

HOW...

ASRS Employees Deliver Service With PRIDE!

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 (ASRS) INVESTMENT COMMITTEE

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

February 22, 2016
2:30 p.m.

Pursuant to A.R.S. § 38-431.02, notice is hereby given to the members of the Arizona State Retirement System (ASRS) Investment Committee (IC) and to the general public that the ASRS Investment Committee will hold a public meeting February 22, 2016 beginning at 2:30 p.m., in the 14th Floor Conference Room of the Arizona State Retirement System office, 3300 North Central Avenue, Phoenix, Arizona. Trustees of the Committee may attend either in person or by telephone conference call.

This is a regularly scheduled meeting of the Investment Committee; 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 Investment Committee 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 ASRS Board of Trustees 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 office in Tucson, 4400 E. Broadway Blvd., Suite 200, Tucson, AZ 85711. The conference call to Tucson will be disconnected after 15 minutes if there are no attendees in the Tucson audience.

The Agenda for the meeting is as follows:

1. Call to Order; Roll Call (estimated time 4 min.)..... Mr. Tom Connelly
Chair, Investment Committee
2. Approval of Minutes of the November 30, 2015 Investment Committee Meeting (Action item;
estimated time 1 min.) Mr. Tom Connelly

3. Presentation, Discussion, and Appropriate Action Regarding ASRS Investment Program Updates (Informational and discussion item; estimated time 20 min.) Mr. Gary Dokes
Chief Investment Officer, ASRS
.....Mr. Dave Underwood
Assistant Chief Investment Officer, ASRS
..... Mr. Al Alaimo
Portfolio Manager of Fixed Income, ASRS
.....Mr. Karl Polen
Head of Private Markets Investing, ASRS
..... Mr. Eric Glass
Portfolio Manager of Private Markets, ASRS
..... Mr. Kien Trinh
Assistant Vice President, Risk Services, State Street Investment Analytics
 - a. ASRS Fund Positioning
 - b. IMD Investment House Views
 - c. Asset Class Committee (ACC) Activities
 - d. Fund Repositioning, Research, Projects & Initiatives
 - e. State Street Risk Reports

Regarding the following agenda item, pursuant to A.R.S. § 38-431.03(A)(2) and A.R.S. § 38-718(P) notice is hereby given to Trustees of the ASRS Investment Committee and the general public that the ASRS Investment Committee may vote to go into executive session, in the event specific manager data is discussed that is deemed confidential/non-public information. The executive session will take place in the 14th floor conference room.

4. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight of the ASRS Investment Program - Includes Total Fund and Investment Performance Report Q4-15 (Informational and discussion item; estimated time 20 min.)
..... Mr. Allan Martin
Partner, NEPC
..... Mr. Dan LeBeau
Consultant, NEPC
5. Presentation, Discussion, and Appropriate Action Regarding the Public Equity Portfolio Trade Analysis (Informational and discussion item; estimated time 40 min.) Mr. Paul Matson
..... Mr. Gary Dokes
.....Mr. Dave Underwood
..... Mr. Jon Papa
Client Service Representative, Elkins McSherry / State Street Corporation
6. Request for Future Agenda Items (Informational and discussion item; estimated time 5 min.)
..... Mr. Tom Connelly
..... Mr. Gary Dokes
7. Call to the Public Mr. Tom Connelly

Those wishing to address the ASRS Committee 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 Committee Administrator. Trustees of the Committee are prohibited by A.R.S. § 38-431.01(H) from discussing or taking legal action on matters raised during an open call to the public unless the matters are properly noticed for discussion and legal action. As

a result of public comment, the Committee Chair may direct staff to study and/or reschedule the matter for discussion and decision at a later date.

8. The next ASRS Investment Committee Meeting is scheduled for Monday, April 25, 2016 at 2:30 p.m., at 3300 N. Central Avenue, 14th Floor Conference room, Phoenix, Arizona.

9. Adjournment of the ASRS Investment Committee Meeting

A copy of the agenda background material provided to Committee 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 February 17, 2016

ARIZONA STATE RETIREMENT SYSTEM

Gloria Montiel
Committee Administrator

Gary R. Dokes
Chief Investment Officer

Agenda Item #2



ARIZONA STATE RETIREMENT SYSTEM

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Paul Matson
Director

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

HELD ON
Monday, November 30, 2015
2:30 p.m.

The Arizona State Retirement System (ASRS) Investment Committee (IC) met at 3300 N. Central Avenue, 14th Floor, Phoenix, AZ 85012. The meeting was also teleconferenced to the ASRS office at 7660 E. Broadway Boulevard, Suite 108, Tucson, Arizona 85710.

Mr. Tom Connelly, Chair, called the meeting to order at 2:31 p.m.

1. Call to Order; Roll Call; Opening Remarks

Present: Mr. Tom Connelly, Chair
Mr. Robert Wadsworth

Absent: Prof. Dennis Hoffman

A quorum was present for the purpose of conducting business.

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

Motion: Mr. Robert Wadsworth moved to approve the minutes of the October 26, 2015 public meeting. Mr. Tom 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 Appropriate Action Regarding ASRS Investment Program Updates

Mr. Gary Dokes, Chief Investment Officer, provided the Committee with the latest progressions within the Investment Management Division (IMD), noting the under-weights and over-weights of each asset class, fund positioning and the latest developments of cash assetization within the fund. In August, the ASRS cash assetization benchmark was modified to a "risk off" composition, which reflected IMD defensive House Views. Areas of concern were due to China's slowing economy, which could potentially weaken further, spilling over to the developed-world capital markets, and the possibility of an increase to the Federal Funds rate by the Federal Open Market Committee (FOMC) at their September meeting. Mr. Dokes also commended IMD staff members for their diligence in meeting with 66 managers since the last IC meeting to review current investments, new initiatives, and new strategy offerings.

4. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight of the ASRS Investment Program – Includes Total Fund and Investment Performance Report Q3-15

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

Performance results: (as of September 30, 2015)

- 7.6% (20-year annualized net return) vs. 8% (actuarial assumed interest rate)

	Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception 06/30/75
Total Fund	-4.6%	-0.2%	8.0%	8.8%	6.0%	9.7%
Interim SAA Policy*	-4.9%	-1.5%	6.9%	8.1%	5.7%	9.4%
Excess Return	0.3%	1.3%	1.1%	0.7%	0.3%	0.3%

**Interim SAA Policy: 22% S&P 500/3% S&P 400/3% S&P 600/18% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/16% Barclays Capital Aggregate/5% Barclays Capital High Yield/5% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/7% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodity Index/5% Multi-Asset Class Custom Index.*

Note: Interim SAA Policy includes proration of 0.9% Private Equity, 3.3% Real Estate and 5.3% Private Debt which are unfunded. Private Equity was prorated to domestic equity; Real Estate was prorated to domestic equity and fixed income; Private Debt was prorated to Core and High Yield Fixed Income. Recently approved Strategic Asset Allocation Policy effective April 1, 2015.

Mr. LeBeau further discussed NEPC's review of all Private and Public Market Committees, stating NEPC analyzes all meeting materials, minutes and investment commitments approved at each meeting to ensure adherence to ASRS investment policies and procedures.

5. Presentation, Discussion, and Appropriate Action Regarding ASRS Inflation-Linked Asset Class

Mr. Polen, Head of Private Markets Investing, and Mr. Eric Glass, Portfolio Manager of Private Markets, addressed the Committee regarding the ASRS inflation linked asset class. Mr. Polen discussed the execution of the program in 2012, noting inflation linked investments include assets that hedge inflation because their valuation or cash flow are positively linked to inflation. Mr. Polen and Mr. Glass gave in-depth presentations on the strategy and performance of real estate, agriculture, infrastructure, and commodities asset classes.

6. Presentation, Discussion, and Appropriate Action Regarding Proposed Modifications to the ASRS Plan and Long Term Disability (LTD) Existing Strategic Investment Policies (SIPs) and Newly Created SIPs for the ASRS System

Mr. Paul Matson, Director, addressed the Committee with detailed information regarding the proposed additions to the System SIPs, and the modifications to the ASRS Plan and LTD SIPs. He noted SIPs 001, 002, 003, 004 were modified for clarity, while the two additional System SIPs referenced in the materials are being added to fill a void and add value to the System plan SIPs.

The proposed modifications to the following SIPs are:

- SIP001 Asset Allocation (Plan) - reflects the correct 20-year rolling annual period to achieve the ASRS investment goals and objectives, and minor cosmetic edits.
- SIP002 Fund Positioning and Rebalancing (Plan) - reflects minor cosmetic edits.
- SIP003 Asset Allocation (LTD) - reflects minor cosmetic edits.
- SIP004 Fund Positioning and Rebalancing (LTD) - reflects minor cosmetic edits.

The proposed New SIPs are:

- SIP00X Asset Allocation (System)
- SIP00XX Fund Positioning and Rebalancing (System)

Motion: Mr. Connelly moved to recommend to the full Board the proposed modifications to existing SIPs: 001, 002, 003, 004 pertaining to the Asset Allocation, Fund Positioning, and Rebalancing SIPs for the Plan and LTD, and the creation of new SIPs pertaining to System Asset Allocation and Fund Positioning Rebalancing. Mr. Wadsworth seconded the motion.

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

7. Presentation, Discussion, and Appropriate Action Regarding the IC Meeting 2016 Schedule

Mr. Dokes presented the proposed 2015 IC meeting schedule. He noted the meeting dates occur on a bi-monthly basis and are aligned with the Board meeting schedule. Proposed IC meeting dates included the following:

- Monday, February 22, 2016
- Monday, April 25, 2016
- Monday, June 20, 2016
- Monday, August 22, 2016
- Monday, October 24, 2016
- Monday, November 28, 2016

The Committee accepted the schedule.

8. Request for Future Agenda Items

Mr. Connelly requested a future agenda item centered around new investment concepts and ideas. Mr. Dokes stated he is currently working on adding his request to a future IC meeting.

9. Call to the Public

No members of the public requested to speak.

10. Adjournment

The meeting adjourned at 4:30 p.m.

Respectfully submitted,

ARIZONA STATE RETIREMENT SYSTEM

Gloria Montiel Date
Investment Committee Administrator

Gary R. Dokes Date
Chief Investment Officer

Agenda Item #3



ARIZONA STATE RETIREMENT SYSTEM

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*Paul Matson
Director*

MEMORANDUM

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

FROM: Mr. Paul Matson, Director
Mr. Gary Dokes, Chief Investment Officer (CIO)
Mr. Dave Underwood, Assistant Chief Investment Officer
Mr. Al Alaimo, Fixed Income Portfolio Manager
Mr. Karl Polen, Head of Private Markets Investing
Mr. Eric Glass, Portfolio Manager of Private Markets

DATE: February 16, 2016

RE: **Agenda Item #3:** Presentation, Discussion, and Appropriate Action Regarding ASRS Investment Program Updates

Purpose

To present and discuss information regarding ASRS investment program updates and Investment Risk Reports.

Recommendation

Informational only; no action required.

Background

The CIO and IMD Portfolio Managers will present and facilitate a discussion of the ASRS Investment Program.

The topics listed below are intended to comprehensively cover how ASRS investments are managed, what and why recent strategic/tactical investment decisions have been made and share other information regarding the investment activities of the ASRS.

- a. ASRS Fund Positioning
- b. IMD Investment House Views
- c. Asset Class Committee (ACC) Activities
- d. Fund Repositioning, Research, Projects & Initiatives
- e. State Street Risk Report

Additionally, on a quarterly basis; the Director includes in the Board Packet the two primary Investment Risk reports IMD uses to help monitor and manage macro-level Total Fund investment risk. These reports along with other portfolio risk and positioning reports provide the CIO with valuable information needed to manage the ASRS Total Fund.

The Director and CIO will discuss the Total Fund and the State Street truView Risk Report.

Attachments:

- From ASRS - Investment Program Updates Report
- From State Street - TruView Risk Report – as of December 31, 2015

Arizona State Retirement System

Investment Committee

Investment Program Updates

February 22, 2016

Presented by:

Gary R. Dokes, Chief Investment Officer, ASRS

David Underwood, Assistant Chief Investment Officer, ASRS

Karl Polen, Head of Private Markets Investing, ASRS

Al Alaimo, Fixed Income Portfolio Manager, ASRS

Eric Glass, Portfolio Manager of Private Markets, ASRS

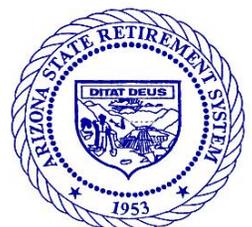
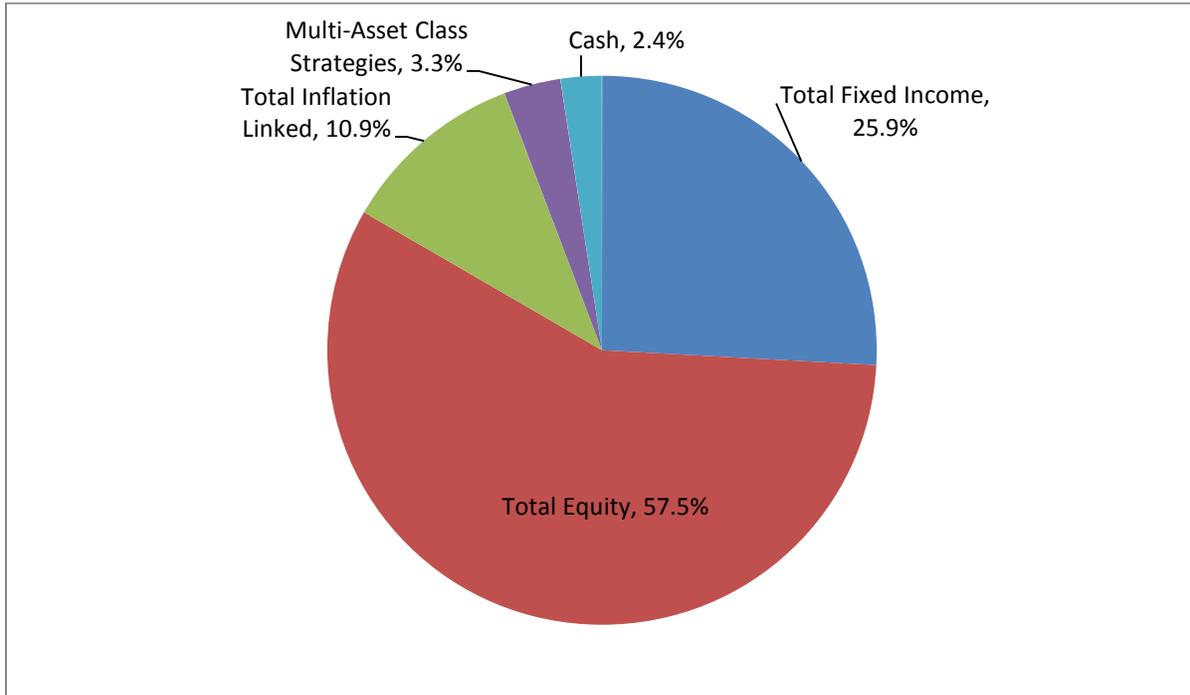


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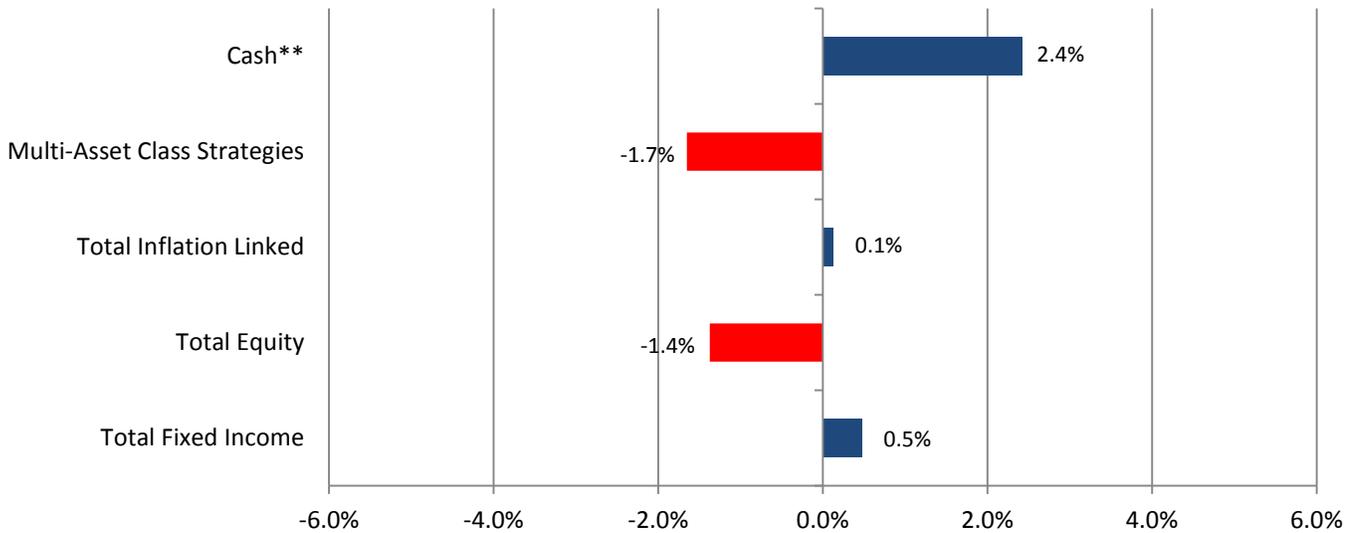
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TOTAL FUND POSITIONING 01/29/2016

ACTUAL PORTFOLIO



ACTUAL PORTFOLIO VS. INTERIM SAA POLICY *



*The Interim SAA Policy is prorated thusly: Real Estate was prorated to domestic equity, international equity and fixed income, Private Equity was prorated to domestic equity, and Private Debt was prorated to core fixed income and U.S. high yield. All Private asset classes' market values are reported on a quarter-lag and adjusted to include the current quarter's cash flows.

**Cash represents assetized cash which is exposed via futures to ASRS public markets asset class, and unassetized cash which represents monies needed to cover external and internal cash flows.

Account Manager	Account Manager Style	Fixed Income		Equity		Inflation Linked	Multi-Asset	Total	Pct of Fund
		Active	Enh/Passive	Active	Enh/Passive				
State Street B&T: Boston	Tactical Cash (non-assetized)							0	0.00%
								Tactical Cash Policy Range: 0% - 3%	0.00%
	Operating Cash (non-assetized)		24,925,611					24,925,611	0.08%
	Operating Cash (assetized)		763,896,313					763,896,313	2.35%
	Cash Total							\$788,943,835	2.43%
								Cash Policy: 0%	0.00%
Blackrock: San Francisco	Treasuries (Long Duration)		370,803,883					370,803,883	1.14%
	Treasuries (Long Duration) Total							\$370,803,883	1.14%
								Treasuries (Long Duration) Policy Range: 0% - 10%	0.00%
Blackrock: San Francisco	Passive (Intermediate Gov Credit)		24,633,086					24,633,086	0.08%
ASRS: Phoenix	Enhanced Passive F2		1,896,819,051					1,896,819,051	5.84%
Blackrock: San Francisco	Passive (US Debt Index)		1,562,692,169					1,562,692,169	4.81%
	Core Fixed Income Total							\$3,854,948,188.44	11.86%
								Interest Rate Sensitive: 11%	11.00%
Columbia: Minneapolis	Active	665,578,756						665,578,756	2.05%
JP Morgan: Indianapolis	Active	332,786,432						332,786,432	1.02%
	High Yield Fixed Income Total							\$998,378,944	3.07%
								High Yield Fixed Income Policy	4.00%
	Opportunistic Debt	1,162,882,158						\$1,162,882,158	3.58%
								Opportunistic Debt Policy:	0.00%
	Private Debt Total	2,385,216,690						\$2,385,216,690	7.34%
								Total Private Debt: 8% - 12%	10.00%
	Fixed Income Total							\$8,401,425,980	25.86%
								Total Fixed Income Policy Range: 18% - 35%	25.00%
LSV: Chicago	Active (Value)			653,680,803				653,680,803	2.01%
ASRS: Phoenix	Passive E2				4,641,248,286			4,641,248,286	14.28%
ASRS: Phoenix	Enhanced Passive E7				572,289,835			572,289,835	1.76%
ASRS: Phoenix	Enhanced Passive E8				553,996,789			553,996,789	1.71%
ASRS: Phoenix	Risk Factor Portfolio				531,767,287			531,767,287	1.64%
	Large Cap Equity Total							\$6,953,384,997	21.40%
								Large Cap Policy	20.00%
Wellington: Boston	Active (Core)			248,849,357				248,849,357	0.77%
ASRS: Phoenix	Passive E3 (Growth)				373,016,663			373,016,663	1.15%
ASRS: Phoenix	Passive E4 (Value)				328,341,986			328,341,986	1.01%
	Mid Cap Equity Total							\$950,208,006	2.92%
								Mid Cap Policy	3.00%
TimesSquare: New York	Active (Growth)			321,873,081				321,873,081	0.99%
DFA: Santa Monica	Active (Value)			244,968,227				244,968,227	0.75%
ASRS: Phoenix	Passive E6				298,238,998			298,238,998	0.92%
	Small Cap Equity Total							\$865,080,306	2.66%
								Small Cap Policy	3.00%
	U.S. Equity Total							\$8,768,673,309	26.99%
								US Equity Policy Range: 16% - 36%	26.00%
Brandes: San Diego	Active (Value)			530,251,498				530,251,498	1.63%
American Century	Active (EAFE)			520,570,380				520,570,380	1.60%
Trinity Street	Active (EAFE)			297,544,289				297,544,289	0.92%
Thompson Siegel Walmsley	Active (EAFE)			275,185,897				275,185,897	0.85%
Blackrock: San Francisco	Passive (EAFE)				3,673,889,200			3,673,889,200	11.31%
	Large Cap Developed Non-US Equity Total							\$5,298,062,044	16.31%
								Large Cap Developed Policy	17.00%
AQR: Greenwich	Active (EAFE SC)			91,012,536				91,012,536	0.28%
DFA: Santa Monica	Active (EAFE SC)			93,855,819				93,855,819	0.29%
Franklin Templeton: San Mateo	Active (EAFE SC)			199,467,160				199,467,160	0.61%
Blackrock: San Francisco	Passive (EAFE SC)				232,370,864			232,370,864	0.72%
	Small Cap Developed Non-US Equity Total							\$616,708,765	1.90%
								Small Cap Developed Policy	2.00%
William Blair: Chicago	Active (EM)			312,178,092				312,178,092	0.96%
Eaton Vance: Boston	Active (EM)			235,167,016				235,167,016	0.72%
LSV: Chicago	Active (EM)			97,700,764				97,700,764	0.30%
Blackrock: San Francisco	Passive (EM)				272,157,571			272,157,571	0.84%
	Emerging Markets Equity Total							\$917,203,444	2.82%
								Emerging Markets Policy	5.00%
	Non-US Equity Total							\$6,831,974,253	21.03%
								Non-US Equity Policy Range: 14% - 34%	24.00%
	Private Equity Total			2,590,087,280				\$2,590,087,280	7.97%
								Private Equity Policy Range: 6% - 10%	8.00%
	Opportunistic Equity			492,400,373				\$492,400,373	1.52%
								Opportunistic Equity Policy:	0.00%
	Equity Total							\$18,683,135,216	57.50%
								Total Equity Policy Range: 48% - 65%	58.00%
Gresham: New York	Commodities Total					201,172,941		201,172,941	0.62%
								\$201,172,941	0.62%
								Commodities Policy Range: 0% - 4%	2.00%
	Real Estate Total					2,829,321,631		\$2,829,321,631	8.71%
								Real Estate Policy Range: 8% - 12%	10.00%
	Infrastructure Total					316,552,365		\$316,552,365	0.97%
								Infrastructure Policy Range: 0% - 3%	0.00%
	Farmland & Timber Total					182,760,272		\$182,760,272	0.56%
								Farmland & Timber Policy Range: 0% - 3%	0.00%
	Inflation Linked Total							\$3,529,807,209	10.86%
								Inflation Linked Policy Range: 10% - 16%	12.00%
Bridgewater	Multi-Asset Class Strategies						1,087,458,825	1,087,458,825	3.35%
								\$1,087,458,825	3.35%
								Multi-Asset Class Policy Range: 0% - 12%	5.00%
	TOTAL Amounts	\$4,546,477,792	\$4,643,892,023	\$7,205,679,660	\$11,477,455,556	\$3,529,807,209	\$1,087,458,825	\$32,490,771,064	Total Fund
	TOTAL Percent	13.99%	14.29%	22.18%	35.33%	10.86%	3.35%		

