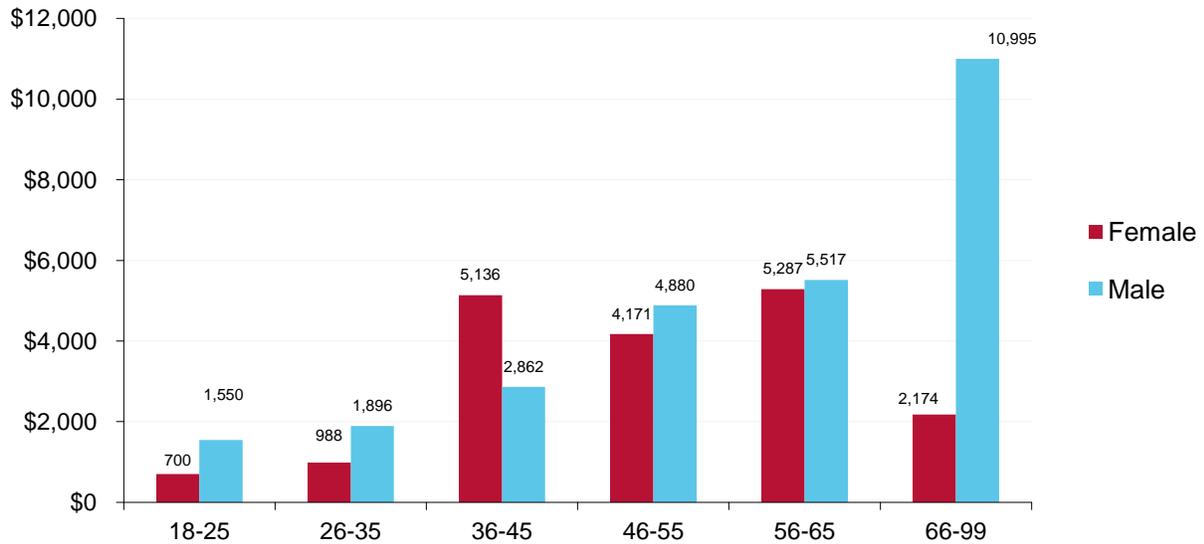


Peer Group 2016 YTD

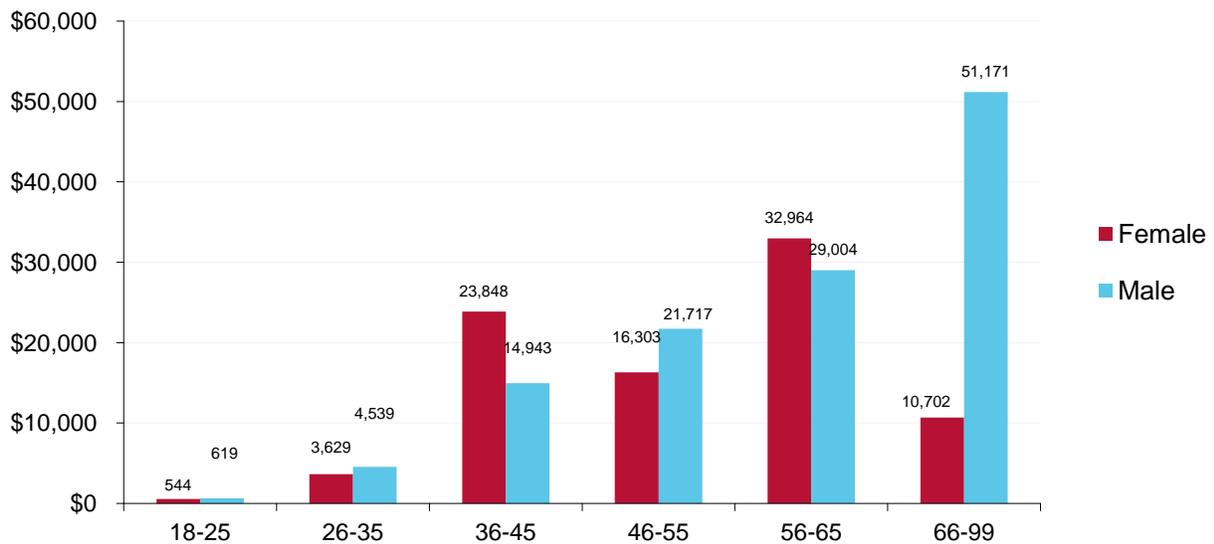


# PARTICIPANT DEMOGRAPHICS

## Male/Female Average Deferrals by Age

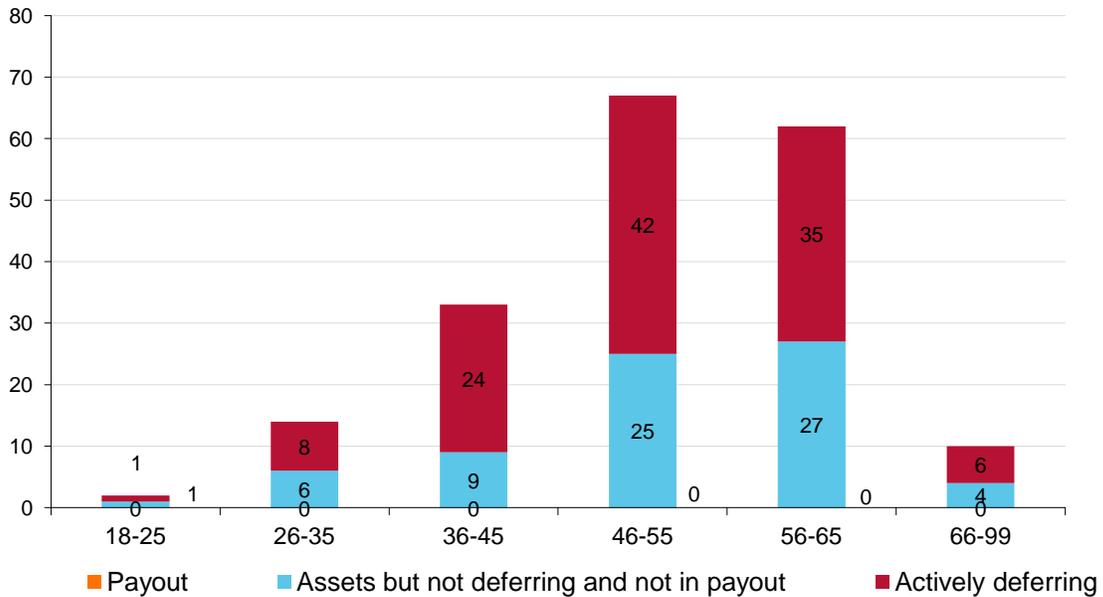


## Male/Female Average Account Balance by Age as of 06/30/16

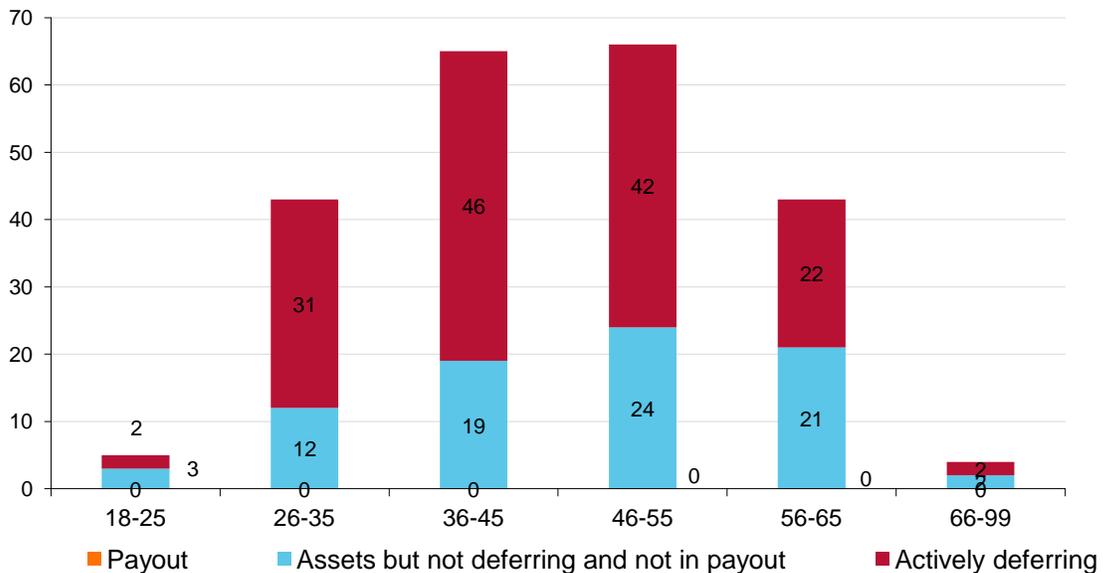


# PARTICIPANT DEMOGRAPHICS

## Female Participant Count by Age and Status as of 06/30/16



## Male Participant Count by Age and Status as of 06/30/16



# PLAN ASSETS

as of 06/30/16

<b>Fund</b>	<b>Asset Value</b>	<b>% of Assets</b>	<b>Count / % of Participants</b>	
<b>Asset Allocation</b>				
Ivy Asset Strategy Fund - Class A	27,148.41	0.3%	14	3.4%
Nationwide Investor Destinations Aggressive Fund: Service Class	498,866.37	6.1%	66	15.9%
Nationwide Investor Destinations Conservative Fund: Service Class	52,441.72	0.6%	22	5.3%
Nationwide Investor Destinations Moderate Fund: Service Class	172,167.01	2.1%	31	7.5%
<b><u>Sub-Total Asset Allocation</u></b>	<b>750,623.51</b>	<b>9.2%</b>		
<b>Bonds</b>				
Metropolitan West Total Return Bond Fund - Class M	316,101.15	3.9%	42	10.1%
Vanguard Total Bond Market Index Fund - Admiral Shares	670,493.24	8.2%	52	12.6%
<b><u>Sub-Total Bonds</u></b>	<b>986,594.39</b>	<b>12.1%</b>		
<b>International</b>				
EuroPacific Growth Fund(R) - Class R4	288,666.28	3.5%	31	7.5%
Lazard Emerging Markets Equity Portfolio - Open Shares	63,308.17	0.8%	29	7.0%