Asset Class	Actual Portfolio	SAAP Target (Range)	Interim SAA* Adj Policy	Actual - Interim SAA**		Policy Band check Actual - Adj Policy
				% diff	\$ diff	
Tactical Cash	0.00%	0% (0-3%)	0.00%	0.00%		
Cash	2.43%	0.00%	0.00%	2.43%	788,943,835	
Interest Rate Sensitive	11.86%	11%	13.34%	-1.47%		
High Yield	3.07%	4%	4.71%	-1.64%		
Opportunistic Debt	3.58%	0%	0.00%	3.58%	\$1,162,882,158	
Private Debt	7.34%	10% (8-12%)	7.34% (5-9%)	0.00%		
Total Fixed Income	25.86%	25% (18-35%)	25.39% (18-35%)	0.47%	\$152,806,572	OK
Large Cap	21.40%	20%	20.53%	0.87%	\$282,351,744	
Mid Cap	2.92%	3%	3.00%	-0.08%	-\$24,515,126	
Small Cap	2.66%	3%	3.00%	-0.34%	-\$109,642,826	
US Equity	26.99%	26% (16-36%)	26.53% (17-37%)	0.46%	\$148,193,792	OK
Developed Large Cap	16.31%	17%	17.37%	-1.07%	-\$347,098,125	
Developed Small Cap	1.90%	2%	2.00%	-0.10%	-\$33,106,656	
Emerging Markets	2.82%	5%	5.00%	-2.18%	-\$707,335,110	
Non-US Equity	21.03%	24% (14-34%)	24.37% (14-34%)	-3.35%	-\$1,087,539,890	OK
Private Equity	7.97%	8% (6-10%)	7.97%	0.00%	\$0	OK
Opportunistic Equity	1.52%	0%	0.00%	1.52%	\$492,400,373	
Total Equity	57.50%	58% (48-65%)	58.88% (49-66%)	-1.38%	-\$446,945,725	OK
Commodities	0.62%	2% (0-4%)	2.03%	-1.41%	-\$457,037,590	OK
Real Estate	8.71%	10% (8-12%)	8.71%	0.00%	\$0	OK
Infrastructure	0.97%	0% (0-3%)	0.00%	0.97%	\$316,552,365	OK
Farmland & Timber	0.56%	0% (0-3%)	0.00%	0.56%	\$182,760,272	OK
Opportunistic VL	0.00%	0%	0.00%	0.00%	\$0	
Total Inflation Linked	10.86%	12% (10-16%)	10.73% (9-13%)	0.13%	\$42,275,047	OK
Multi-Asset Strategies***	3.35%	5% (0-12%)	5% (0-12%)	-1.65%	-\$537,079,729	OK
Total	100.00%	100%	100.00%	0.00%	\$0	
						Internally Managed Portfolios
						\$8,663,951,608
						27%
*Interim SAA includes a proration of unfunded Private Equity, Private Debt, and Real Estate						
**Private Equity is prorated to domestic equity; Real Estate is prorated to equity, commodities, and fixed income; Private Debt is prorated to Interest Rate Sensitive and High Yield						
Opportunistic definitions:						
An investment in a category that is not included in the ASRS Asset Allocation policy and represents an investment opportunity that is tactical in nature.						
Opportunistic investments have a 0% target (0%-10% range), regardless of asset class.						
Total Opportunistic						
Opportunistic Debt	\$1,162,882,158	3.6%				
Opportunistic Equity	\$492,400,373	1.5%				
Opportunistic IL	\$0	0.0%				
	\$1,655,282,531	5.1%				

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

FEBRUARY 2016

U.S. EQUITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **NEUTRAL**
 - Economic data still shows stable, sub-trend growth in 2015.
 - U.S. unemployment, is displaying sustained improvement. Income growth has not, although some localized instances of upward pressure has begun to surface.
 - Inflation remains generally subdued; **disinflation may surface as the greater risk.**
 - **Liquidity remains generally available; Federal Reserve policy is accommodative even without the asset purchases program.**
 - Overall U.S. corporate profits growth has decelerated, mostly due to the impact of lower energy prices; revenues are still in a modest uptrend; high profit margins are no longer expanding.
2. Valuations: **NEUTRAL**
 - **U.S. equity markets have been more volatile, with a downward bias since year-end 2015. The mixed macro data, downward revisions to corporate growth estimates, apprehension over the timing of upward resets to interest rates, more volatile foreign exchange markets and anxieties that negative spill-overs may emanate from the energy sector issues have weighed heavily on equities.**
 - Though marginally rich, price/earnings multiples remain near historic averages: S&P 500, **13.6x-15.4x**; S&P MID, **14.2x-16.2x**; S&P SC600, **14.3x-16.7x.**
 - Historic P/Es imply advances of **13-19%** for mid and small caps; **10-15%** for S&P 500.
 - Still rising earnings and low yields on 10-Yr Treasury notes combine for equity risk premiums that are favorably above the 4.0% long-range average for large caps, whereas those of mid- and small-caps are around 4.0%.
3. Sentiment: **NEUTRAL**
 - **Higher short-term caution as heightened and prolonged volatility has imparted a downside bias to what had formerly been an essentially trendless equity market late in 2015.**
 - **Investors appear to have a reduced demand for risk-oriented assets.**
 - **The strong U.S. Dollar no longer appears to be attracting asset flows from offshore into U.S. equities.**

Commentary:

The opinion on Fundamentals has changed to "NEUTRAL"; "NEUTRAL" opinions for Sentiment and Valuations are unchanged.

Staff moved the allocation to U.S. equities in the Total Fund toward a modest underweight versus the interim SAA policy targets at the end of November 2015. It will continue toward that goal as capital market conditions warrant and as needs and opportunities arise elsewhere in the Total Fund. This reflects an increasingly

cautious intermediate-term stance as capital market volatility continues to escalate; heightened market volatility with violent sell downs warrant lessened exposure to equities. This also reflects partly, a more clouded outlook over the intermediate term for U.S. equity returns, in general; more modest returns seem likeliest yet there are some offsets.

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

Certainly, some conditions that are more associated with late-stage market/business cycles – flattening of both profit margin expansion and revenue growth, primarily – have surfaced and do present some head winds to the secular trend for stocks. However, much of that impairment is due to a strong USD as well as collateral effects from the imbalances within the energy sector. USD strength is a function of a reasonably solid economy and valid monetary policy. As the latter shifts slowly toward neutrality, it remains lenient and quite unlike pre-recession restrictive policy; cessation of QE purchases is not tightening monetary policy. More irrational is that nearly all financial markets, but those of equities in particular, are currently being driven in large part by fluctuating market sentiment based on the direction of oil prices, which are now down more than 50% over the past 18 months. The financial stress on companies sensitive to weak energy prices is still at an early stage; however it appears that it will have negative impacts on lenders as well as operators and suppliers. Even so, it is unlikely that duress will affect a wider swath of the economy, case market participants.

CURRENT PORTFOLIO POSTURE: EQUAL WEIGHT vs. SAA target

NON – U.S. EQUITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **NEUTRAL**

- Progress of Eurozone and Japanese economic conditions are plateauing; economic continues are weakening in many lesser-developed economies.
- Although relatively inexpensive, liquidity is shifting away from these developing, U.S. Dollar-sensitive economies.
- Monetary and economic policies that are focused on promoting economic growth and stemming disinflation seem to be blunted by the collateral impact of the change in drivers of the Chinese economy.

2. Valuations: **POSITIVE**

- Reasonable global valuations relative to the U.S.; price-to-book values of **1.3x - 1.4x**; P/Es of **9.5x – 13.0x** on trend earnings.
- Dividend yields are incrementally more favorable -ranging from **1.2x to 1.6x** that of the S&P500.

3. Sentiment: **NEUTRAL**

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

Commentary:

The “POSITIVE” opinion on Valuations is unchanged, as are the “NEUTRAL” opinions on Fundamentals and Sentiment. This is reflected in the underweight exposure of the EAFE and equal-weight exposure of EAFE-Small Capitalization equities subclasses to their respective “interim” SAA policy weights. The overall non-U.S. equities asset class is however, underweight to its “interim” SAA policy weight by about 3.3% from the effect of below-SAA policy weight allocation to the Emerging Markets equities asset subclass. It is currently about 59% of policy weight as result of IMD electing to reduce exposure to risk-oriented assets in 2015.

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

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

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

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

The global equity markets have been volatile in early 2016. Forces that prevailed last year haven’t dissipated: weak energy and commodities prices, turmoil in the Chinese economy and capital markets, and the effects of rising U.S. interest rates. Prospects of sluggish global economic growth in 2016 have only intensified investor apprehensions.

CURRENT PORTFOLIO POSTURE: UNDERWEIGHT vs. SAA target

Primary Markets Metrics & Indicators:

1. Fundamentals: **NEGATIVE**

- Concerns about slowing global growth driven by weakening fundamentals in China and emerging markets have spilled over into the U.S. markets in a variety of ways. Credit spreads have materially widened in both the investment grade and high yield bond markets. While initially led by commodity sectors such as energy and mining, the spread widening has repriced a number of other sectors in these markets. **Spreads have also widened as a result of diminished trading liquidity stemming from regulatory changes.** In addition, China is exerting significant deflationary pressure in the global markets while other developed economies are struggling with disinflation. In the U.S., the economy has improved enough that the Federal Reserve **has raised short-term rates for the first time in several years.** However, the pace of future rate hikes is quite uncertain as some aspects of the U.S. economy such as manufacturing have recently softened and weakness in the broader financial markets remains an area of concern.
- We believe that long-term U.S. interest rates may remain relatively low by historical standards for a number of reasons. These include slowing growth and disinflationary (or deflationary) pressures in many regions of the world including Europe and China, accommodative monetary policies in other countries and very low competing long-term interest rates in other developed markets.

2. Valuations: **ATTRACTIVE**

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

3. Sentiment: **NEGATIVE**

Sentiment has declined in the credit markets due to a combination of weakening fundamentals and diminished trading liquidity. While U.S. Treasuries remain a safe haven for investors looking to reduce risk, these securities may face technical selling pressure from central banks in China and other emerging market countries that may sell U.S. dollar assets to support their currencies to counteract recent U.S. dollar appreciation.

Commentary:

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

CURRENT PORTFOLIO POSTURE: EQUAL WEIGHT vs. SAA target

REAL ESTATE

Primary Market Metrics & Indicators:

1. Fundamentals: **POSITIVE**

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

2. Valuations: **NEUTRAL**

- Values have recovered from the global financial crisis with stable properties in coastal markets priced at record values.
- Increases in CMBS spreads are beginning to make financing less accommodating and this may trickle through to values.
- Recent increases in treasury rates do not appear to have affected commercial real estate valuations. Many observers believe that ~100bps of rate increase was already discounted into cap rates.
- In January, REITs were trading at an average dividend yield of 4.07% (215bp above 10y treasury) and a 8% discount to NAV. The dividend yield spread is above the historical average of 127 while the historical difference to NAV is a 4% premium.

3. Sentiment: **NEUTRAL**

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

Commentary:

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

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

PRIVATE EQUITY

Primary Market Metrics & Indicators:

1. Fundamentals: **POSITIVE**

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

2. Valuations: **NEUTRAL**

- Current U.S. median purchase price multiples are **8.5x**, down from 8.9x a year ago.
- The leveraged loan and high yield debt markets **tightened up in 2015**. Single B high yield spreads have widened to **~826bps**.
- The U.S. median Debt/EBITDA ratio of **6.2x** is up a bit from 5.8x in 2014.

3. Sentiment: **NEUTRAL**

- Globally, **\$551B (1,062 funds)** closed in 2015 compared to \$589B (1,394 funds) in 2014.

- Dry powder of nearly \$1.3T globally has ticked up from \$1.2T for 2014.
- The global number of buyout deals was 3,556 in 2015 compared to 3,796 for all of 2014. The aggregate value of deals was \$411B in 2015 compared to \$348B for all of 2014.
- There were 1,620 exits representing \$405B in 2015. There were 1,734 exits representing \$460B in 2014.
- The IPO market in 2015 has softened to a level of \$30B in 2015 versus \$67B in 2014.

Commentary:

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

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

CURRENT PORTFOLIO POSTURE: EQUAL WEIGHT vs. SAA target

COMMODITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **NEGATIVE**

- The U.S. dollar remains strong on a relative basis and the Fed raised interest rates in December as expected. China's economy has slowed down while Europe has begun to deal with its economic weakness with stimulus.
- Most commodity sectors appear well supplied, particularly for the current global growth environment.
- The decision by Saudi Arabia not to reduce production with the addition of Iranian supply has kept energy markets depressed, resulting in rig lay downs in the U.S. while the budgetary impacts globally continue to add up.
- Corn and wheat stockpiles have recently hit multi-year highs while world food prices continue to slide. Energy markets reflect the continued growth in global production as WTI and Brent prices are both near \$30. Metals are mixed as precious metals have strengthened while industrial metals still exhibit weak demand.

2. Valuations: **NEGATIVE**

- The Bloomberg Commodities Index is just above its 15 year low as global supplies outpace demand.
- On a trailing twelve-month basis, commodities are down 25% with ags being the least impacted sector with a decline of 15%. Year-to-date gold and silver have risen by 12%.

3. Sentiment: **NEGATIVE**

- The moderate growth, weak inflation, and strong dollar environment in the U.S. has reduced investor enthusiasm for commodities and resulted in outflows from commodities.
- The slowdown in the Chinese economy and its equity market has tempered enthusiasm for commodities.

- Geopolitical news has not been constructive for energy prices. Looking across the individual commodities, most remain well supplied, which is reflected in prices as inflationary fears are muted.

Commentary:

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

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

CURRENT PORTFOLIO POSTURE: UNDERWEIGHT vs. SAA target

OPPORTUNISTIC INVESTMENTS

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

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

GLOSSARY

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

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

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

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

2015 ASSET CLASS COMMITTEE AND IC MEETINGS

2015		Asset Class Committees				Board Committee		Grand Totals	
		Private Market Committee (PRIVMC)		Public Market Committee (PUBMC)		Investment Committee (IC)			
Quarter	Month	Dates		Total	Dates	Total	Dates	Total	
1 st	January	01/23	01/29	2					
	February	02/27		1			02/09	02/23	2
	March	03/19	03/20	3					
03/27									
2 nd	April	04/21		1			04/20/15	1	
	May	05/18		1					
	June	06/04	06/23	2			06/22	1	
3 rd	July	07/20	07/29	2					
	August	08/28		1	08/14	1	08/24	1	
	September	09/15		1					
4 th	October	10/15		1			10/26	1	
	November	11/18	11/24	2			11/30	1	
	December	12/18		1					
Totals				18		1		7	26

2016 ASSET CLASS COMMITTEE AND IC MEETINGS

2016		Asset Class Committees				Board Committee		Grand Totals
		Private Market Committee (PRIVMC)		Public Market Committee (PUBMC)		Investment Committee (IC)		
Quarter	Month	Dates	Total	Dates	Total	Dates	Total	
1 st	January	01/19	1					3
	February	02/25	1			02/22	1	
	March							
2 nd	April							
	May							
	June							
3 rd	July							
	August							
	September							
4 th	October							
	November							
	December							
Totals			2				1	3

INVESTMENT MANAGEMENT DIVISION (IMD) ACTIVITIES: FUND REPOSITIONING, RESEARCH, PROJECTS & INITIATIVES

- In Q4-15, approximately \$300 million was raised from U.S Equities to replenish ASRS Cash Assetization Program to meet external cash flow needs and anticipated capital calls for private markets commitments through the end of calendar year 2015.
- IMD annually prepares pacing and implementation plans for the private equity and real estate programs in order to establish target investment levels and strategies for the ensuing calendar year. The private equity pacing and implementation plan was completed and presented to the private markets committee on November 18 and a target commitment amount of \$700 million was approved for calendar 2016. The real estate implementation plan was presented in December, 2015. The plan calls for about \$300 million in new separate commitments to round out the separate account manager team and net zero in commitments to commingled product.
- As a standard course of business, IMD meets with both incumbent and potential investment managers to discuss macro-economies and capital markets as well as providing a means to review new initiatives, relationships and new strategy offerings. Since the last IC meeting, IMD met (conference call or in-person) with 138 investment managers: Private markets (RE, PE, Debt) – 62 and Public markets (Equity and Debt) – 76.
- IMD internally manages 7 public equities and fixed income portfolios with an approximate aggregate market value of \$9 billion or 27% of Total Fund. For CY 2015 thru December 31, 2015, 2 of 7 met or exceeded their benchmarks, and 7 of 7 portfolios met or exceeded their benchmarks on an inception-to-date basis.

Executive Presentation

To: Arizona State Retirement System

truView Risk Report December 31, 2015

Produced by State Street Investment Analytics, Risk Services

Monthly Reallocation Summary*

Month Ending December 31, 2015

Portfolio Reductions

- TOTAL EQUITY
 - \$2.7M – INTECH (Large Cap)
 - \$1M – E3 (Mid Cap)
- TOTAL FIXED INCOME
 - \$270M – BGI US DEBT FD (Core)
 - \$30M – BGI LONG TERM GOVT BOND (Core)
- TOTAL CASH
 - \$311.7M – CASH-ASSETIZED
- **TOTAL REDUCTIONS****
 - **\$615.4M**

Portfolio Additions

- TOTAL EQUITY
 - \$1M – E4 (Mid Cap)
- TOTAL CASH
 - \$614.4M – CASH-UNASSETIZED
- **TOTAL ADDITIONS****
 - **\$615.4M**

*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 January 31, 2016

Portfolio Reductions

- TOTAL CASH
 - \$127.5M – CASH–ASSETIZED

- TOTAL REDUCTIONS**
 - \$127.5M

Portfolio Additions

- TOTAL CASH
 - \$127.5M – CASH–UNASSETIZED

- TOTAL ADDITIONS**
 - \$127.5M

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

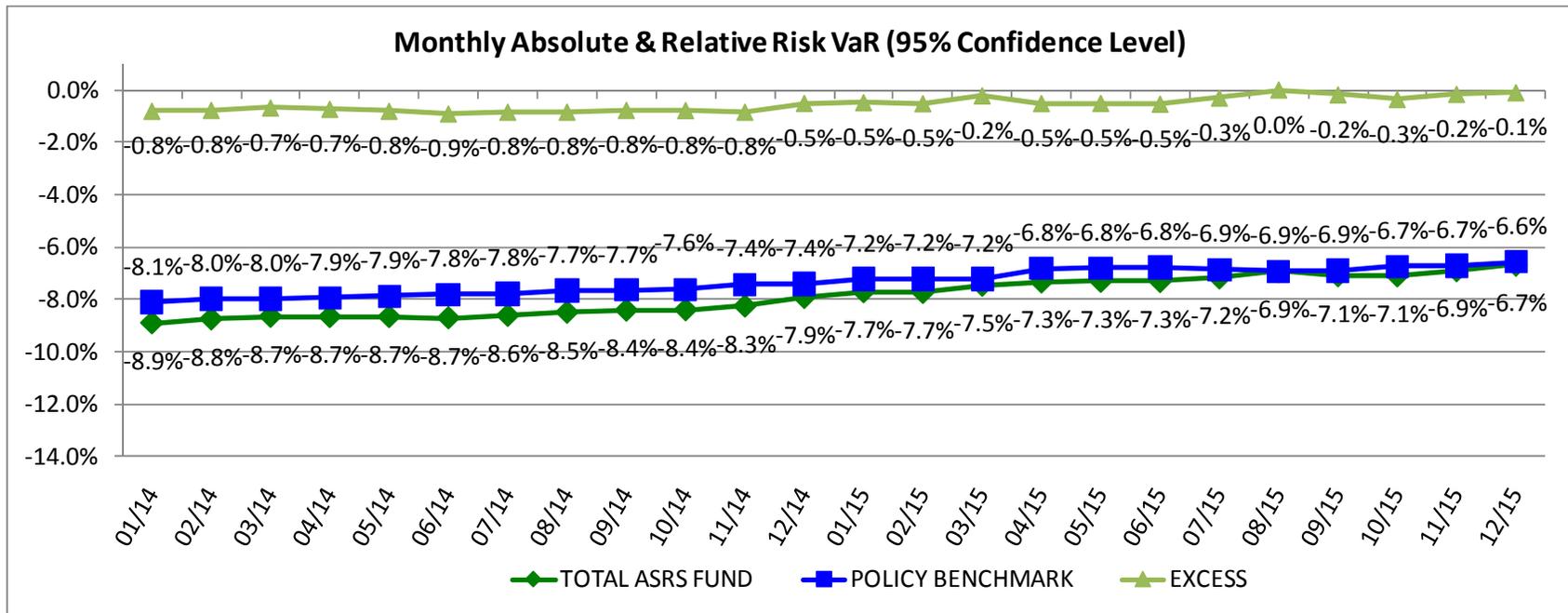
**Reductions and additions do not include plan distributions.

Monthly Risk Summary

Month Ending December 31, 2015

Month-end Risk Profile

- Historical Risk (95% VaR) for all asset classes remain relatively constant from prior months. The Multi-Asset Class strategy continues to be dynamically managed and is providing risk diversification for December. Total Plan risk decreased 22bps which was primarily driven by market fluctuations and underlying active manager positionings. The Policy Benchmark decreased a corresponding 15bps.
- Excess risk over the Policy Benchmark decreased to 10bps.



ARIZONA STATE RETIREMENT SYSTEM

As of December 31, 2015

TOTAL PLAN EXPOSURE OVERVIEW

Sector (Public US Equity Only)	\$ Value	% Value	**Blended US BM	Difference
CONSUMER NON-CYCLICAL	\$ 2,146,265,439	23.3%	24.5%	(1.2%)
FINANCIAL	\$ 1,584,376,305	17.2%	17.7%	(0.5%)
TECHNOLOGY	\$ 1,045,946,209	11.3%	13.1%	(1.8%)
CONSUMER CYCLICAL	\$ 910,451,811	9.9%	10.4%	(0.5%)
INDUSTRIAL	\$ 904,070,985	9.8%	9.4%	0.4%
COMMUNICATIONS	\$ 858,832,480	9.3%	13.0%	(3.7%)
FUNDS	\$ 546,544,671	5.9%	0.0%	5.9%
ENERGY	\$ 535,805,349	5.8%	6.5%	(0.7%)
UTILITIES	\$ 322,486,185	3.5%	3.0%	0.5%
BASIC MATERIALS	\$ 231,326,975	2.5%	2.4%	0.1%
CASH	\$ 113,444,596	1.2%	0.0%	1.2%
GOVERNMENT	\$ 28,112,561	0.3%	0.0%	0.3%
DIVERSIFIED	\$ 1,546,110	0.0%	0.0%	(0.0%)
INDEX	\$ 71,274	0.0%	0.0%	0.0%
GRAND TOTAL	\$ 9,229,280,950	100.0%	100.0%	0.0%

Country Category (Total Plan)	\$ Value	% Value	*Blended TOTAL BM	Difference
NORTH AMERICA	\$ 25,639,370,395	77.2%	53.5%	23.8%
EUROPE DEVELOPED	\$ 4,414,517,410	13.3%	23.9%	(10.6%)
ASIA DEVELOPED	\$ 2,195,674,250	6.6%	14.9%	(8.3%)
ASIA EM	\$ 567,187,461	1.7%	4.9%	(3.2%)
LATIN AMERICA	\$ 173,686,884	0.5%	1.5%	(0.9%)
MIDDLE EAST	\$ 86,951,921	0.3%	0.5%	(0.2%)
AFRICA	\$ 86,043,614	0.3%	0.6%	(0.4%)
EUROPE EM	\$ 33,124,969	0.1%	0.2%	(0.1%)
GRAND TOTAL	\$ 33,196,556,905	100.0%	100.0%	0.0%

Market Cap^ (Public Equities Only)	\$ Value	% Value	*Blended TOTAL BM	Difference
1) 0 - 100M	\$ 2,470,630	0.0%	0.0%	(0.0%)
2) 100M - 500M	\$ 238,162,698	1.5%	2.2%	(0.8%)
3) 500M - 1B	\$ 385,067,777	2.4%	4.2%	(1.8%)
4) 1B - 5B	\$ 2,542,423,218	15.5%	26.8%	(11.3%)
5) 5B - 10B	\$ 1,881,213,618	11.5%	11.6%	(0.1%)
6) 10B - 50B	\$ 5,346,379,013	32.6%	32.4%	0.2%
7) >50B	\$ 5,989,692,867	36.6%	22.7%	13.8%
GRAND TOTAL	\$ 16,385,409,820	100.0%	100.0%	0.0%

^Excludes cash and non-traded securities

Top 20 Issuer (Total Plan)	\$ Value	% Value	Market Cap	Sector	Industry Group
1 CASH***	\$ 2,600,279,306	7.8%		CASH	Cash
2 US TREASURY N/B	\$ 1,130,522,052	3.4%		GOVERNMENT	SOVEREIGN
3 FANNIE MAE	\$ 650,314,173	2.0%		MORTGAGE SECURITIES	FNMA COLLATERAL
4 FREDDIE MAC	\$ 243,286,732	0.7%		MORTGAGE SECURITIES	FGLMC COLLATERAL
5 TREASURY BILL	\$ 219,201,879	0.7%		GOVERNMENT	SOVEREIGN
6 APPLE INC	\$ 164,787,402	0.5%	7) 50B+	TECHNOLOGY	COMPUTERS
7 MICROSOFT CORP	\$ 158,844,616	0.5%	7) 50B+	TECHNOLOGY	SOFTWARE
8 ISHARES MSCI USA MOMENTUM FACTC	\$ 147,752,640	0.4%	4) 1B - 5B	FUNDS	EQUITY FUND
9 ISHARES MSCI USA QUALITY FACTOR I	\$ 140,988,595	0.4%	4) 1B - 5B	FUNDS	EQUITY FUND
10 JOHNSON & JOHNSON	\$ 137,468,414	0.4%	7) 50B+	CONSUMER NON-CYCLICAL	PHARMACEUTICALS
11 EXXON MOBIL CORP	\$ 135,215,344	0.4%	7) 50B+	ENERGY	OIL&GAS
12 ISHARES MSCI USA SIZE FACTOR ETF	\$ 131,362,876	0.4%	2) 100M - 500M	FUNDS	EQUITY FUND
13 GOVERNMENT NATIONAL MORTGAGE /	\$ 129,449,262	0.4%		MORTGAGE SECURITIES	GNMA COLLATERAL
14 ISHARES MSCI USA VALUE FACTOR ET	\$ 126,440,560	0.4%	3) 500M - 1B	FUNDS	EQUITY FUND
15 ALPHABET INC	\$ 124,218,113	0.4%	7) 50B+	COMMUNICATIONS	INTERNET
16 AT&T INC	\$ 113,282,239	0.3%	7) 50B+	COMMUNICATIONS	TELECOMMUNICATIONS
17 PFIZER INC	\$ 111,168,304	0.3%	7) 50B+	CONSUMER NON-CYCLICAL	PHARMACEUTICALS
18 JPMORGAN CHASE & CO	\$ 110,624,894	0.3%	7) 50B+	FINANCIAL	BANKS
19 NESTLE SA	\$ 94,502,483	0.3%	7) 50B+	CONSUMER NON-CYCLICAL	FOOD
20 PROCTER & GAMBLE CO/THE	\$ 90,152,855	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 December 31, 2015

Sector (Public Intl Equity Only)	\$ Value	% Value	*Blended NON-US BM	Difference
FINANCIAL	\$ 1,818,160,622	24.6%	25.6%	(1.0%)
CONSUMER NON-CYCLICAL	\$ 1,671,648,927	22.6%	22.0%	0.6%
CONSUMER CYCLICAL	\$ 1,072,162,501	14.5%	12.4%	2.1%
INDUSTRIAL	\$ 843,292,272	11.4%	11.3%	0.1%
COMMUNICATIONS	\$ 602,898,347	8.2%	9.5%	(1.3%)
BASIC MATERIALS	\$ 347,522,278	4.7%	5.5%	(0.8%)
ENERGY	\$ 324,766,253	4.4%	4.9%	(0.5%)
TECHNOLOGY	\$ 316,647,939	4.3%	5.0%	(0.7%)
UTILITIES	\$ 237,124,888	3.2%	3.4%	(0.1%)
CASH	\$ 105,475,411	1.4%	0.0%	1.4%
DIVERSIFIED	\$ 35,307,360	0.5%	0.6%	(0.1%)
INDEX	\$ 17,263,153	0.2%	0.0%	0.2%
FX	\$ (20,615)	(0.0%)	0.0%	(0.0%)
GRAND TOTAL	\$ 7,392,249,336	100.0%	100.0%	0.0%

Top 20 Industry Groups (Public Intl Only)	\$ Value	% Value	*Blended NON-US BM	Difference
1 BANKS	\$ 924,975,725	12.5%	13.1%	(0.6%)
2 PHARMACEUTICALS	\$ 604,351,991	8.2%	7.8%	0.3%
3 INSURANCE	\$ 402,497,908	5.4%	5.3%	0.2%
4 TELECOMMUNICATIONS	\$ 396,767,278	5.4%	5.6%	(0.2%)
5 FOOD	\$ 364,123,952	4.9%	4.4%	0.5%
6 RETAIL	\$ 299,221,277	4.0%	2.9%	1.1%
7 OIL&GAS	\$ 291,814,215	3.9%	4.4%	(0.4%)
8 AUTO MANUFACTURERS	\$ 259,700,223	3.5%	3.6%	(0.1%)
9 CHEMICALS	\$ 206,749,295	2.8%	3.2%	(0.4%)
10 DIVERSIFIED FINAN SERV	\$ 180,365,008	2.4%	2.6%	(0.1%)
11 COMMERCIAL SERVICES	\$ 174,130,382	2.4%	2.0%	0.4%
12 REAL ESTATE	\$ 168,268,644	2.3%	2.4%	(0.1%)
13 BEVERAGES	\$ 162,873,154	2.2%	2.3%	(0.1%)
14 ELECTRIC	\$ 160,641,706	2.2%	2.2%	(0.1%)
15 SEMICONDUCTORS	\$ 151,864,803	2.1%	2.4%	(0.4%)
16 TRANSPORTATION	\$ 124,031,299	1.7%	1.7%	(0.0%)
17 AUTO PARTS&EQUIPMENT	\$ 119,953,006	1.6%	1.4%	0.2%
18 COSMETICS/PERSONAL CARE	\$ 115,829,572	1.6%	1.6%	(0.0%)
19 BUILDING MATERIALS	\$ 110,954,728	1.5%	1.2%	0.3%
20 Cash	\$ 105,475,411	1.4%	0.0%	1.4%

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

INTERNATIONAL EQUITY EXPOSURE OVERVIEW

Country Category (Public Intl Equity Only)	\$ Value	% Value	*Blended NON-US BM	Difference
EUROPE DEVELOPED	\$ 4,092,136,791	55.4%	50.9%	4.5%
ASIA DEVELOPED	\$ 2,190,389,859	29.6%	32.3%	(2.7%)
ASIA EM	\$ 571,324,018	7.7%	11.6%	(3.8%)
NORTH AMERICA	\$ 175,241,357	2.4%	0.1%	2.3%
LATIN AMERICA	\$ 173,605,376	2.3%	2.3%	0.0%
MIDDLE EAST	\$ 85,616,013	1.2%	1.1%	0.1%
AFRICA	\$ 71,290,663	1.0%	1.3%	(0.4%)
EUROPE EM	\$ 32,645,260	0.4%	0.4%	0.0%
GRAND TOTAL	\$ 7,392,249,336	100.0%	100.0%	0.0%

Market Cap** (Public Intl Equities Only)	\$ Value	% Value	*Blended NON-US BM	Difference
1) 0 - 100M	\$ 2,179,140	0.0%	0.0%	0.0%
2) 100M - 500M	\$ 72,514,408	1.0%	0.4%	0.6%
3) 500M - 1B	\$ 137,937,243	1.9%	1.3%	0.6%
4) 1B - 5B	\$ 948,781,017	13.1%	12.7%	0.4%
5) 5B - 10B	\$ 1,049,610,011	14.4%	13.3%	1.2%
6) 10B - 50B	\$ 2,885,279,870	39.7%	38.8%	0.9%
7) >50B	\$ 2,170,176,843	29.9%	33.5%	(3.6%)
GRAND TOTAL	\$ 7,266,478,533	100.0%	100.0%	0.0%

**Excludes cash and non-traded securities

ARIZONA STATE RETIREMENT SYSTEM

TOTAL FIXED INCOME EXPOSURE OVERVIEW

As of December 31, 2015

Sector (Public Fixed Income Only)	\$ Value	% Value	*Blended FI BM	Difference
GOVERNMENT	\$ 1,433,033,070	32.1%	32.0%	0.2%
MORTGAGE SECURITIES	\$ 1,033,745,823	23.2%	22.1%	1.1%
FINANCIAL	\$ 386,623,690	8.7%	9.5%	(0.9%)
COMMUNICATIONS	\$ 325,919,041	7.3%	7.6%	(0.3%)
CONSUMER NON-CYCLICAL	\$ 313,732,875	7.0%	7.4%	(0.4%)
CONSUMER CYCLICAL	\$ 212,821,341	4.8%	5.2%	(0.5%)
ENERGY	\$ 199,093,955	4.5%	5.0%	(0.6%)
INDUSTRIAL	\$ 132,697,426	3.0%	3.9%	(0.9%)
TECHNOLOGY	\$ 102,569,110	2.3%	2.1%	0.2%
UTILITIES	\$ 85,662,173	1.9%	2.2%	(0.3%)
CASH	\$ 75,821,407	1.7%	0.0%	1.7%
BASIC MATERIALS	\$ 74,298,918	1.7%	2.4%	(0.7%)
INDEX	\$ 30,296,721	0.7%	0.0%	0.7%
BANK LOANS	\$ 25,357,237	0.6%	0.0%	0.6%
ASSET BACKED SECURITIES	\$ 23,767,498	0.5%	0.4%	0.1%
DIVERSIFIED	\$ 2,691,948	0.1%	0.2%	(0.2%)
GRAND TOTAL	\$ 4,458,132,235	100.0%	100.0%	0.0%

Top 20 Industry Groups (Public Fixed Income Only)	\$ Value	% Value	*Blended FI BM	Difference
1 SOVEREIGN	\$ 1,341,403,575	30.1%	29.9%	0.2%
2 FNMA COLLATERAL	\$ 593,049,836	13.3%	9.3%	4.0%
3 FGLMC COLLATERAL	\$ 213,495,523	4.8%	5.7%	(0.9%)
4 BANKS	\$ 202,119,206	4.5%	5.2%	(0.7%)
5 TELECOMMUNICATIONS	\$ 163,083,584	3.7%	3.9%	(0.3%)
6 MEDIA	\$ 134,275,400	3.0%	3.2%	(0.2%)
7 OIL&GAS	\$ 120,745,242	2.7%	3.1%	(0.4%)
8 DIVERSIFIED FINAN SERV	\$ 102,910,325	2.3%	2.3%	(0.0%)
9 GNMA2 COLLATERAL	\$ 101,265,326	2.3%	4.8%	(2.5%)
10 COMMERCIAL MBS	\$ 94,209,975	2.1%	1.3%	0.8%
11 HEALTHCARE-SERVICES	\$ 89,296,013	2.0%	1.9%	0.1%
12 ELECTRIC	\$ 83,224,769	1.9%	2.0%	(0.2%)
13 PHARMACEUTICALS	\$ 81,245,347	1.8%	1.5%	0.3%
14 Cash	\$ 75,821,407	1.7%	0.0%	1.7%
15 PIPELINES	\$ 74,963,278	1.7%	1.4%	0.3%
16 RETAIL	\$ 72,609,712	1.6%	1.8%	(0.1%)
17 SOFTWARE	\$ 60,781,139	1.4%	1.0%	0.3%
18 CHEMICALS	\$ 53,629,696	1.2%	0.9%	0.3%
19 MUNICIPAL	\$ 48,214,655	1.1%	0.6%	0.4%
20 REITS	\$ 44,200,121	1.0%	1.0%	0.0%

Credit Rating Group** (Public Fixed Income Only)	\$ Value	% Value	*Blended FI BM	Difference
01) AAA	\$ 2,518,634,994	56.5%	52.9%	3.6%
02) AA	\$ 180,216,838	4.0%	3.3%	0.8%
03) A	\$ 336,516,579	7.5%	7.1%	0.4%
04) BBB	\$ 496,820,171	11.1%	10.5%	0.7%
05) BB	\$ 425,049,694	9.5%	13.7%	(4.2%)
06) B	\$ 403,867,581	9.1%	9.5%	(0.4%)
07) CCC	\$ 88,070,963	2.0%	2.9%	(0.9%)
08) CC	\$ 157,521	0.0%	0.0%	(0.0%)
09) C	\$ -	0.0%	0.0%	(0.0%)
10) D	\$ 5,901,400	0.1%	0.1%	0.1%
11) Not Rated	\$ 2,896,493	0.1%	0.1%	0.0%
GRAND TOTAL	\$ 4,458,132,235	100.0%	100.0%	0.0%

Maturity Bucket (Public Fixed Income Only)	\$ Value	% Value	*Blended FI BM	Difference
0-1Y	\$ 150,357,795	3.4%	0.5%	2.9%
1Y-3Y	\$ 683,235,187	15.4%	19.2%	(3.8%)
3Y-5Y	\$ 700,516,021	15.8%	17.6%	(1.8%)
5Y-10Y	\$ 1,432,619,233	32.3%	29.5%	2.8%
10Y-15Y	\$ 168,311,331	3.8%	4.7%	(0.9%)
15Y+	\$ 1,298,697,346	29.3%	28.5%	0.8%
GRAND TOTAL	\$ 4,433,736,913	100.0%	100.0%	0.0%

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

ARIZONA STATE RETIREMENT SYSTEM
As of December 31, 2015

TOTAL PLAN RISK OVERVIEW

Strategy	\$ Value	% Value	Historical VaR 95%	HVaR Contri 95%	HVaR Contri % to Total	Parametric VaR 95%	PVaR Contri 95%	PVaR Contri % to Total	Exp Tail Loss 95%	Exp Tail Loss Contri 95%	Exp Tail Loss Contri % to Total	Max Loss	Std Dev	Downside Risk (8%)	Downside Risk Contri (8%)	Downside Risk Contri (8%) to Total
MONTHLY RISK																
CASH - UNASSETIZED	\$ 57,133,295	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%)	(0.1%)	0.0%
CASH - ASSETIZED	\$ 904,489,268	3%	(2.7%)	(2.8%)	1.1%	(2.6%)	(2.4%)	1.0%	(4.6%)	(4.3%)	1.0%	(9.8%)	1.7%	(1.6%)	(1.3%)	1.0%
TOTAL FIXED INCOME	\$ 4,458,132,235	13%	(1.9%)	(0.1%)	0.3%	(1.7%)	(0.2%)	0.4%	(2.6%)	(0.0%)	0.0%	(4.3%)	1.1%	(1.2%)	(0.1%)	0.6%
US EQUITY	\$ 9,229,280,950	28%	(8.2%)	(8.5%)	35.3%	(8.1%)	(7.9%)	33.0%	(14.3%)	(14.3%)	34.6%	(29.6%)	5.7%	(4.1%)	(4.1%)	33.1%
INTERNATIONAL EQUITY	\$ 7,392,249,336	22%	(10.0%)	(8.9%)	29.7%	(9.4%)	(9.0%)	30.1%	(15.0%)	(14.3%)	27.7%	(35.3%)	6.3%	(4.6%)	(4.5%)	29.4%
REAL ESTATE	\$ 2,745,590,835	8%	(10.8%)	(11.0%)	13.7%	(11.0%)	(10.3%)	12.7%	(19.1%)	(17.9%)	12.9%	(39.0%)	7.1%	(5.4%)	(5.2%)	12.5%
FARMLAND & TIMBER	\$ 182,760,279	1%	(11.3%)	(11.5%)	1.0%	(11.5%)	(10.7%)	0.9%	(19.9%)	(18.7%)	0.9%	(40.8%)	7.4%	(5.6%)	(5.4%)	0.9%
PRIVATE EQUITY	\$ 2,596,437,991	8%	(10.8%)	(10.7%)	12.6%	(10.6%)	(10.0%)	11.7%	(18.2%)	(18.0%)	12.3%	(36.5%)	6.9%	(5.3%)	(5.2%)	11.8%
PRIVATE DEBT	\$ 2,367,085,177	7%	(2.5%)	(0.3%)	0.3%	(4.1%)	(2.6%)	2.8%	(7.9%)	(5.3%)	3.3%	(17.4%)	2.8%	(2.3%)	(1.5%)	3.1%
OPPORTUNISTIC EQUITY	\$ 492,306,646	1%	(10.8%)	(10.7%)	2.4%	(10.6%)	(10.0%)	2.2%	(18.2%)	(18.0%)	2.3%	(36.4%)	6.9%	(5.3%)	(5.2%)	2.2%
OPPORTUNISTIC DEBT	\$ 1,146,064,775	3%	(7.3%)	(4.1%)	2.1%	(9.2%)	(7.1%)	3.7%	(14.6%)	(11.9%)	3.6%	(28.6%)	5.7%	(4.3%)	(3.5%)	3.6%
GLOBAL INFLATION LINKED	\$ 216,348,677	1%	(7.3%)	(4.7%)	0.5%	(7.3%)	(5.0%)	0.5%	(10.9%)	(8.3%)	0.5%	(24.0%)	4.3%	(3.7%)	(2.7%)	0.5%
INFRASTRUCTURE	\$ 312,507,259	1%	(9.5%)	(9.3%)	1.3%	(9.1%)	(8.9%)	1.3%	(15.3%)	(15.1%)	1.2%	(35.1%)	5.8%	(4.6%)	(4.7%)	1.3%
MULTI-ASSET CLASS	\$ 1,096,170,182	3%	(3.0%)	0.2%	(0.1%)	(3.1%)	0.4%	(0.2%)	(4.6%)	0.9%	(0.3%)	(7.5%)	1.9%	(1.7%)	0.2%	(0.2%)
GRAND TOTAL	\$ 33,196,556,905	100%	(6.7%)	(6.7%)	100.0%	(6.7%)	(6.7%)	100.0%	(11.5%)	(11.5%)	100.0%	(25.9%)	4.5%	(3.4%)	(3.4%)	100.0%
INTERIM POLICY BENCHMARK			(6.6%)			(6.5%)			(11.0%)			(25.3%)	4.5%	(3.3%)		