Vanguard Total International Stock Index Fund Admiral	517,498.88	6.4%	80	19.3%
<b><u>Sub-Total International</u></b>	<b>869,473.33</b>	<b>10.7%</b>		
<b>Large Cap</b>				
PRIMECAP Odyssey Stock Fund	549,254.63	6.8%	89	21.5%
Vanguard 500 Index Fund - Admiral Shares	1,841,082.92	22.6%	180	43.5%
<b><u>Sub-Total Large Cap</u></b>	<b>2,390,337.55</b>	<b>29.4%</b>		
<b>Loan</b>				
Loan Outstanding Principal Balance	268,335.48	3.3%	31	7.5%
<b><u>Sub-Total Loan</u></b>	<b>268,335.48</b>	<b>3.3%</b>		
<b>Mid Cap</b>				
Dreyfus Structured Midcap Fund - Class I	32,340.86	0.4%	15	3.6%
Vanguard Mid-Cap Index Fund - Admiral Shares	1,025,456.57	12.6%	92	22.2%
<b><u>Sub-Total Mid Cap</u></b>	<b>1,057,797.43</b>	<b>13.0%</b>		

***Please consider the funds' investment objectives, risks, and charges and expenses carefully before investing. The prospectus contains this and other important information about the investment company. Read the prospectus carefully before investing. Prospectuses may be obtained from your plan's website or by calling your plan's toll-free customer service phone number.***

The use of diversification and asset allocation as part of an overall investment strategy does not assure a profit or protect against loss in a declining market.