ANNUALIZED RISK																
CASH - UNASSETIZED	\$ 57,133,295	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%)	(0.2%)	0.0%
CASH - ASSETIZED	\$ 904,489,268	3%	(9.4%)	(9.6%)	1.1%	(9.2%)	(8.5%)	1.0%	(16.0%)	(14.9%)	1.0%	N/A	6.0%	(5.4%)	(4.5%)	1.0%
TOTAL FIXED INCOME	\$ 4,458,132,235	13%	(6.5%)	(0.5%)	0.3%	(6.0%)	(0.6%)	0.4%	(9.0%)	(0.1%)	0.0%	N/A	3.6%	(4.1%)	(0.5%)	0.6%
US EQUITY	\$ 9,229,280,950	28%	(28.4%)	(29.3%)	35.3%	(28.2%)	(27.4%)	33.0%	(49.6%)	(49.4%)	34.6%	N/A	19.6%	(14.3%)	(14.1%)	33.1%
INTERNATIONAL EQUITY	\$ 7,392,249,336	22%	(34.5%)	(30.8%)	29.7%	(32.6%)	(31.3%)	30.1%	(52.0%)	(49.4%)	27.7%	N/A	21.7%	(15.8%)	(15.6%)	29.4%
REAL ESTATE	\$ 2,745,590,835	8%	(37.4%)	(38.2%)	13.7%	(38.0%)	(35.5%)	12.7%	(66.1%)	(61.8%)	12.9%	N/A	24.6%	(18.7%)	(17.9%)	12.5%
FARMLAND & TIMBER	\$ 182,760,279	1%	(39.1%)	(39.9%)	1.0%	(39.7%)	(37.1%)	0.9%	(69.0%)	(64.6%)	0.9%	N/A	25.8%	(19.5%)	(18.7%)	0.9%
PRIVATE EQUITY	\$ 2,596,437,991	8%	(37.6%)	(37.2%)	12.6%	(36.9%)	(34.6%)	11.7%	(63.1%)	(62.4%)	12.3%	N/A	24.0%	(18.3%)	(17.9%)	11.8%
PRIVATE DEBT	\$ 2,367,085,177	7%	(8.8%)	(0.9%)	0.3%	(14.3%)	(9.1%)	2.8%	(27.3%)	(18.4%)	3.3%	N/A	9.6%	(7.9%)	(5.2%)	3.1%
OPPORTUNISTIC EQUITY	\$ 492,306,646	1%	(37.5%)	(37.2%)	2.4%	(36.8%)	(34.6%)	2.2%	(63.0%)	(62.3%)	2.3%	N/A	24.0%	(18.3%)	(17.9%)	2.2%
OPPORTUNISTIC DEBT	\$ 1,146,064,775	3%	(25.4%)	(14.2%)	2.1%	(32.0%)	(24.6%)	3.7%	(50.7%)	(41.1%)	3.6%	N/A	19.8%	(14.8%)	(12.2%)	3.6%
GLOBAL INFLATION LINKED	\$ 216,348,677	1%	(25.4%)	(16.3%)	0.5%	(25.4%)	(17.3%)	0.5%	(37.9%)	(28.7%)	0.5%	N/A	15.0%	(12.9%)	(9.2%)	0.5%
INFRASTRUCTURE	\$ 312,507,259	1%	(32.8%)	(32.1%)	1.3%	(31.4%)	(30.9%)	1.3%	(52.9%)	(52.4%)	1.2%	N/A	20.0%	(16.0%)	(16.2%)	1.3%
MULTI-ASSET CLASS	\$ 1,096,170,182	3%	(10.4%)	0.7%	(0.1%)	(10.7%)	1.4%	(0.2%)	(15.9%)	3.2%	(0.3%)	N/A	6.7%	(6.0%)	0.6%	(0.2%)
GRAND TOTAL	\$ 33,196,556,905	100%	(23.1%)	(23.1%)	100.0%	(23.1%)	(23.1%)	100.0%	(39.7%)	(39.7%)	100.0%	N/A	15.5%	(11.8%)	(11.8%)	100.0%
INTERIM POLICY BENCHMARK			(22.8%)			(22.6%)			(38.2%)			N/A	15.5%	(11.4%)		

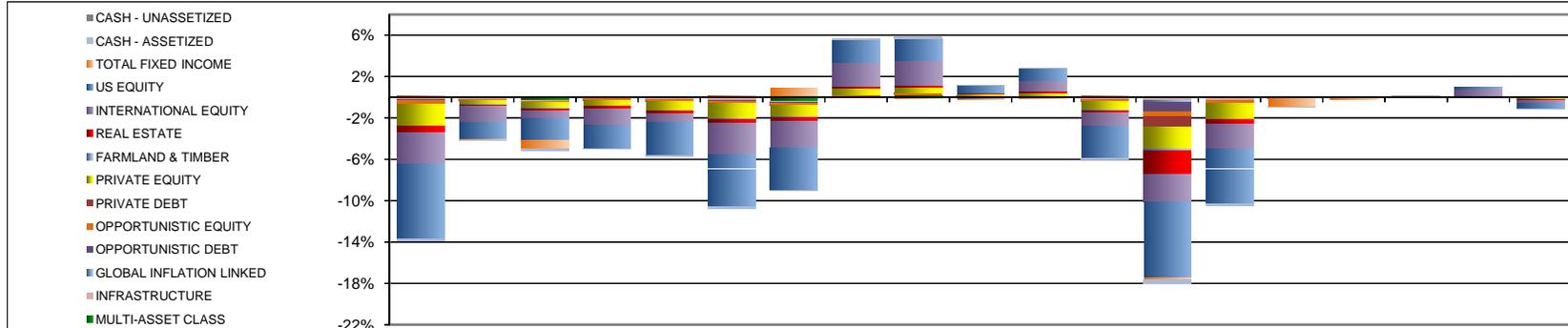
Strategy	\$ Value	% Value	Beta SP500	Corr SP500	Beta MSCI EAFE	Corr MSCI EAFE	Duration	Convexity	Notional Exposure	Gross Exposure	Gross Leverage
CASH - UNASSETIZED	\$ 57,133,295	0%	0.00		0.00				\$ 57,133,295	\$ 57,133,295	100.0%
CASH - ASSETIZED	\$ 904,489,268	3%	0.15	0.91	0.12	0.84			\$ 1,813,424,736	\$ 904,489,268	100.0%
TOTAL FIXED INCOME	\$ 4,458,132,235	13%	(0.00)	(0.01)	0.02	0.09	5.16	0.124	\$ 4,316,524,255	\$ 4,458,132,235	100.0%
US EQUITY	\$ 9,229,280,950	28%	1.03	0.99	0.79	0.90	0.02	0.000	\$ 9,422,526,075	\$ 9,237,379,192	100.1%
INTERNATIONAL EQUITY	\$ 7,392,249,336	22%	1.06	0.90	0.99	0.99			\$ 7,392,294,880	\$ 7,411,939,722	100.3%
REAL ESTATE	\$ 2,745,590,835	8%	1.16	0.87	1.00	0.88			\$ 2,745,590,835	\$ 2,745,590,835	100.0%
FARMLAND & TIMBER	\$ 182,760,279	1%	1.21	0.87	1.04	0.88			\$ 182,760,279	\$ 182,760,279	100.0%
PRIVATE EQUITY	\$ 2,596,437,991	8%	1.23	0.95	0.94	0.85			\$ 2,596,437,991	\$ 2,602,914,457	100.2%
PRIVATE DEBT	\$ 2,367,085,177	7%	0.32	0.61	0.26	0.60	0.67	0.009	\$ 2,360,051,193	\$ 2,367,199,636	100.0%
OPPORTUNISTIC EQUITY	\$ 492,306,646	1%	1.23	0.95	0.94	0.85			\$ 492,306,646	\$ 492,306,646	100.0%
OPPORTUNISTIC DEBT	\$ 1,146,064,775	3%	0.73	0.68	0.64	0.70			\$ 1,146,064,775	\$ 1,146,064,775	100.0%
GLOBAL INFLATION LINKED	\$ 216,348,677	1%	0.26	0.63	0.24	0.67	0.28	0.001	\$ 423,654,526	\$ 216,348,677	100.0%
INFRASTRUCTURE	\$ 312,507,259	1%	1.05	0.97	0.90	0.98			\$ 312,507,259	\$ 312,507,259	100.0%
MULTI-ASSET CLASS	\$ 1,096,170,182	3%	(0.00)	(0.12)	(0.00)	(0.16)			\$ 14,510,712,280	\$ 1,096,170,182	100.0%
GRAND TOTAL	\$ 33,196,556,905	100%	0.56	0.97	0.47	0.95	4.58	0.110	\$ 47,771,989,025	\$ 33,230,936,458	100.1%

ARIZONA STATE RETIREMENT SYSTEM
As of December 31, 2015

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 Aug- Oct	IR Steepening: Sept 98 - Nov 98	Emerging Markets Rally: Jan 99 - May 99	Fed Tightening: April - June 99	Nasdaq Rally: Nov 99 - Jan 00	9/11 Attack - 5 Day	09-10-2008	S&P 500 -20%	IR Parallel Shift +100bps	Spread Up 100bps	Inflation +1%	Gold Shock -20%	Oil Shock -20%	
Stress Test Stand Alone																						
CASH - UNASSETIZED	\$ 57,133,295	0.2%	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	\$ 904,489,268	2.7%	(10.1)	(2.6)	(6.6)	(2.8)	(4.4)	(9.5)	(2.3)	3.4	7.6	2.0	3.1	(3.8)	(13.8)	(7.8)	(2.5)	0.0	0.4	(0.1)	(0.7)	
TOTAL FIXED INCOME	\$ 4,458,132,235	13.4%	1.0	(0.4)	(6.0)	0.7	0.5	0.9	6.8	0.0	(0.8)	(0.7)	(1.2)	1.3	(1.4)	0.0	(5.3)	(1.4)	0.7	(0.0)	0.4	
US EQUITY	\$ 9,229,280,950	27.8%	(26.0)	(5.7)	(7.4)	(7.9)	(11.5)	(18.2)	(14.8)	8.2	7.5	2.7	4.0	(11.1)	(26.3)	(19.2)	0.0	0.0	(0.0)	0.6	(2.0)	
INTERNATIONAL EQUITY	\$ 7,392,249,336	22.3%	(13.2)	(7.1)	(3.7)	(7.2)	(3.5)	(13.3)	(11.6)	10.0	10.8	(0.8)	4.9	(5.8)	(12.1)	(10.5)	0.0	0.0	0.0	3.2	(1.4)	
REAL ESTATE	\$ 2,745,590,835	8.3%	(7.7)	(1.7)	(2.2)	(2.3)	(3.4)	(5.5)	(4.4)	2.5	2.2	0.8	1.2	(3.3)	(27.8)	(5.7)	0.0	0.0	0.0	0.0	(0.6)	
FARMLAND & TIMBER	\$ 182,760,279	0.6%	(8.1)	(1.8)	(2.3)	(2.4)	(3.6)	(5.7)	(4.6)	2.6	2.3	0.8	1.2	(3.5)	(29.0)	(5.9)	0.0	0.0	0.0	0.0	(0.6)	
PRIVATE EQUITY	\$ 2,596,437,991	7.8%	(26.0)	(5.7)	(7.4)	(7.9)	(11.5)	(18.3)	(14.7)	8.2	7.5	2.7	3.9	(11.1)	(27.1)	(19.1)	0.0	0.0	0.0	0.0	(2.0)	
PRIVATE DEBT	\$ 2,367,085,177	7.1%	(0.3)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.1)	0.1	0.1	0.0	0.0	(0.1)	(14.8)	(0.2)	(0.0)	(0.2)	0.0	0.0	(0.1)	
OPPORTUNISTIC EQUITY	\$ 492,306,646	1.5%	(26.0)	(5.7)	(7.4)	(7.9)	(11.5)	(18.3)	(14.8)	8.2	7.5	2.7	4.0	(11.1)	(27.1)	(19.1)	0.0	0.0	0.0	0.0	(2.0)	
OPPORTUNISTIC DEBT	\$ 1,146,064,775	3.5%	(3.2)	(0.7)	(0.9)	(1.0)	(1.4)	(2.2)	(1.8)	1.0	0.9	0.3	0.5	(1.4)	(27.3)	(2.3)	0.0	0.0	0.0	0.0	(0.5)	
GLOBAL INFLATION LINKED	\$ 216,348,677	0.7%	(0.0)	0.0	0.0	(0.0)	(0.0)	(0.0)	0.1	(0.0)	0.0	0.0	0.0	(0.0)	(15.9)	0.0	(0.0)	0.0	0.0	(4.9)	(5.0)	
INFRASTRUCTURE	\$ 312,507,259	0.9%	(20.6)	(4.5)	(5.9)	(6.2)	(9.1)	(14.5)	(11.7)	6.5	5.9	2.1	3.1	(8.8)	(28.3)	(15.1)	0.0	0.0	0.0	0.0	(1.9)	
MULTI-ASSET CLASS	\$ 1,096,170,182	3.3%	(0.7)	(3.7)	(9.3)	(1.9)	(3.3)	(4.6)	(10.7)	(1.5)	5.4	0.9	0.8	(2.7)	(2.7)	(3.8)	(4.9)	0.3	0.8	2.2	1.0	
GRAND TOTAL	\$ 33,196,556,905	100.0%	(13.8)	(4.2)	(5.1)	(4.9)	(5.7)	(10.7)	(8.1)	5.6	5.8	0.9	2.7	(5.8)	(18.0)	(10.5)	(0.9)	(0.2)	0.1	0.9	(1.1)	
INTERIM POLICY BENCHMARK			(14.0)	(4.5)	(5.6)	(5.4)	(5.4)	(11.2)	(7.5)	6.7	6.5	0.7	3.0	(5.8)	(20.4)	(10.7)	(1.2)	(0.4)	0.2	0.9	(1.2)	

Stress Test Contribution																						
CASH - UNASSETIZED	\$ 57,133,295	0.2%	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	\$ 904,489,268	2.7%	(0.3)	(0.1)	(0.2)	(0.1)	(0.1)	(0.3)	(0.1)	0.1	0.2	0.1	0.1	(0.1)	(0.4)	(0.2)	(0.1)	0.0	0.0	(0.0)	(0.0)	
TOTAL FIXED INCOME	\$ 4,458,132,235	13.4%	0.1	(0.1)	(0.8)	0.1	0.1	0.1	0.9	0.0	(0.1)	(0.1)	(0.2)	0.2	(0.2)	0.0	(0.7)	(0.2)	0.1	(0.0)	0.1	
US EQUITY	\$ 9,229,280,950	27.8%	(7.2)	(1.6)	(2.0)	(2.2)	(3.2)	(5.1)	(4.1)	2.3	2.1	0.7	1.1	(3.1)	(7.3)	(5.3)	0.0	0.0	(0.0)	0.2	(0.5)	
INTERNATIONAL EQUITY	\$ 7,392,249,336	22.3%	(2.9)	(1.6)	(0.8)	(1.6)	(0.8)	(3.0)	(2.6)	2.2	2.4	(0.2)	1.1	(1.3)	(2.7)	(2.3)	0.0	0.0	0.0	0.7	(0.3)	
REAL ESTATE	\$ 2,745,590,835	8.3%	(0.6)	(0.1)	(0.2)	(0.2)	(0.3)	(0.5)	(0.4)	0.2	0.2	0.1	0.1	(0.3)	(2.3)	(0.5)	0.0	0.0	0.0	0.0	(0.0)	
FARMLAND & TIMBER	\$ 182,760,279	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)	(0.2)	(0.0)	0.0	0.0	0.0	0.0	(0.0)	
PRIVATE EQUITY	\$ 2,596,437,991	7.8%	(2.0)	(0.4)	(0.6)	(0.6)	(0.9)	(1.4)	(1.2)	0.6	0.6	0.2	0.3	(0.9)	(2.1)	(1.5)	0.0	0.0	0.0	0.0	(0.2)	
PRIVATE DEBT	\$ 2,367,085,177	7.1%	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	(0.0)	(1.1)	(0.0)	(0.0)	(0.0)	0.0	0.0	(0.0)	
OPPORTUNISTIC EQUITY	\$ 492,306,646	1.5%	(0.4)	(0.1)	(0.1)	(0.1)	(0.2)	(0.3)	(0.2)	0.1	0.1	0.0	0.1	(0.2)	(0.4)	(0.3)	0.0	0.0	0.0	0.0	(0.0)	
OPPORTUNISTIC DEBT	\$ 1,146,064,775	3.5%	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	0.0	0.0	0.0	0.0	(0.0)	(0.9)	(0.1)	0.0	0.0	0.0	0.0	(0.0)	
GLOBAL INFLATION LINKED	\$ 216,348,677	0.7%	(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	\$ 312,507,259	0.9%	(0.2)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	0.1	0.1	0.0	0.0	(0.1)	(0.3)	(0.1)	0.0	0.0	0.0	0.0	(0.0)	
MULTI-ASSET CLASS	\$ 1,096,170,182	3.3%	(0.0)	(0.1)	(0.3)	(0.1)	(0.1)	(0.2)	(0.4)	(0.0)	0.2	0.0	0.0	(0.1)	(0.1)	(0.1)	(0.2)	0.0	0.0	0.1	0.0	
GRAND TOTAL	\$ 33,196,556,905	100.0%	(13.8)	(4.2)	(5.1)	(4.9)	(5.7)	(10.7)	(8.1)	5.6	5.8	0.9	2.7	(5.8)	(18.0)	(10.5)	(0.9)	(0.2)	0.1	0.9	(1.1)	
INTERIM POLICY BENCHMARK			(14.0)	(4.5)	(5.6)	(5.4)	(5.4)	(11.2)	(7.5)	6.7	6.5	0.7	3.0	(5.8)	(20.4)	(10.7)	(1.2)	(0.4)	0.2	0.9	(1.2)	



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.	

Agenda Item #4



NEPC, LLC

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

From: Mr. Allan Martin, Partner, Consultant, NEPC
Mr. Dan LeBeau, Consultant, NEPC

Date: February 17, 2016

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

Purpose

To present and discuss information regarding the independent reporting, monitoring and oversight of the ASRS Investment Program.

In addition to the Total Fund Report, NEPC and IMD Staff will provide a detailed review of the quarterly ASRS Investment Performance Report (IPR).

Recommendation

Informational only; no action required.

Notice

Regarding this agenda item, pursuant to A.R.S. § 38-431.03(A)(2) and A.R.S. § 38-718(P) notice is hereby given to Trustees of the ASRS Investment Committee and the general public that the ASRS Investment Committee may vote to go into executive session, in the event specific manager data is discussed that is deemed confidential/non-public information.

Background

NEPC is responsible for providing an independent reporting, monitoring and oversight function from the Investment Program information which is presented by the CIO and IMD.

As a result, NEPC has developed reports for both the IC and Board designed to 1) provide the appropriate level of investment information for the purposes of independent oversight (ASRS SAAP compliance, Asset Class Committee minutes review, investment selection due diligence packet compliance, etc.); 2) provide ASRS investment program performance relative to its goals/objectives (presented quarterly); and 3) communicate NEPC's perspectives on the market environment, investment outlook or other initiatives or topics they believe are important to convey to the IC and Board.

More specific to the IC, NEPC will provide the IC with an ASRS Investment Performance Report (IPR) on a quarterly basis, which will provide investment manager-level detail information for discussion by NEPC and IMD staff. In addition, IMD will provide one or more staff reports related to ASRS private investments or other asset class/managers. These



reports will be marked as confidential/non-public and, prior to a discussion of individual manager performance, the IC will move to executive session.

As of December 31, 2015 the Total Fund's market value was approximately \$33.6 billion.

For the one-year period ending December 31, 2015, the Total Fund returned 1.3% (net of fees), outperforming the Interim SAA Policy by 1.7%. For the three-year period, the Total Fund produced a return of 8.3% per annum, outperforming the Interim SAA Policy by 1.6%. Over the past ten years, the Total Fund has returned 6.1% per annum, and since inception, the portfolio's performance is 9.7%.

Attachments:

- NEPC's Independent Reporting, Monitoring and Oversight reports
- ASRS Investment Performance Report (IPR) for period ending December 31, 2015. (Confidential/Non-Public) – distributed at the meeting

Arizona State Retirement System

Independent ASRS Investment Program Oversight for the Period Ending December 31, 2015

February 22, 2016

Allan Martin, Partner, NEPC
Dan LeBeau, Consultant, NEPC



- ASRS Investment Objectives/Performance
- Independent Oversight/Compliance
 - SAA Policy Compliance
 - Total Fund and Asset Class Analysis
 - Asset Class Committee Monitoring
- Market Environment Update and Outlook
- Appendix: SAA Policy History

ASRS Investment Objectives/Performance

Note: All of the data shown on the following pages is as of December 31, 2015 and reflects the deduction of investment manager fees, unless otherwise noted.



Macro

- Objective #1: Achieve a twenty-year rolling annual total fund net rate of return equal to or greater than the actuarial assumed interest rate.
- Objective #2: Achieve one- and three-year rolling annual total fund net rates of return equal to or greater than the return of the ASRS Strategic Asset Allocation Policy (SAAP) Benchmark.
- Objective #3: Achieve one- and three-year rolling annual net rates of return for ASRS strategic asset classes that are equal to or greater than their respective strategic asset class benchmarks.
- Objective #4: Ensure sufficient monies are available to meet pension benefits, health insurance, member refunds, administrative payments, and other cash flow requirements.

Micro

Source: ASRS Strategic Plan, March 2013

- Objective #1: Achieve a twenty-year rolling annual total fund net rate of return equal to or greater than the actuarial assumed interest rate.

	<u>20 Year Annualized Return</u>
Total Fund	7.5%
Constant 8%	<u>8.0%</u>
Excess Return	(0.5)%

Goal Met:
No

Total Fund Performance

- Objective #2: Achieve one- and three-year rolling annual total fund net rates of return equal to or greater than the return of the ASRS Strategic Asset Allocation Policy (SAAP) Benchmark.

	Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception (6/30/75)
Total Fund	2.7%	1.3%	8.3%	7.8%	6.1%	9.7%
Interim SAA Policy¹	1.6%	-0.4%	6.7%	6.9%	5.6%	9.4%
Excess Return	1.1%	1.7%	1.6%	0.9%	0.5%	0.3%

1 Year Goal Met: Yes
3 Year Goal Met: Yes

¹Composition of SAA Policy can be found in the appendix.

Arizona State Retirement System
Total Fund Attribution Analysis

Total Plan	1 Year	3 Years	5 Years
Allocation Effect ¹	0.46%	0.87%	0.44%
Manager Selection Effect ²	1.19%	0.70%	0.53%
Residual ³	0.00%	-0.02%	-0.04%
Excess Return	1.65%	1.55%	0.93%

The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:

1. Allocation Effect: Measures the impact of the decision to over/under weight asset classes relative to Interim SAAP benchmark weights. (Return Asset Class Index – Total Interim Policy Index Return) × (Weight Asset Class Portfolio – Weight Asset Class Interim Policy Index)

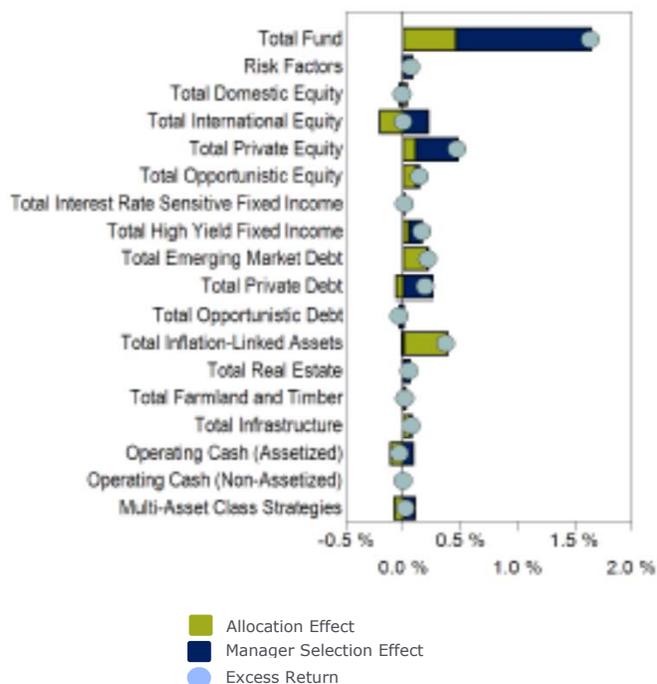
2. Manager Selection Effect: Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. [Weight Asset Class Benchmark × (Return Portfolio Asset Class – Return Asset Class in Interim Policy Index)] + **Interaction Effect:** Measures the impact of over/under weighting decisions and over/under performance. (Return Asset Class Portfolio (Weight Asset Class Portfolio – Weight Asset Class Policy Index)) – (Return Asset Class Index (Weight Asset Class Portfolio – Weight Asset Class Index))

3. Residual: Contribution to excess return not captured in Allocation Effect and Manager Selection Effect.

Arizona State Retirement System

Total Fund Attribution Detail

Attribution Effects
1 Year Ending December 31, 2015



1 Year Excess Return: +1.65%

- Allocation Effect: +0.46%
 - Commodities tactical underweight (+0.38%)
 - Emerging Market Debt tactical underweight (+0.20%)
 - Opportunistic Equity tactical allocation (+0.10%)
 - Private Equity overweight (+0.10%)
 - International Equity tactical underweight (-0.21%)
 - Multi-Asset Strategies tactical underweight (-0.08%)
- Manager Selection Effect: +1.19%
 - Private Equity outperformed due to various managers (+0.36%)
 - Private Debt outperformed due to various managers (+0.25%)
 - International Equity outperformed due to various managers (+0.21%)
 - Multi-Asset Strategies outperformed (+0.09%)
 - Operating Cash outperformed (+0.08%)
 - Risk Factors outperformed (+0.07%)
- Residual: 0.00%

The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:

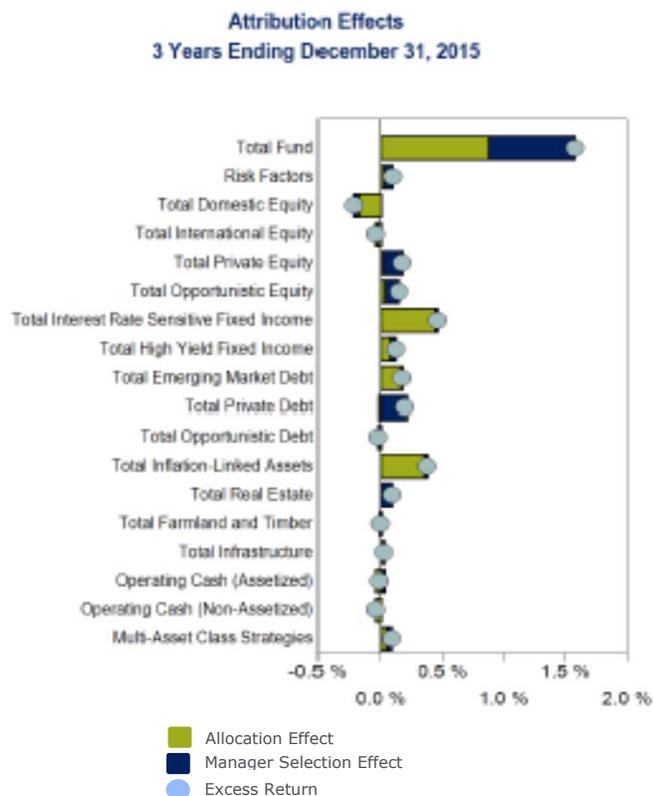
Allocation Effect: Measures the impact of the decision to over/under weight asset classes relative to Interim SAAP benchmark weights. $(\text{Return Asset Class Index} - \text{Total Interim Policy Index Return}) \times (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Interim Policy Index})$

Manager Selection Effect: Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. $[\text{Weight Asset Class Benchmark} \times (\text{Return Portfolio Asset Class} - \text{Return Asset Class in Interim Policy Index})] + \text{Interaction Effect}$
Interaction Effect: Measures the impact of over/under weighting decisions and over/under performance. $(\text{Return Asset Class Portfolio} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Policy Index})) - (\text{Return Asset Class Index} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Index}))$

Residual: Contribution to excess return not captured in Allocation Effect and Manager Selection Effect.

Arizona State Retirement System

Total Fund Attribution Detail



3 Year Excess Return: +1.55%

- Allocation Effect: +0.87%
 - Public Markets Fixed Income tactical underweight (+0.67%)
 - Commodities tactical underweight (+0.36%)
 - Domestic Equity tactical underweight (-0.18%)
- Manager Selection Effect: +0.70%
 - Private Debt outperformed due to various managers (+0.21%)
 - Private Equity outperformed due to various managers (+0.15%)
 - Opportunistic Equity outperformed due to various managers (+0.11%)
 - Real Estate outperformed due to various managers (+0.09%)
 - Risk Factors outperformed (+0.07%)
 - Public Markets Fixed Income outperformed due to various managers (+0.07%)
- Residual: -0.02%

The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:

Allocation Effect: Measures the impact of the decision to over/under weight asset classes relative to Interim SAAP benchmark weights. $(\text{Return Asset Class Index} - \text{Total Interim Policy Index Return}) \times (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Interim Policy Index})$

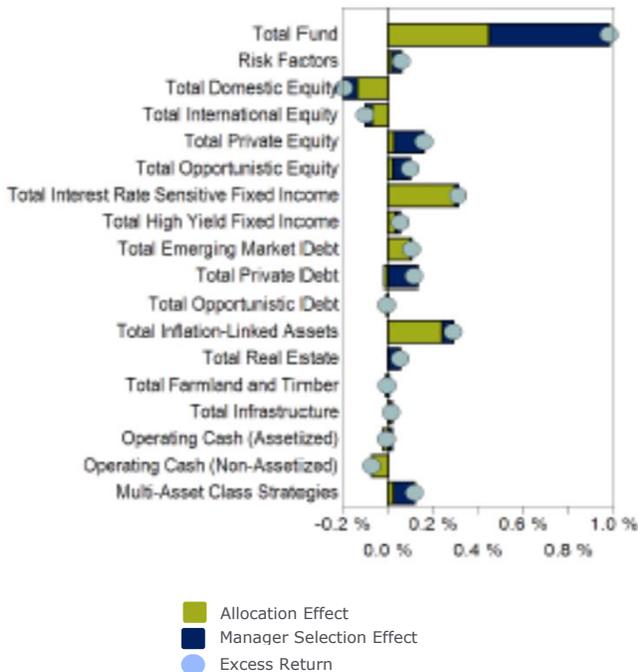
Manager Selection Effect: Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. $[\text{Weight Asset Class Benchmark} \times (\text{Return Portfolio Asset Class} - \text{Return Asset Class in Interim Policy Index})] + \text{Interaction Effect}$
Interaction Effect: Measures the impact of over/under weighting decisions and over/under performance. $(\text{Return Asset Class Portfolio} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Policy Index})) - (\text{Return Asset Class Index} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Index}))$

Residual: Contribution to excess return not captured in Allocation Effect and Manager Selection Effect.

Arizona State Retirement System

Total Fund Attribution Detail

Attribution Effects
5 Years Ending December 31, 2015



5 Year Excess Return: +0.93%

- Allocation Effect: +0.44%
 - Public Markets Fixed Income tactical underweight (+0.43%)
 - Commodities tactical underweight (+0.24%)
 - Domestic Equity tactical underweight (-0.14%)
 - International Equity tactical overweight (-0.07%)
- Manager Selection Effect: +0.53%
 - Private Equity outperformed due to various managers (+0.13%)
 - Private Debt outperformed due to various managers (+0.13%)
 - Multi-Asset Strategies outperformed (+0.09%)
 - Opportunistic Equity outperformed due to various managers (+0.08%)
 - Commodities outperformed (+0.05%)
 - Real Estate outperformed due to various managers (+0.05%)
- Residual: -0.04%

The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:

Allocation Effect: Measures the impact of the decision to over/under weight asset classes relative to Interim SAAP benchmark weights. $(\text{Return Asset Class Index} - \text{Total Interim Policy Index Return}) \times (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Interim Policy Index})$

Manager Selection Effect: Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. $[\text{Weight Asset Class Benchmark} \times (\text{Return Portfolio Asset Class} - \text{Return Asset Class in Interim Policy Index})]$ + **Interaction Effect:** Measures the impact of over/under weighting decisions and over/under performance. $(\text{Return Asset Class Portfolio} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Policy Index})) - (\text{Return Asset Class Index} (\text{Weight Asset Class Portfolio} - \text{Weight Asset Class Index}))$

Residual: Contribution to excess return not captured in Allocation Effect and Manager Selection Effect.

Asset Class Performance vs. Benchmark – Public Markets

- Objective #3: Achieve one- and three-year rolling annual net rates of return for ASRS strategic asset classes that are equal to or greater than their respective strategic asset class benchmarks.

	1 Year Return	3 Year Return
ASRS Total Domestic and Int'l Equity ¹	-0.9%	9.8%
ASRS Custom Total Equity Benchmark	-1.1%	9.6%
Excess Return	0.2%	0.2%
ASRS Domestic Equity	0.8%	14.7%
ASRS Custom Domestic Equity Benchmark	0.9%	14.8%
Excess Return	-0.1%	-0.1%
ASRS International Equity	-2.2%	2.7%
ASRS Custom Int'l Equity Benchmark	-3.2%	2.8%
Excess Return	1.0%	-0.1%
ASRS Public Markets Fixed Income	0.2%	0.7%
ASRS Custom Fixed Income Benchmark	-1.8%	0.0%
Excess Return	2.0%	0.7%
ASRS Inflation-Linked	-26.0%	-17.1%
ASRS Custom Inflation-Linked Benchmark	-24.7%	-17.3%
Excess Return	-1.3%	0.2%
ASRS Multi-Asset Class Strategies	-1.4%	7.1%
ASRS Multi-Asset Class Strategies Benchmark	0.3%	7.6%
Excess Return	-1.7%	-0.5%

¹Performance of ASRS Total Domestic and Int'l 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.

Note: Composition of ASRS Custom Asset Class Benchmarks can be found in the appendix.

**Goal Met:
Partially**

Asset Class Performance vs. Benchmark – Private Markets¹

- Objective #3: Achieve one- and three-year rolling annual net rates of return for ASRS strategic asset classes that are equal to or greater than their respective strategic asset class benchmarks.

	1 Year Return	3 Year Return	IRR Since Inception	Inception Date
ASRS Private Equity	5.4%	12.6%	11.4%	Oct-07
Russell 2000	-0.8%	8.6%	9.5%	
Excess Return	6.2%	4.0%	1.9%	
ASRS Opportunistic Equity ²	12.0%	23.2%	23.9%	Apr-11
ASRS Private Debt	8.7%	11.3%	11.4%	Jul-12
S&P/LSTA Leveraged Loan Index + 250 bps	3.3%	4.7%	4.9%	
Excess Return	5.4%	6.6%	6.5%	
ASRS Opportunistic Debt ²	-0.1%	6.5%	10.3%	Jan-08
ASRS Real Estate	14.8%	14.0%	7.5%	Oct-05
NFI - ODCE Index	13.9%	12.4%	6.8%	
Excess Return	0.9%	1.6%	0.7%	
ASRS Farmland and Timber	3.6%	--	2.8%	Jul-13
CPI ex-Food and Energy + 350 bps	5.5%	--	5.5%	
Excess Return	-1.9%		-2.7%	
ASRS Total Infrastructure	--	--	4.9%	Dec-14
CPI ex-Food and Energy + 350 bps	--	--	5.4%	
Excess Return			-0.5%	

1- Performance of private markets portfolios and corresponding benchmarks is reported on a one quarter lag. Performance shown as of September 30, 2015.

2- Net absolute rate of return expectations range from 10-14% per annum.

Note: Due to the drawdown nature of private markets portfolios in which the investment managers call capital over time, dollar-weighted performance, or internal rate of return (IRR) is a more appropriate measure of the performance of ASRS private markets portfolios.

**Goal Met:
Partially**



Cash Management

- Objective #4: Ensure sufficient monies are available to meet pension benefits, health insurance, member refunds, administrative payments, and other cash flow requirements.

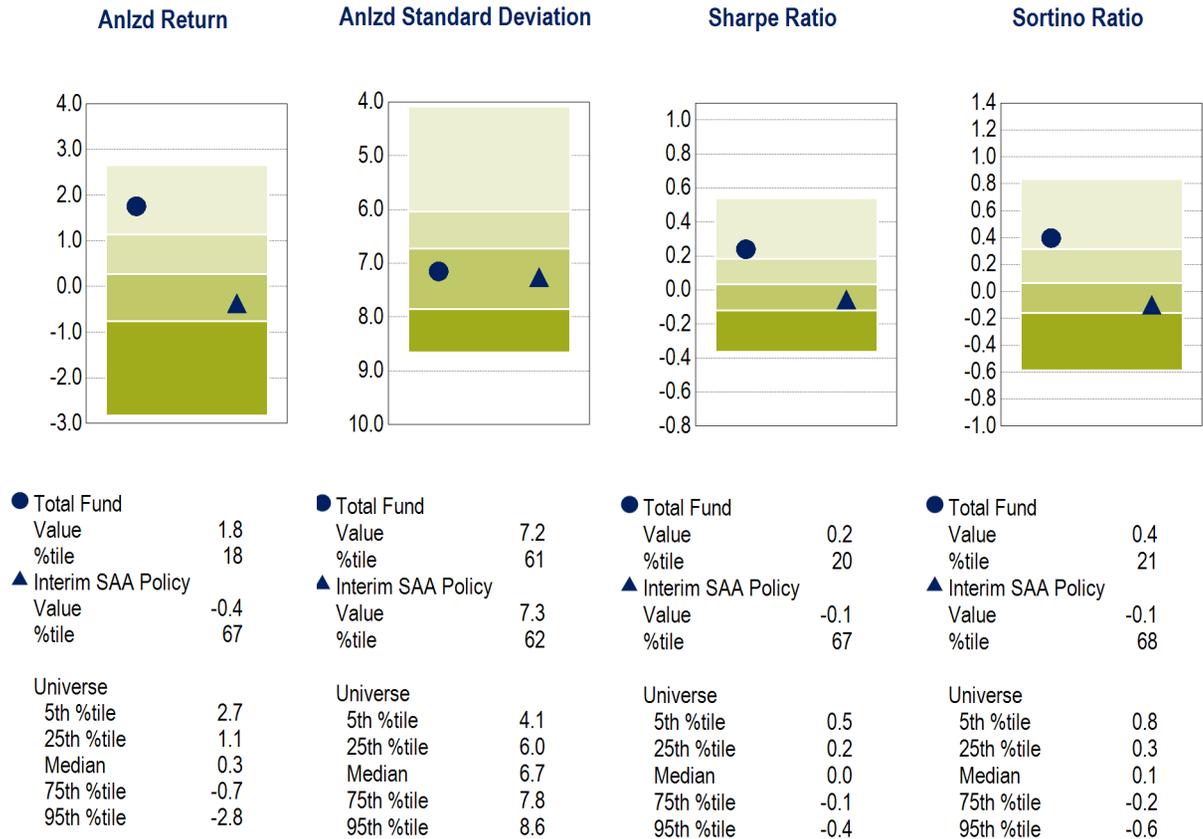
Month	External CFs +	Internal CFs =	Total CFs during the Month	Last day of the Month Ending Balance*
Jan – 15	(\$82.9)	(\$39.8)	(\$122.7)	\$140.1
Feb – 15	(\$123.2)	\$7.2	(\$116.0)	\$80.4
Mar – 15	(\$64.8)	(\$19.3)	(\$84.1)	\$418.0
Apr – 15	(\$90.9)	(\$154.8)	(\$245.7)	\$550.1
May – 15	(\$47.8)	(\$37.8)	(\$85.6)	\$479.0
Jun – 15	(\$74.4)	(\$117.1)	(\$191.5)	\$318.3
Jul – 15	(\$150.0)	(\$205.8)	(\$355.8)	\$405.5
Aug – 15	(\$136.3)	(\$115.6)	(\$251.9)	\$351.7
Sep – 15	(\$103.3)	(\$333.9)	(\$437.2)	\$392.0
Oct – 15	(\$73.0)	(\$43.3)	(\$116.3)	\$394.5
Nov – 15	(\$107.8)	(\$129.9)	(\$237.7)	\$705.5
Dec – 15	(\$65.4)	(\$302.6)	(\$368.0)	\$966.1

* Includes assetized & unassetized cash balances (Inception of 1/26/15); represents monies to be used for funding needs that occur in subsequent month(s). Generally, monthly pension payments occur on the first day of month.

**Goal Met:
Yes**

Total Fund Risk Statistics vs. Peer Universe

Total Fund vs. IFx Public DB > \$1B Gross(USD)(peer)
1 Year



Note: The information contained herein is for comparison purposes only and is not a Total Fund benchmark. Peer universe comparisons are subject to several limitations, including: peer groups are not comprehensive; several funds are included in multiple peer groups; peer groups are constructed using gross of fee returns; and survivorship bias in that poorly performing funds may no longer report results.

Universes are constructed using gross of fee returns; therefore, ASRS rank is based on gross of fee returns.

Rankings are from highest (1) to lowest (100) in the InvestorForce Public Funds > \$1 Billion Universe.

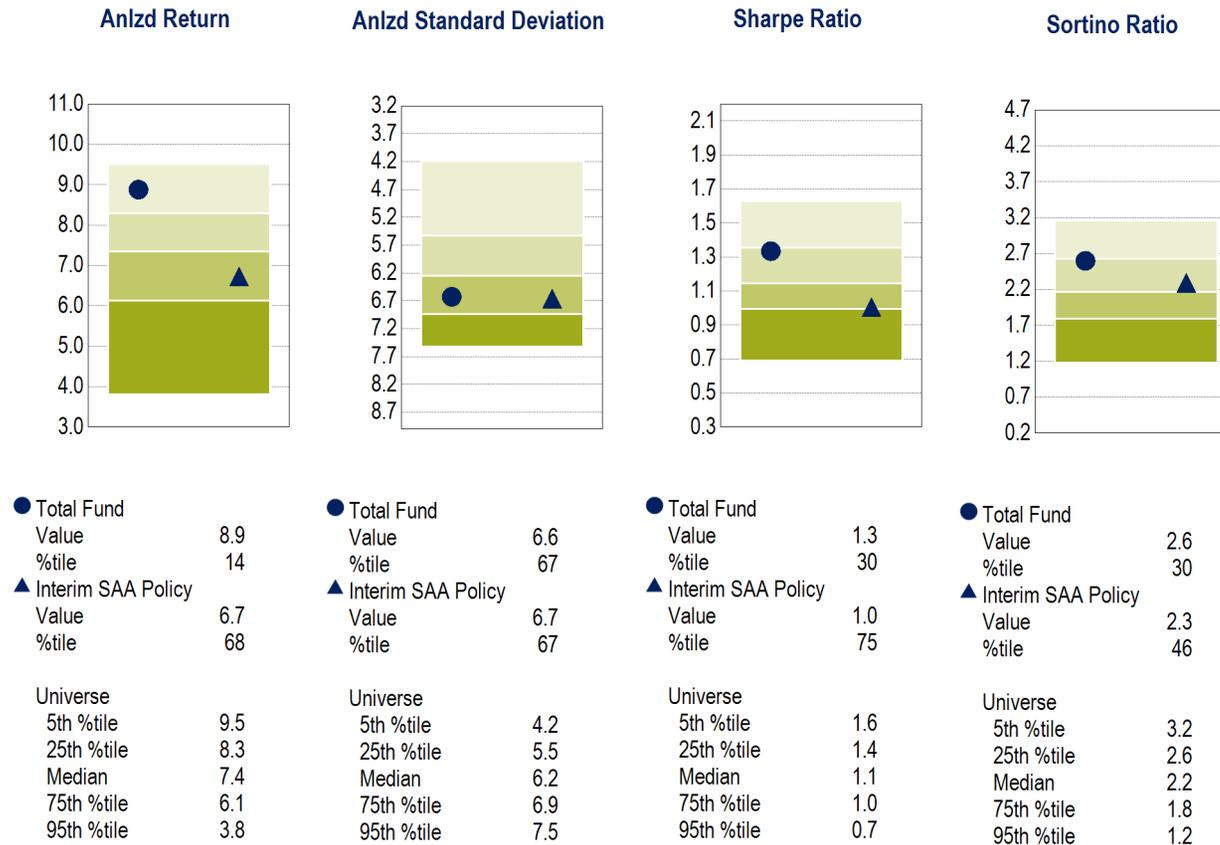
The InvestorForce Public Funds > \$1 Billion Universe contains 105 observations for the period ending December 31, 2015, with total assets of \$1.9 trillion.

Composition of Interim SAA Policy can be found in the appendix.

Total Fund Risk Statistics vs. Peer Universe

Total Fund vs. IFx Public DB > \$1B Gross(USD)(peer)

3 Year



Note: The information contained herein is for comparison purposes only and is not a Total Fund benchmark. Peer universe comparisons are subject to several limitations, including: peer groups are not comprehensive; several funds are included in multiple peer groups; peer groups are constructed using gross of fee returns; and survivorship bias in that poorly performing funds may no longer report results.

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The InvestorForce Public Funds > \$1 Billion Universe contains 105 observations for the period ending December 31, 2015, with total assets of \$1.9 trillion.

Composition of Interim SAA Policy can be found in the appendix.

Total Fund Risk Statistics vs. Peer Universe

Total Fund vs. IFx Public DB > \$1B Gross(USD)(peer)

5 Year



Note: The information contained herein is for comparison purposes only and is not a Total Fund benchmark. Peer universe comparisons are subject to several limitations, including: peer groups are not comprehensive; several funds are included in multiple peer groups; peer groups are constructed using gross of fee returns; and survivorship bias in that poorly performing funds may no longer report results.

Universes are constructed using gross of fee returns; therefore, ASRS rank is based on gross of fee returns.

Rankings are from highest (1) to lowest (100) in the InvestorForce Public Funds > \$1 Billion Universe.

The InvestorForce Public Funds > \$1 Billion Universe contains 105 observations for the period ending December 31, 2015, with total assets of \$1.9 trillion.

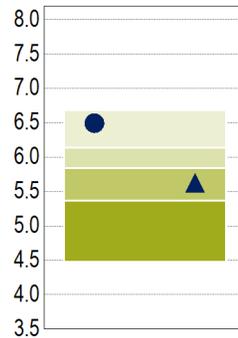
Composition of Interim SAA Policy can be found in the appendix.