Asset allocation funds are designed to provide diversification and asset allocation across several types of investments and asset classes, primarily by investing in underlying funds. Therefore, in addition to the expenses of the asset allocation fund itself, you are indirectly paying a proportionate share of the applicable fees and expenses of the underlying funds.

# PLAN ASSETS

as of 06/30/16

<b>Fund</b>	<b>Asset Value</b>	<b>% of Assets</b>	<b>Count / % of Participants</b>	
<b>SDO</b>				
Schwab Personal Choice Retirement Account	77,872.11	1.0%	2	0.5%
<b><u>Sub-Total SDO</u></b>	<b>77,872.11</b>	<b>1.0%</b>		
<b>Short Term Investments</b>				
Morley Stable Value Fund II	954,538.44	11.7%	254	61.4%
<b><u>Sub-Total Short Term Investments</u></b>	<b>954,538.44</b>	<b>11.7%</b>		
<b>Small Cap</b>				
JPMorgan Small Cap Equity Fund - Class A	57,887.24	0.7%	14	3.4%
Vanguard Small-Cap Index Fund - Admiral Shares	630,433.37	7.7%	83	20.0%
<b><u>Sub-Total Small Cap</u></b>	<b>688,320.61</b>	<b>8.5%</b>		
<b>Specialty</b>				
Invesco Global Real Estate Fund - Class A	92,826.49	1.1%	35	8.5%
<b><u>Sub-Total Specialty</u></b>	<b>92,826.49</b>	<b>1.1%</b>		
<b>Total</b>	<b>8,136,719.34</b>			

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# Arizona State Retirement System

## *Investment Beliefs*

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### **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.

## 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.