Total Fund Risk Statistics vs. Peer Universe

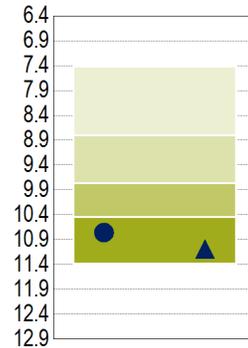
Total Fund vs. IFx Public DB > \$1B Gross(USD)(peer)

10 Year

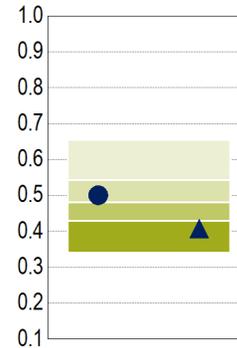
Anlzd Return



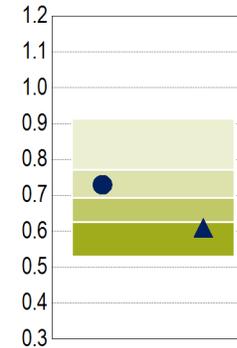
Anlzd Standard Deviation



Sharpe Ratio



Sortino Ratio



● Total Fund

Value 6.5
%tile 13

▲ Interim SAA Policy

Value 5.6
%tile 63

Universe

5th %tile 6.7
25th %tile 6.1
Median 5.9
75th %tile 5.4
95th %tile 4.5

● Total Fund

Value 10.8
%tile 86

▲ Interim SAA Policy

Value 11.1
%tile 89

Universe

5th %tile 7.4
25th %tile 8.8
Median 9.8
75th %tile 10.4
95th %tile 11.4

● Total Fund

Value 0.5
%tile 39

▲ Interim SAA Policy

Value 0.4
%tile 84

Universe

5th %tile 0.7
25th %tile 0.5
Median 0.5
75th %tile 0.4
95th %tile 0.3

● Total Fund

Value 0.7
%tile 34

▲ Interim SAA Policy

Value 0.6
%tile 84

Universe

5th %tile 0.9
25th %tile 0.8
Median 0.7
75th %tile 0.6
95th %tile 0.5

Note: The information contained herein is for comparison purposes only and is not a Total Fund benchmark. Peer universe comparisons are subject to several limitations, including: peer groups are not comprehensive; several funds are included in multiple peer groups; peer groups are constructed using gross of fee returns; and survivorship bias in that poorly performing funds may no longer report results.

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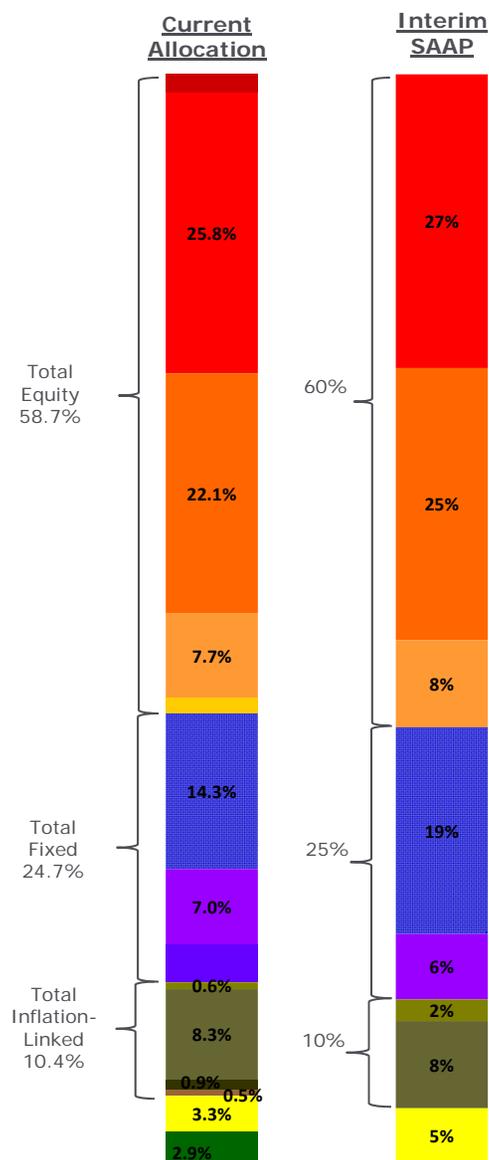
Composition of Interim SAA Policy can be found in the appendix.

Independent Oversight/Compliance

Note: All of the data shown on the following pages is as of December 31, 2015 and reflects the deduction of investment manager fees, unless otherwise noted.



SAA Policy Compliance



	Current Mkt Value	Current Allocation	Interim SAAP	Interim SAAP Difference	Policy Range	Within Range	SAAP
Total Domestic and International Equity	\$16,659,606,097	49.6%	52%	-2.4%			50%
Equity Risk Factor Portfolio	\$562,019,772	1.7%	0%	1.7%			0%
Domestic Equity¹	\$8,678,821,543	25.8%	27%	-1.2%	16% - 36%	Yes	26%
U.S. Large Cap	\$6,729,564,209	20.0%	21%	-1.0%			20%
U.S. Mid Cap	\$1,015,270,164	3.0%	3%	0.0%			3%
U.S. Small Cap	\$933,986,739	2.8%	3%	-0.2%			3%
International Equity¹	\$7,418,764,782	22.1%	25%	-2.9%	14% - 34%	Yes	24%
Developed Large Cap	\$5,743,461,936	17.1%	18%	-0.9%			17%
Developed Small Cap	\$671,643,280	2.0%	2%	0.0%			2%
Emerging Markets	\$1,003,197,802	3.0%	5%	-2.0%			5%
Private Equity²	\$2,595,648,652	7.7%	8%	-0.3%	6% - 10%	Yes	8%
Opportunistic Equity^{2,4}	\$492,306,669	1.5%	0%	1.5%			0%
Total Equity	\$19,747,561,418	58.7%	60%	-1.3%	48% - 65%	Yes	58%
Public Markets Fixed Income¹	\$4,801,990,242	14.3%	19%	-4.7%			15%
Treasuries Long Duration	\$353,386,638	1.1%	0%	1.1%	0% - 10%	Yes	0%
Interest Rate Sensitive	\$3,441,507,011	10.2%	15%	-4.8%			11%
High Yield	\$1,007,096,593	3.0%	4%	-1.0%			4%
Private Debt²	\$2,341,189,989	7.0%	6%	1.0%	8% - 12%	No	10%
Opportunistic Debt^{2,4}	\$1,159,052,291	3.4%	0%	3.4%			0%
Total Fixed Income	\$8,302,232,522	24.7%	25%	-0.3%	18% - 35%	Yes	25%
Commodities	\$207,223,345	0.6%	2%	-1.4%	0% - 4%	Yes	2%
Real Estate²	\$2,802,448,299	8.3%	8%	0.3%	8% - 12%	Yes	10%
Infrastructure²	\$314,726,752	0.9%	0%	0.9%	0% - 3%	Yes	0%
Farmland and Timber²	\$182,760,364	0.5%	0%	0.5%	0% - 3%	Yes	0%
Opportunistic Inflation-Linked⁴	\$0	0.0%	0%	0.0%			0%
Total Inflation-Linked	\$3,507,158,761	10.4%	10%	0.4%	10% - 16%	Yes	12%
Multi-Asset Class Strategies	\$1,097,519,198	3.3%	5%	-1.7%	0% - 12%	Yes	5%
Cash³	\$966,194,256	2.9%	0%	2.9%			0%
Operating Cash (Non-Assetized)	\$57,137,677	0.2%	0%	0.2%			0%
Operating Cash (Assetized)	\$909,056,579	2.7%	0%	2.7%			0%
Total	\$33,620,666,155	100%	100%	0%			100%

¹Domestic Equity, International Equity and Public Markets Fixed Income market values include residual values remaining in terminated manager accounts.

²Values shown for private markets portfolios include cash flows that occurred during 4Q 2015.

³Cash includes money for the upcoming monthly pension distribution.

⁴Aggregate Opportunistic asset classes not to exceed 10%.

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

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

Market values include manager held cash.

Arizona State Retirement System

Asset Class Performance Summary - Public Markets

	Market Value (\$)	% of Portfolio	3 Mo (%)	Rank	FYTD (%)	Rank	1 Yr (%)	Rank	3 Yrs (%)	Rank	5 Yrs (%)	Rank	10 Yrs (%)	Rank	Inception (%)	Since
Total Fund	33,620,666,155	100.0	2.7	--	-2.0	--	1.3	--	8.3	--	7.8	--	6.1	--	9.7	Jul-75
<i>Interim SAA Policy</i>			<u>1.6</u>	--	<u>-3.4</u>	--	<u>-0.4</u>	--	<u>6.7</u>	--	<u>6.9</u>	--	<u>5.6</u>	--	<u>9.4</u>	<i>Jul-75</i>
<i>Over/Under</i>			1.1		1.4		1.7		1.6		0.9		0.5		0.3	
<i>Actual Benchmark</i>			1.8	--	-3.3	--	0.0	--	7.4	--	7.2	--	5.6	--	--	<i>Jul-75</i>
Total Domestic and International Equity¹	16,659,606,097	49.6	5.1	--	-4.0	--	-0.9	--	9.8	--	8.4	--	5.9	--	6.4	Jan-98
<i>ASRS Custom Total Equity Benchmark</i>			<u>5.1</u>	--	<u>-4.5</u>	--	<u>-1.1</u>	--	<u>9.6</u>	--	<u>8.4</u>	--	<u>6.1</u>	--	<u>5.7</u>	<i>Jan-98</i>
<i>Over/Under</i>			0.0		0.5		0.2		0.2		0.0		-0.2		0.7	
Total Domestic Equity	8,678,821,543	25.8	6.0	27	-1.2	24	0.8	35	14.7	34	12.1	32	7.8	40	11.1	Jul-75
<i>ASRS Custom Domestic Equity Benchmark</i>			<u>6.2</u>	24	<u>-1.3</u>	24	<u>0.9</u>	34	<u>14.8</u>	33	<u>12.3</u>	28	<u>7.7</u>	43	<u>11.2</u>	<i>Jul-75</i>
<i>Over/Under</i>			-0.2		0.1		-0.1		-0.1		-0.2		0.1		-0.1	
<i>eA All US Equity Net Median</i>			4.4		-4.7		-1.3		13.4		10.9		7.4		12.6	<i>Jul-75</i>
Total International Equity	7,418,764,782	22.1	3.8	71	-7.6	71	-2.2	65	2.7	76	2.1	75	3.0	81	5.8	Apr-87
<i>ASRS Custom Int'l Equity Benchmark</i>			<u>4.0</u>	68	<u>-8.0</u>	74	<u>-3.2</u>	72	<u>2.8</u>	76	<u>2.2</u>	75	<u>3.7</u>	67	<u>5.5</u>	<i>Apr-87</i>
<i>Over/Under</i>			-0.2		0.4		1.0		-0.1		-0.1		-0.7		0.3	
<i>eA All ACWI ex-US Equity Net Median</i>			4.7		-6.0		-0.4		4.9		3.6		4.4		7.4	<i>Apr-87</i>
Total Public Markets Fixed Income	4,801,990,242	14.3	-0.6	63	-0.4	69	0.2	57	0.7	82	3.1	60	4.7	45	8.2	Jan-00
<i>ASRS Custom Public Markets Fixed Income Benchmark</i>			<u>-1.0</u>	82	<u>-1.4</u>	78	<u>-1.8</u>	80	<u>0.0</u>	97	<u>2.5</u>	73	<u>4.1</u>	61	--	<i>Jul-75</i>
<i>Over/Under</i>			0.4		1.0		2.0		0.7		0.6		0.6		--	
<i>eA All US Fixed Inc Net Median</i>			-0.5		0.1		0.4		1.5		3.5		4.6		8.0	<i>Jul-75</i>
Total Inflation-Linked Assets	207,223,345	0.6	-10.9	--	-24.6	--	-26.0	--	-17.1	--	-12.1	--	--	--	-7.7	Feb-10
<i>ASRS Custom Inflation-Linked Benchmark</i>			<u>-10.5</u>	--	<u>-23.5</u>	--	<u>-24.7</u>	--	<u>-17.3</u>	--	<u>-13.3</u>	--	<u>-3.2</u>	--	<u>-8.7</u>	<i>Feb-10</i>
<i>Over/Under</i>			-0.4		-1.1		-1.3		0.2		1.2		--		1.0	
Total Multi-Asset Class Strategies	1,097,519,198	3.3	0.6	80	-4.9	62	-1.4	33	7.1	4	7.7	1	6.9	2	7.1	Jan-04
<i>Multi-Asset Class Strategies Custom Benchmark</i>			<u>0.0</u>	83	<u>-1.0</u>	14	<u>0.3</u>	9	<u>7.6</u>	2	<u>7.4</u>	2	<u>5.5</u>	29	<u>6.0</u>	<i>Jan-04</i>
<i>Over/Under</i>			0.6		-3.9		-1.7		-0.5		0.3		1.4		1.1	
<i>eA Global TAA Net Median</i>			2.3		-3.7		-3.0		3.4		3.9		5.0		6.4	<i>Jan-04</i>
Operating Cash (Assetized)	909,056,579	2.7	-1.8	--	-6.0	--	--	--	--	--	--	--	--	--	-1.1	Feb-15
<i>ASRS Cash Assetization Custom Benchmark</i>			<u>-2.6</u>	--	<u>-10.5</u>	--	<u>-8.7</u>	--	--	--	--	--	--	--	<u>-7.7</u>	<i>Feb-15</i>
<i>Over/Under</i>			0.8		4.5		--		--		--		--		6.6	

¹Performance of ASRS Total Domestic and International Equity includes the performance of the ASRS Domestic and 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, ranks and medians are based on net of fee performance data. Rankings are from highest (1) to lowest (100) in the eVestment Universe.

Universe shown for Total Public Markets Fixed Income includes all U.S. fixed income strategies and does not accurately represent the exposures of the ASRS Public Markets Fixed Income allocation, which has included allocations ranging from 10% - 25% to emerging markets debt historically.

Composition of Interim SAA Policy and ASRS Custom Asset Class Benchmarks can be found in the appendix.

Arizona State Retirement System

Asset Class Performance Summary - Private Markets

	Market Value (\$)	% of Portfolio	3 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	Inception (%)	Since				
Total Fund	33,620,666,155	100.0	2.7	--	1.3	--	8.3	--	7.8	--	9.7	Jul-75
<i>Interim SAA Policy</i>			<u>1.6</u>	--	<u>-0.4</u>	--	<u>6.7</u>	--	<u>6.9</u>	--	<u>9.4</u>	<i>Jul-75</i>
Over/Under			1.1		1.7		1.6		0.9		0.3	
<i>Actual Benchmark</i>			1.8	--	0.0	--	7.4	--	7.2	--	--	<i>Jul-75</i>
Total Private Equity	2,612,677,353	7.8	-0.7	5.4	12.6	13.3	11.4	Oct-07				
<i>Russell 2000 1 QTR Lagged</i>			<u>-12.3</u>		<u>-0.8</u>		<u>8.6</u>		<u>9.4</u>		<u>9.5</u>	<i>Oct-07</i>
Over/Under			11.6		6.2		4.0		3.9		1.9	
Total Opportunistic Equity¹	482,107,520	1.4	0.3	12.0	23.2	--	23.9	Apr-11				
Total Private Debt	1,994,407,118	5.9	1.8	8.7	11.3	--	11.4	Jul-12				
<i>S&P/LSTA Leveraged Loan Index + 250 bps 1 QTR Lagged</i>			<u>-0.8</u>		<u>3.3</u>		<u>4.7</u>		<u>--</u>		<u>4.9</u>	<i>Jul-12</i>
Over/Under			2.6		5.4		6.6		--		6.5	
Total Opportunistic Debt¹	1,117,410,462	3.3	-2.5	-0.1	6.5	7.2	10.3	Jan-08				
Total Real Estate	2,706,475,430	8.1	3.6	14.8	14.0	13.9	7.5	Oct-05				
<i>NCREIF ODCE 1 QTR Lagged (net)</i>			<u>3.4</u>		<u>13.9</u>		<u>12.4</u>		<u>12.9</u>		<u>6.8</u>	<i>Oct-05</i>
Over/Under			0.2		0.9		1.6		1.0		0.7	
Total Farmland and Timber	183,239,540	0.5	0.2	3.6	--	--	2.8	Jul-13				
<i>CPI ex-Food and Energy + 350 bps 1 QTR Lagged</i>			<u>1.3</u>		<u>5.5</u>		<u>--</u>		<u>--</u>		<u>5.5</u>	<i>Jul-13</i>
Over/Under			-1.1		-1.9		--		--		-2.7	
Total Infrastructure	314,726,752	0.9	2.1	--	--	--	4.9	Dec-14				
<i>CPI ex-Food and Energy + 350 bps 1 QTR Lagged</i>			<u>1.3</u>		<u>--</u>		<u>--</u>		<u>--</u>		<u>5.4</u>	<i>Dec-14</i>
Over/Under			0.8		--		--		--		-0.5	

¹Net absolute rate of return expectations range from 10-14% per annum.

Note: Performance in private markets asset classes is based on net of fee dollar-weighted (IRR) performance data.

Due to the drawdown nature of private markets portfolios in which the investment managers call capital over time, dollar-weighted performance, or internal rate of return, is a more appropriate measure of ASRS private markets portfolios.

Performance data for Total Private Equity, Total Opportunistic Equity, Total Private Debt, Total Opportunistic Debt, Total Real Estate, Total Farmland and Timber, and Total Infrastructure and corresponding benchmarks is lagged by one quarter. Performance data and market values provided by State Street.

Prior to 3Q 2012, the performance of the Total Private Debt and Total Opportunistic Debt asset classes was reported in aggregate. Effective 6/30/2012, the Fund's allocations to Private Debt and Opportunistic Debt were separated and will be reported separately going forward.

Composition of Interim SAA Policy can be found in the appendix.

Arizona State Retirement System

Public Market Asset Class Analysis

3 Years Ending December 31, 2015

	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Tracking Error	Rank	Info Ratio	Rank	Anlzd AJ	Rank	Beta	Sharpe Ratio
Total Fund	100.0%	8.3%	--	6.6%	--	1.2%	--	1.3	--	1.7%	--	1.0	1.2
Interim SAA Policy	--	6.7%	--	6.7%	--	--	--	--	--	--	--	--	1.0
Total Domestic and International Equity	49.6%	9.8%	--	10.6%	--	0.6%	--	0.4	--	0.4%	--	1.0	0.9
ASRS Custom Total Equity Benchmark	--	9.6%	--	10.8%	--	--	--	--	--	--	--	--	0.9
Total Domestic Equity	25.8%	14.7%	34	10.7%	19	0.5%	1	-0.3	--	0.0%	34	1.0	1.4
ASRS Custom Domestic Equity Benchmark	--	14.8%	33	10.8%	22	--	--	--	--	--	34	--	1.4
Total International Equity	22.1%	2.7%	76	11.9%	57	0.7%	1	-0.1	--	0.0%	76	1.0	0.2
ASRS Custom Int'l Equity Benchmark	--	2.8%	76	12.2%	69	--	--	--	--	--	76	--	0.2
Total Public Markets Fixed Income	14.3%	0.7%	82	3.8%	73	0.7%	1	1.0	17	0.7%	81	1.0	0.2
ASRS Custom Public Markets Fixed Income Benchmark	--	0.0%	97	3.7%	72	--	--	--	--	--	96	--	0.0
Total Inflation-Linked Assets	0.6%	-17.1%	--	13.1%	--	2.3%	--	0.1	--	0.4%	--	1.0	-1.3
ASRS Custom Inflation-Linked Benchmark	--	-17.3%	--	12.7%	--	--	--	--	--	--	--	--	-1.4
Total Multi-Asset Class Strategies	3.3%	7.1%	4	8.1%	62	3.9%	2	-0.2	--	-2.0%	28	1.2	0.9
Multi-Asset Class Strategies Custom Benchmark	--	7.6%	2	6.0%	24	--	--	--	--	--	16	--	1.3

Note: Performance is reported net of fees.

Underlying composites do not add up to 100% because the chart excludes private market composites.

Ranks for statistics shown above are based on the respective universe against which the portfolio is ranked on the asset class performance summary that precedes this section of the analysis.

Rankings are from highest (1) to lowest (100) in the eVestment Universe.

Composition of Interim SAA Policy and ASRS Custom Benchmarks can be found in the appendix.

Arizona State Retirement System

Public Market Asset Class Analysis

5 Years Ending December 31, 2015

	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Tracking Error	Rank	Info Ratio	Rank	Anlzd AJ	Rank	Beta	Sharpe Ratio
Total Fund	100.0%	7.8%	--	7.9%	--	1.1%	--	0.8	--	1.1%	--	1.0	1.0
Interim SAA Policy	--	6.9%	--	8.0%	--	--	--	--	--	--	--	--	0.9
Total Domestic and International Equity	49.6%	8.4%	--	12.5%	--	0.6%	--	-0.1	--	0.1%	--	1.0	0.7
ASRS Custom Total Equity Benchmark	--	8.4%	--	12.7%	--	--	--	--	--	--	--	--	0.7
Total Domestic Equity	25.8%	12.1%	32	12.2%	25	0.5%	1	-0.4	--	-0.2%	31	1.0	1.0
ASRS Custom Domestic Equity Benchmark	--	12.3%	28	12.2%	25	--	--	--	--	--	28	--	1.0
Total International Equity	22.1%	2.1%	75	14.4%	36	0.8%	1	-0.1	--	0.0%	75	1.0	0.1
ASRS Custom Int'l Equity Benchmark	--	2.2%	75	14.9%	59	--	--	--	--	--	75	--	0.1
Total Public Markets Fixed Income	14.3%	3.1%	60	3.3%	65	0.6%	1	1.2	6	0.6%	89	1.0	0.9
ASRS Custom Public Markets Fixed Income Benchmark	--	2.5%	73	3.2%	63	--	--	--	--	--	97	--	0.8
Total Inflation-Linked Assets	0.6%	-12.1%	--	14.5%	--	2.4%	--	0.5	--	1.1%	--	1.0	-0.8
ASRS Custom Inflation-Linked Benchmark	--	-13.3%	--	14.5%	--	--	--	--	--	--	--	--	-0.9
Total Multi-Asset Class Strategies	3.3%	7.7%	1	8.8%	64	3.2%	1	0.1	1	-0.1%	26	1.0	0.9
Multi-Asset Class Strategies Custom Benchmark	--	7.4%	2	7.8%	41	--	--	--	--	--	25	--	0.9

Note: Performance is reported net of fees.

Underlying composites do not add up to 100% because the chart excludes private market composites.

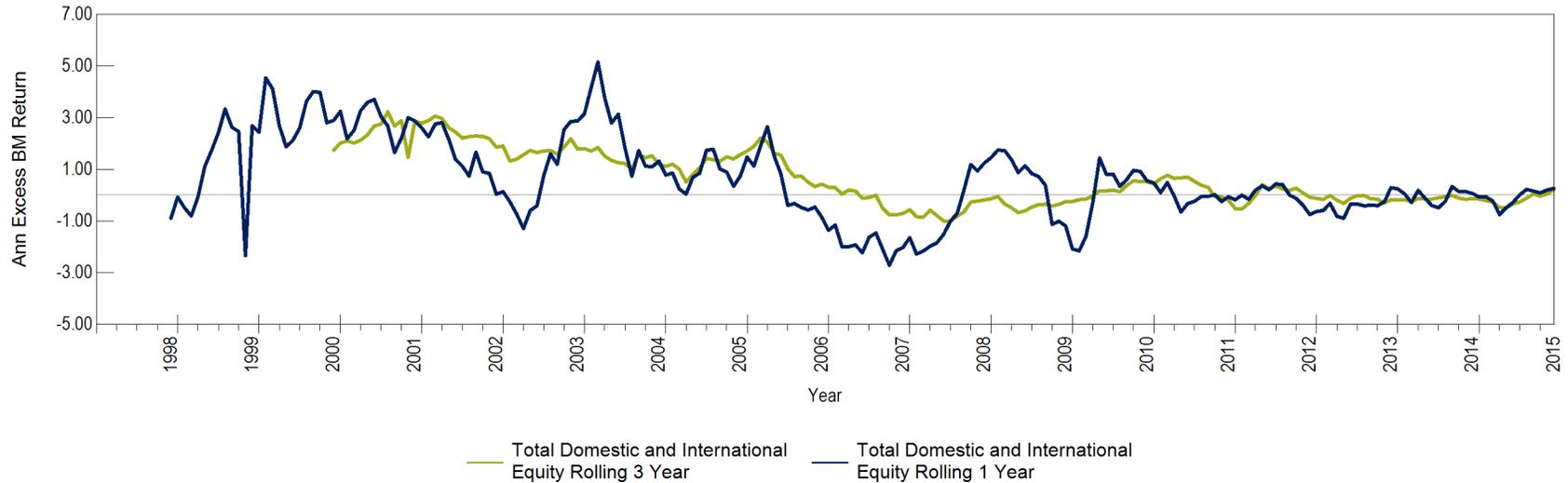
Ranks for statistics shown above are based on the respective universe against which the portfolio is ranked on the asset class performance summary that precedes this section of the analysis.

Rankings are from highest (1) to lowest (100) in the eVestment Universe.

Composition of Interim SAA Policy and ASRS Custom Benchmarks can be found in the appendix.

Asset Class Analysis - Total Domestic and International Equity

Rolling Annual Excess Benchmark Return

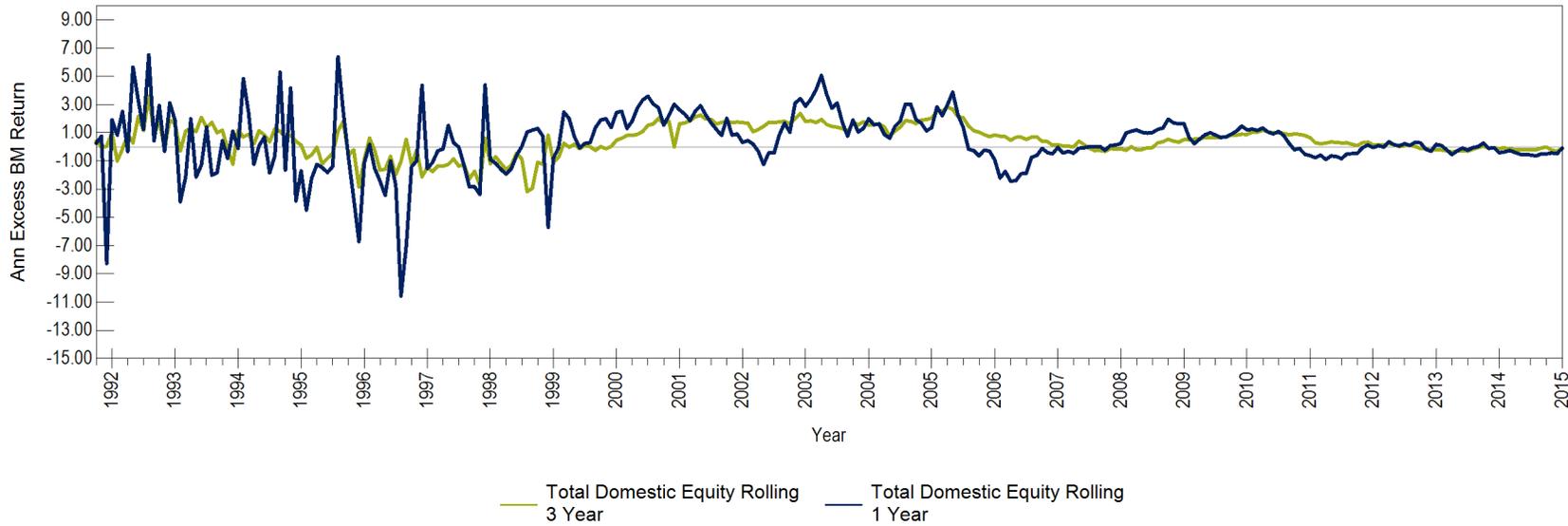


Rolling Information Ratio

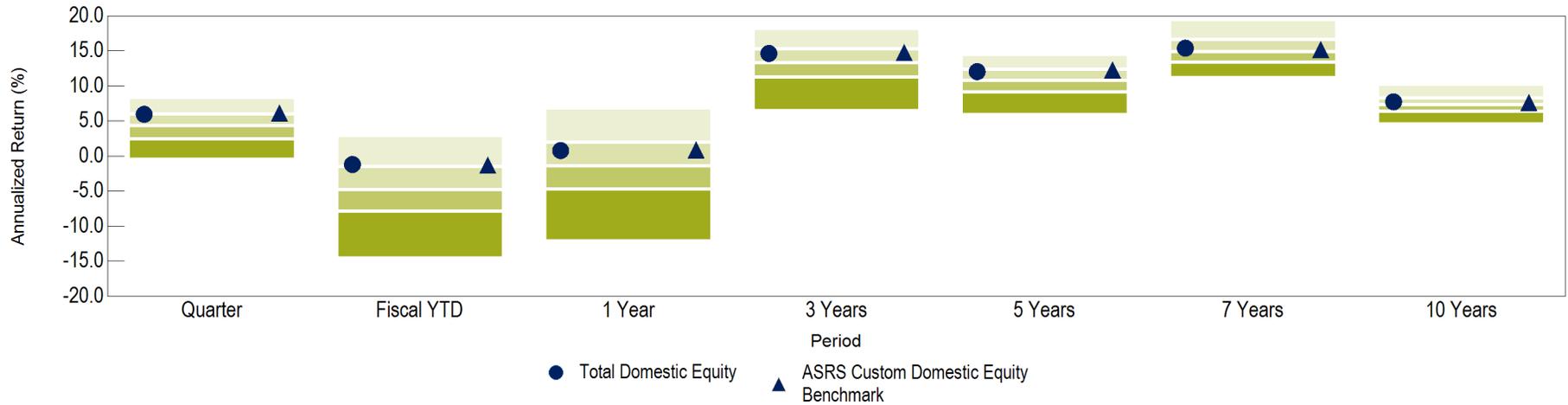


Asset Class Analysis - Total Domestic Equity

Rolling Annual Excess Benchmark Return

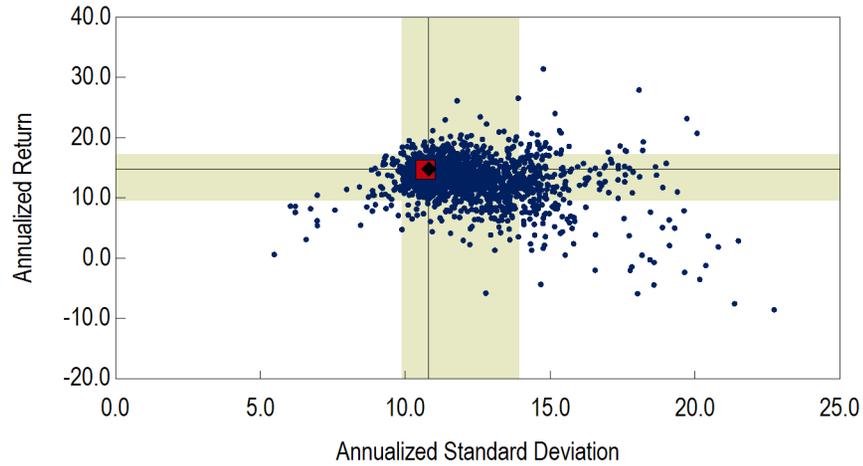


eA All US Equity Net Accounts



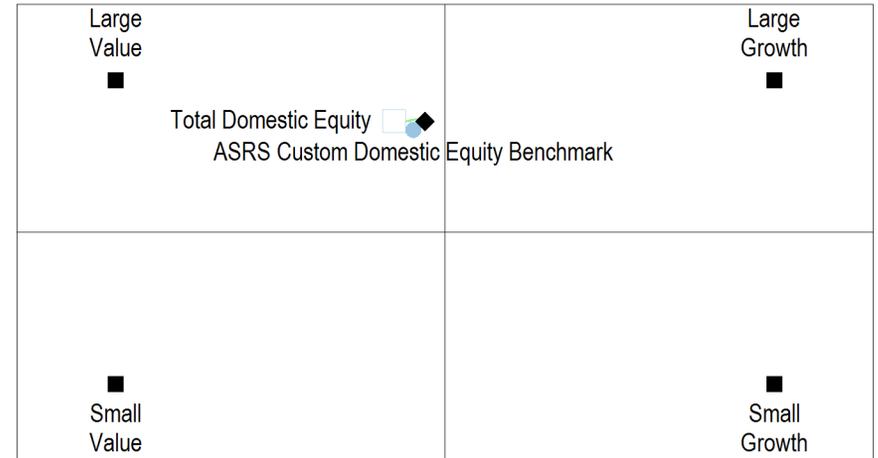
Asset Class Analysis - Total Domestic Equity

3 Year Risk Return

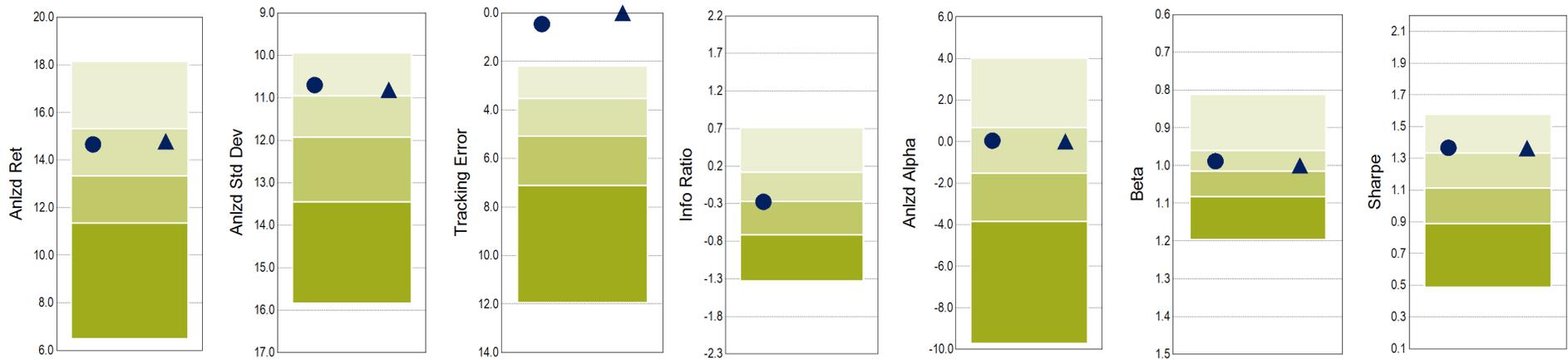


- Total Domestic Equity
- ◆ ASRS Custom Domestic Equity Benchmark
- 68% Confidence Interval
- eA All US Equity Net

3 Year Style Map



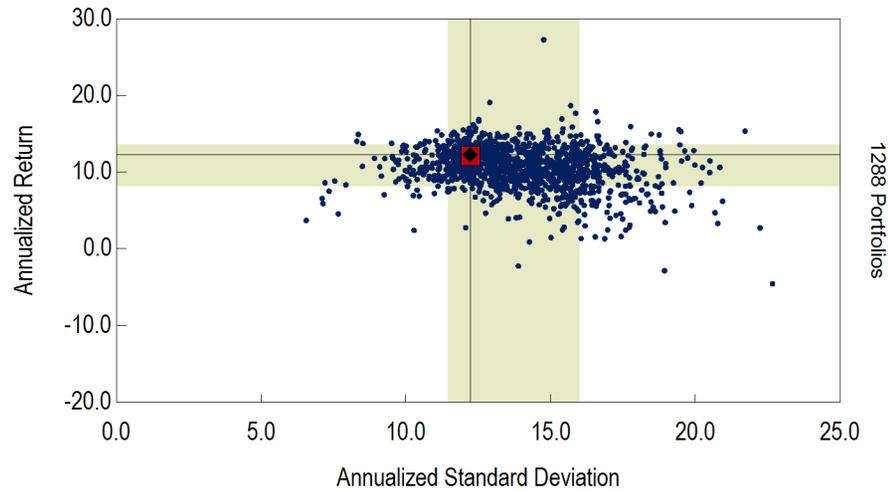
- First Rolling Period
- ◆ Last Rolling Period



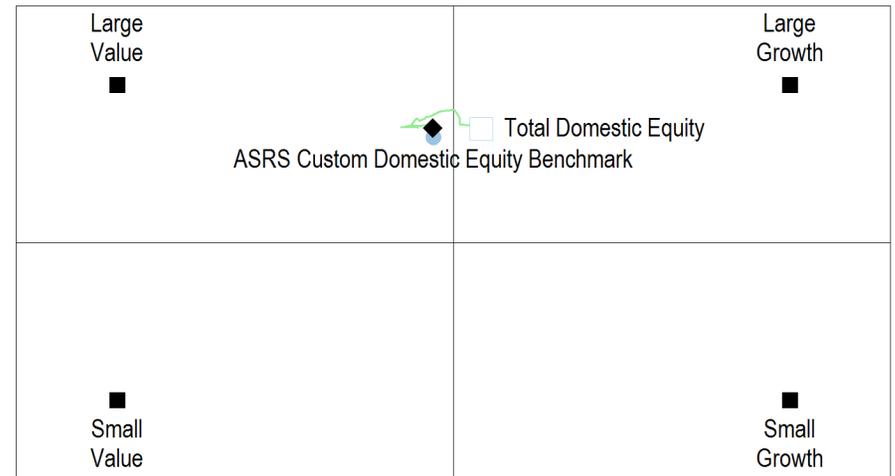
- Total Domestic Equity
- ▲ ASRS Custom Domestic Equity Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

Asset Class Analysis - Total Domestic Equity

5 Year Risk Return

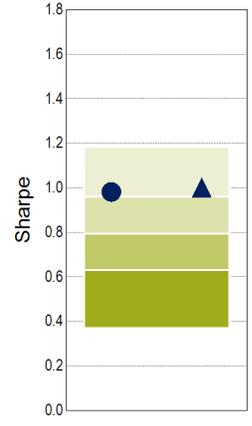
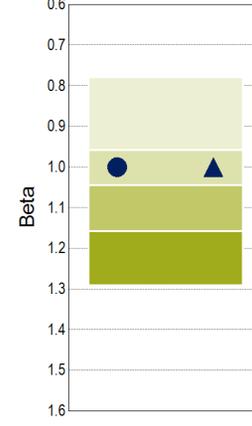
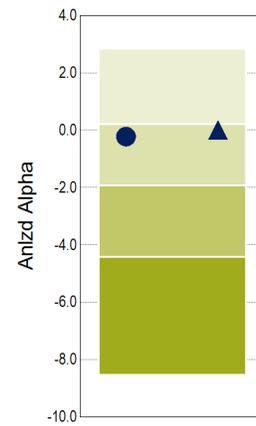
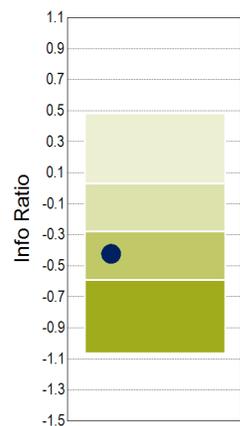
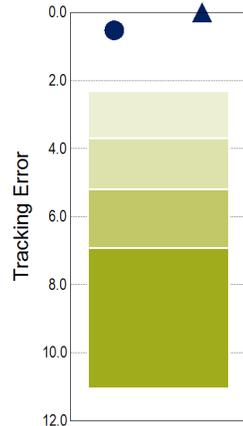
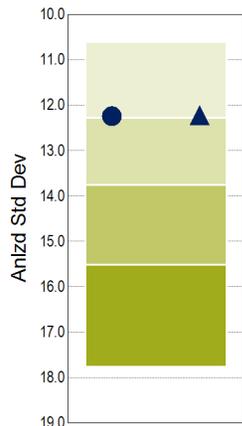
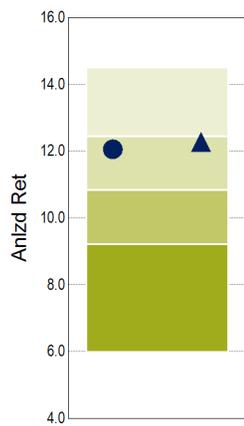


5 Year Style Map



- Total Domestic Equity
- ◆ ASRS Custom Domestic Equity Benchmark
- 68% Confidence Interval
- eA All US Equity Net

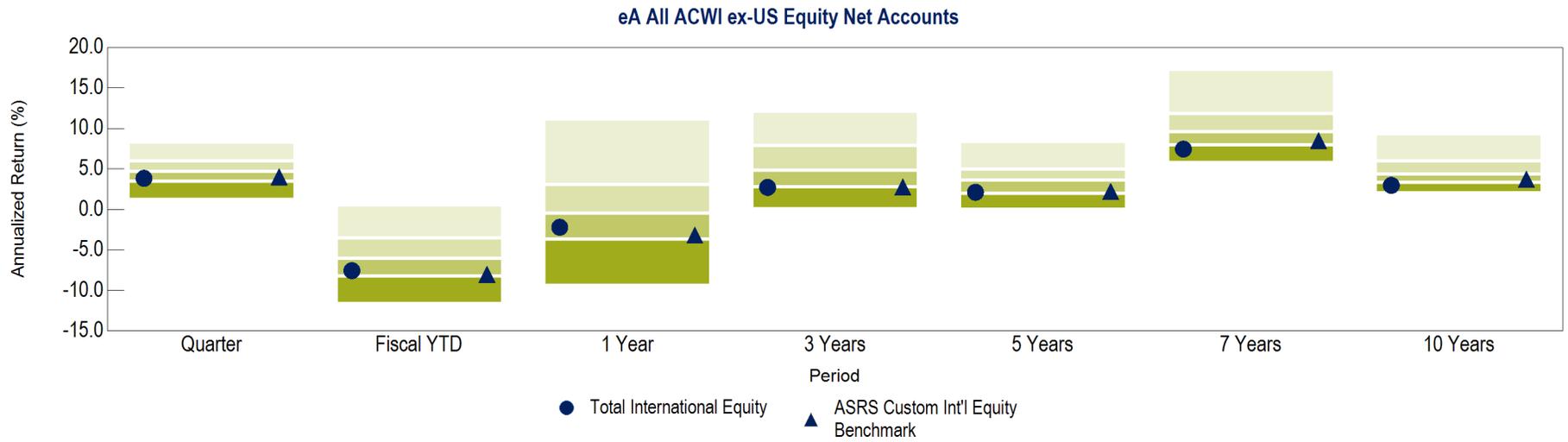
- First Rolling Period
- ◆ Last Rolling Period



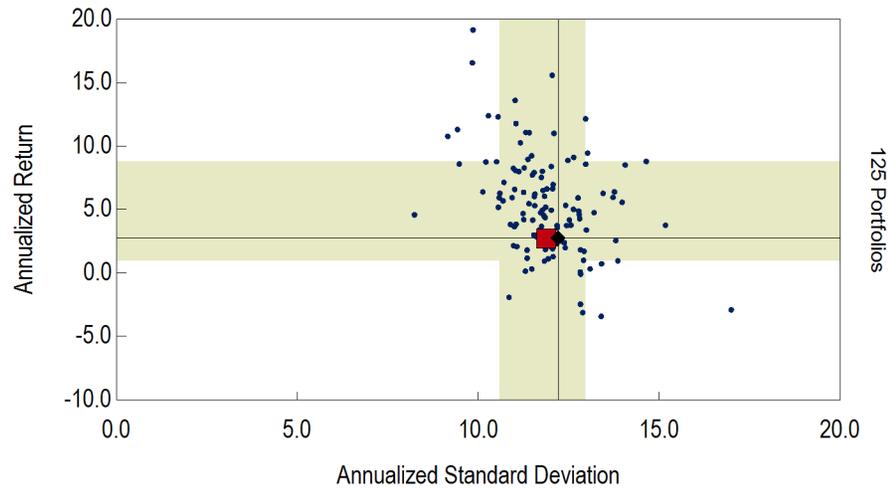
- Total Domestic Equity
- ▲ ASRS Custom Domestic Equity Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

Asset Class Analysis - Total International Equity

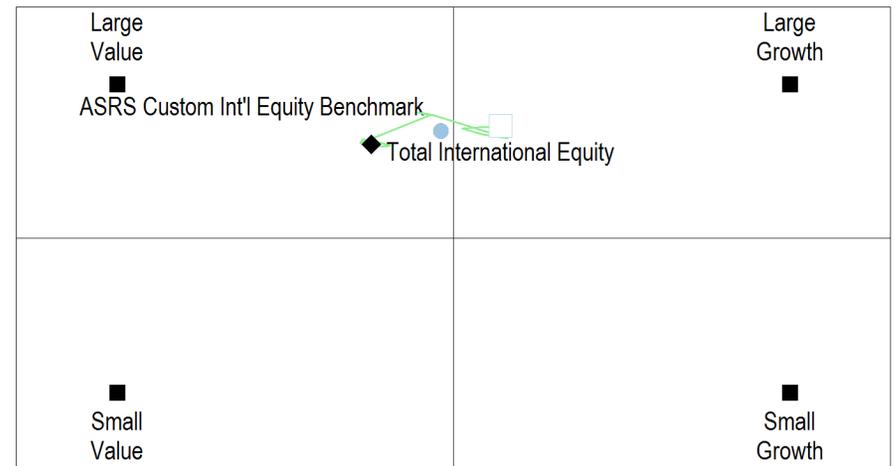
Rolling Annual Excess Benchmark Return



3 Year Risk Return

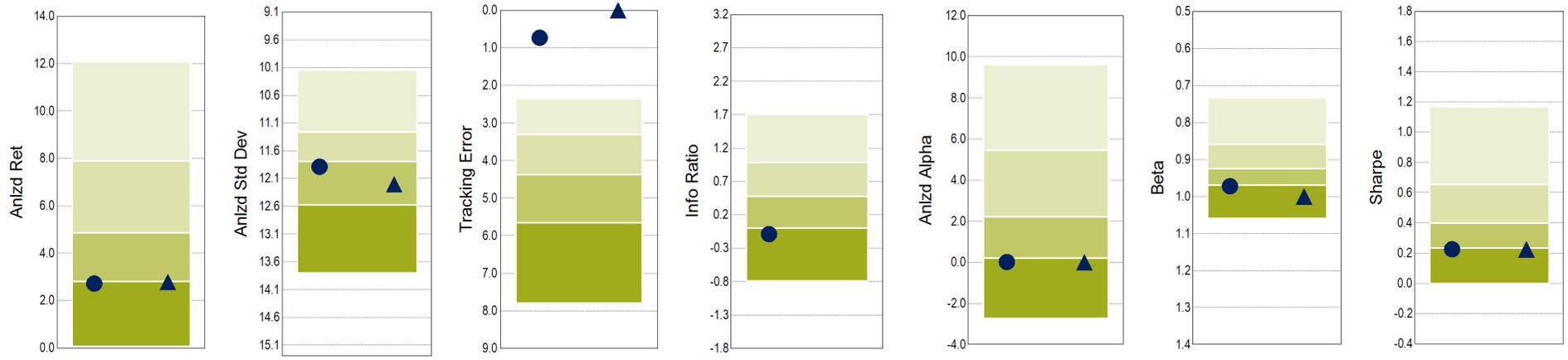


3 Year Style Map



- Total International Equity
- ◆ ASRS Custom Int'l Equity Benchmark
- 68% Confidence Interval
- eA All ACWI ex-US Equity Net

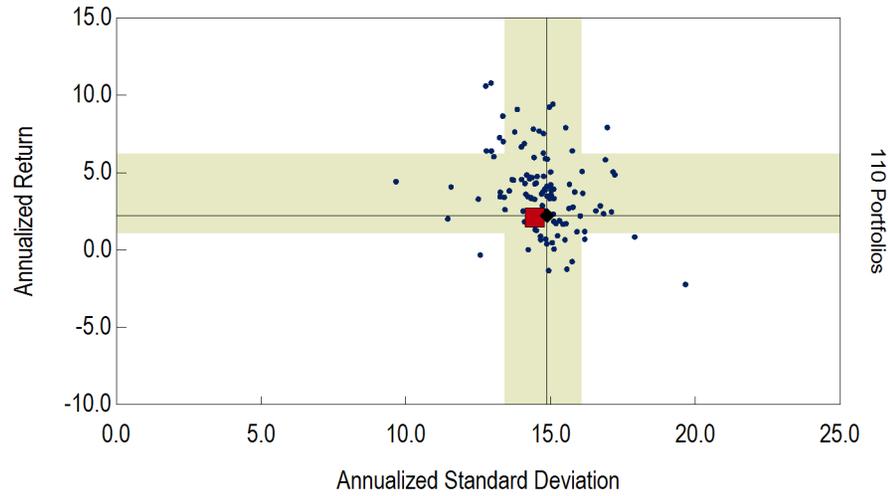
- First Rolling Period
- ◆ Last Rolling Period



- Total International Equity
- ▲ ASRS Custom Int'l Equity Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

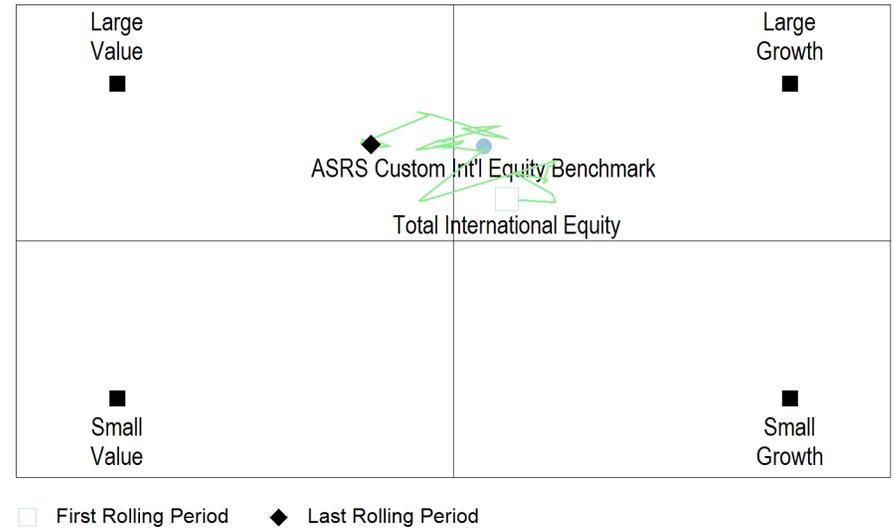
Asset Class Analysis - Total International Equity

5 Year Risk Return

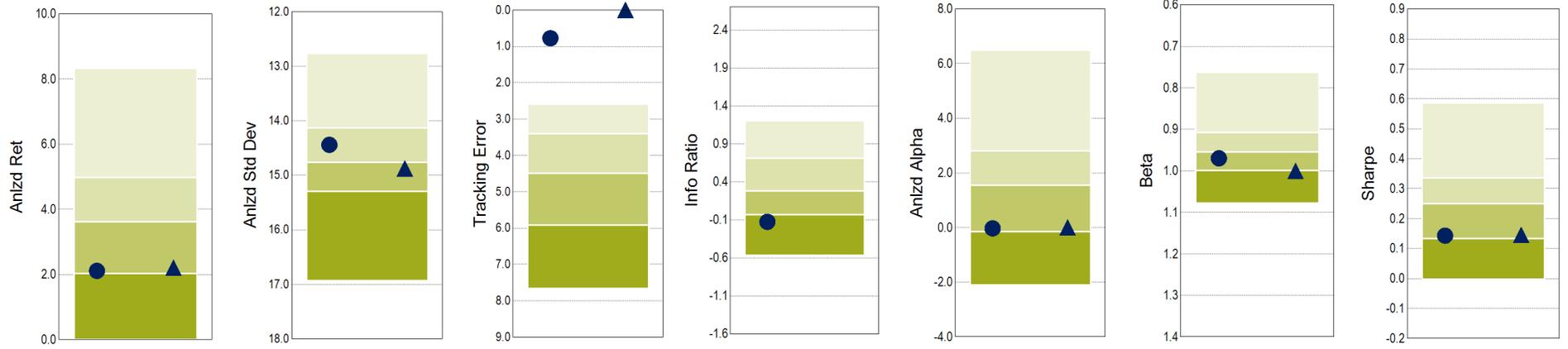


- Total International Equity
- ◆ ASRS Custom Int'l Equity Benchmark
- 68% Confidence Interval
- eA All ACWI ex-US Equity Net

5 Year Style Map

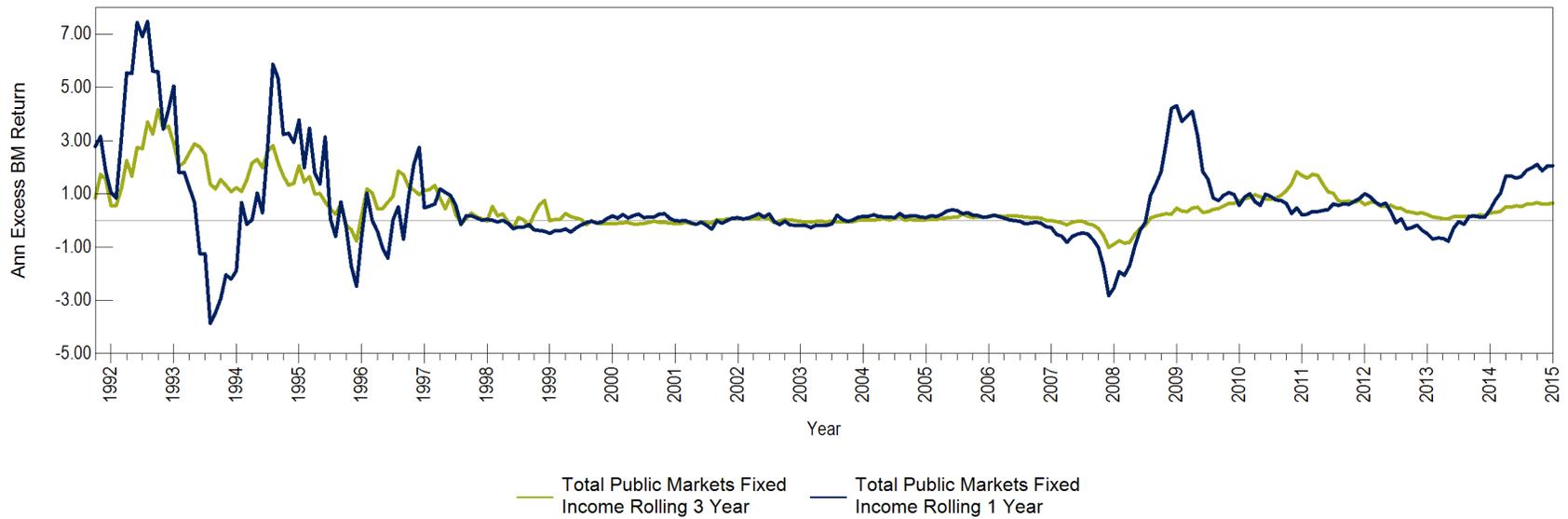


- First Rolling Period
- ◆ Last Rolling Period

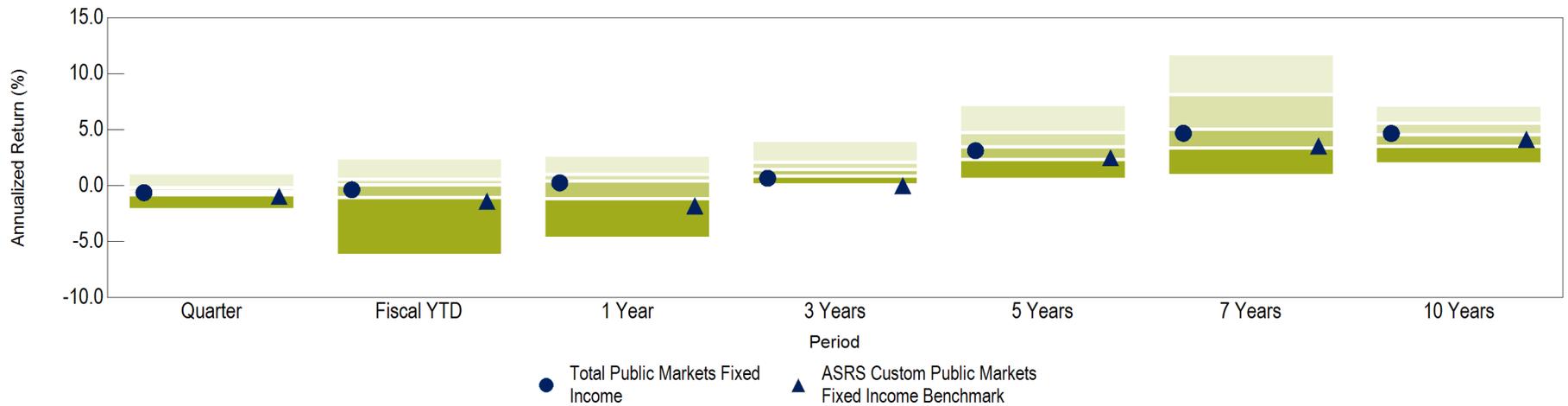


- Total International Equity
- ▲ ASRS Custom Int'l Equity Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

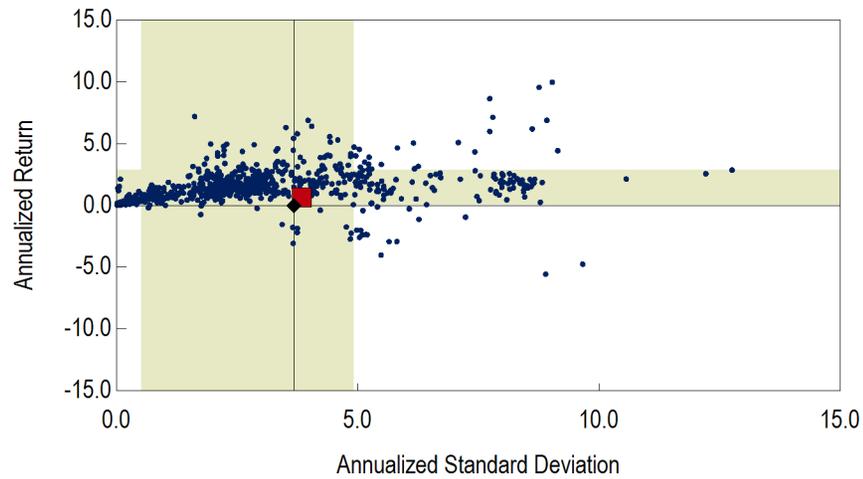
Rolling Annual Excess Benchmark Return



eA All US Fixed Inc Net Accounts

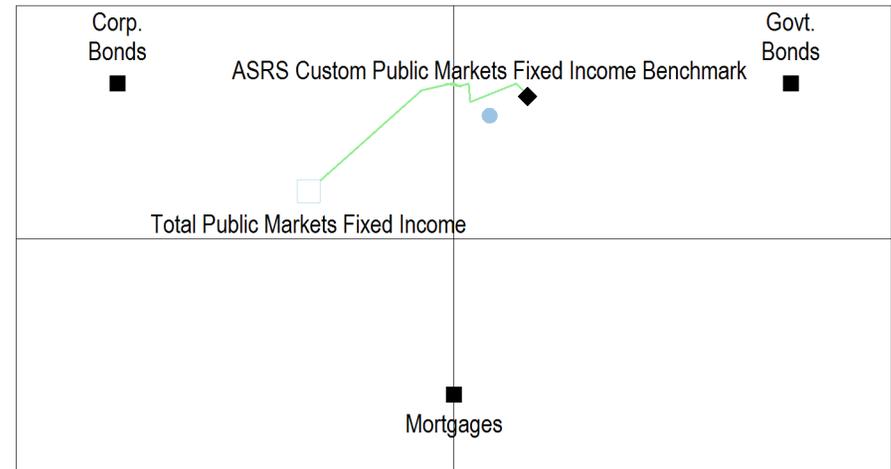


3 Year Risk Return

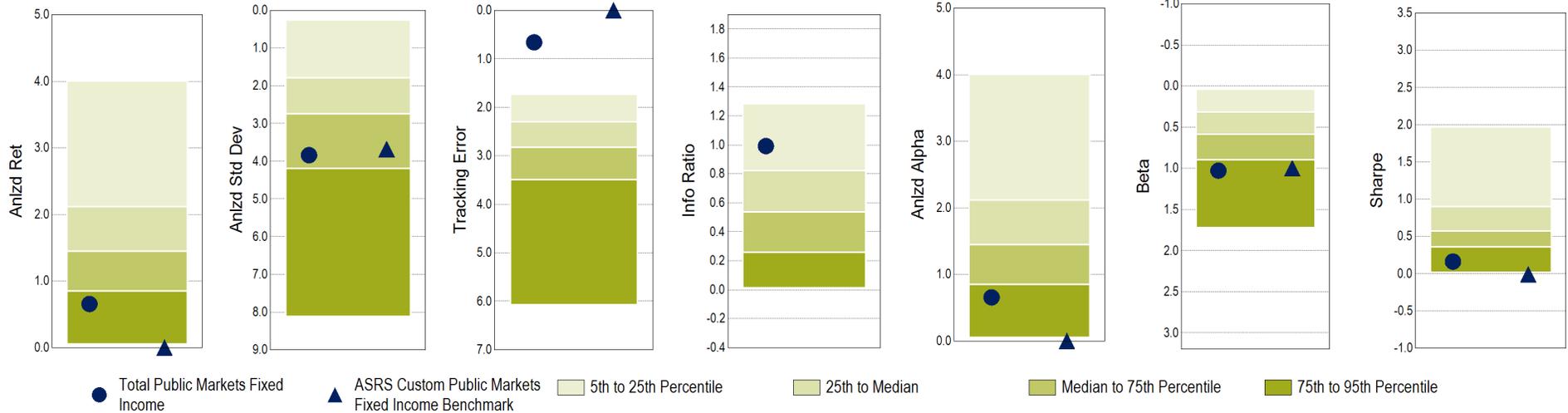


- Total Public Markets Fixed Income
- ◆ ASRS Custom Public Markets Fixed Income Benchmark
- 68% Confidence Interval
- eA All US Fixed Inc Net

3 Year Style Map

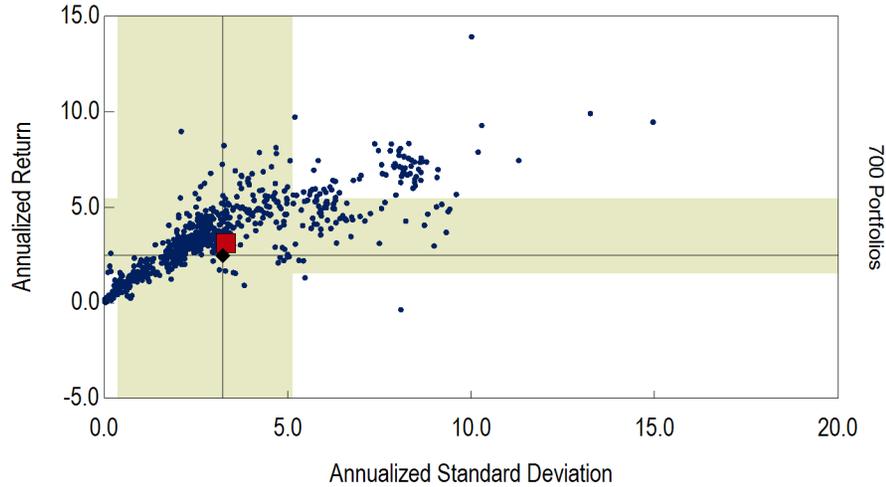


- First Rolling Period
- ◆ Last Rolling Period



- Total Public Markets Fixed Income
- ▲ ASRS Custom Public Markets Fixed Income Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

5 Year Risk Return

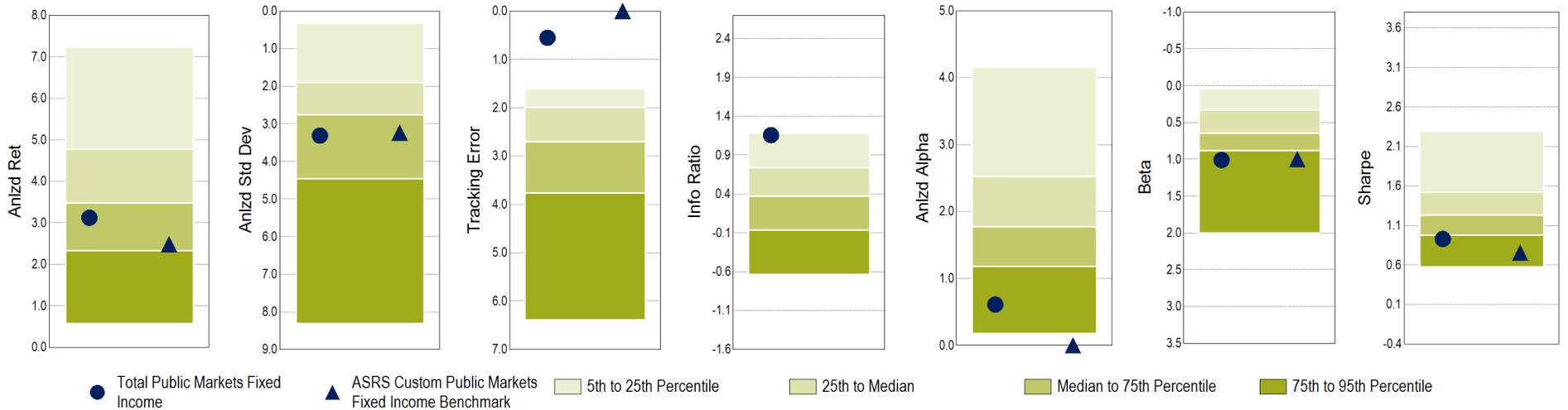


5 Year Style Map



- Total Public Markets Fixed Income
- ◆ ASRS Custom Public Markets Fixed Income Benchmark
- 68% Confidence Interval
- eA All US Fixed Inc Net

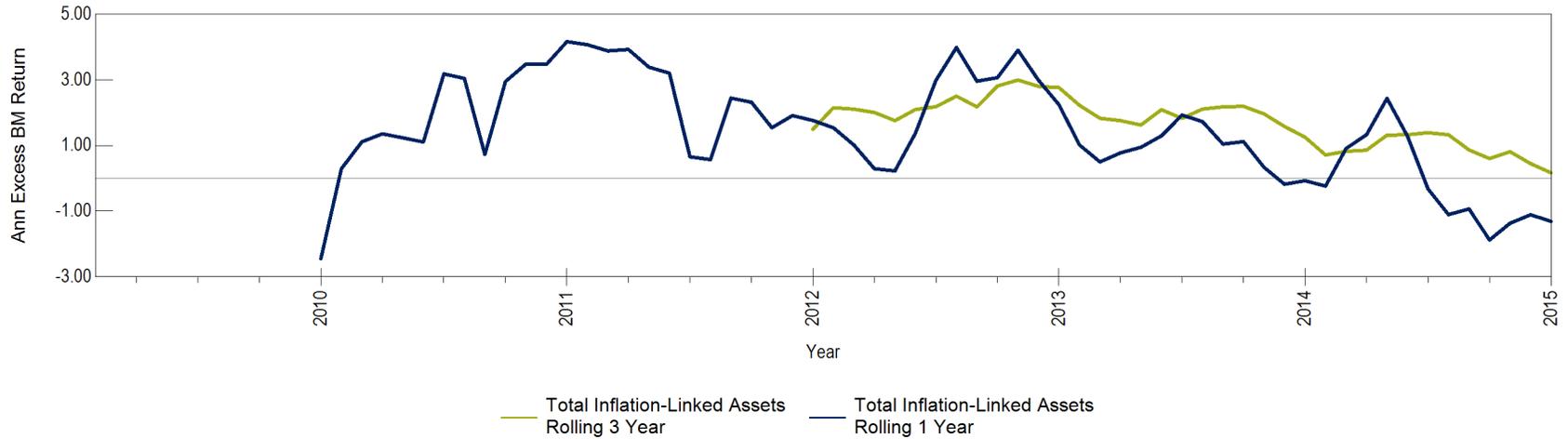
- First Rolling Period
- ◆ Last Rolling Period



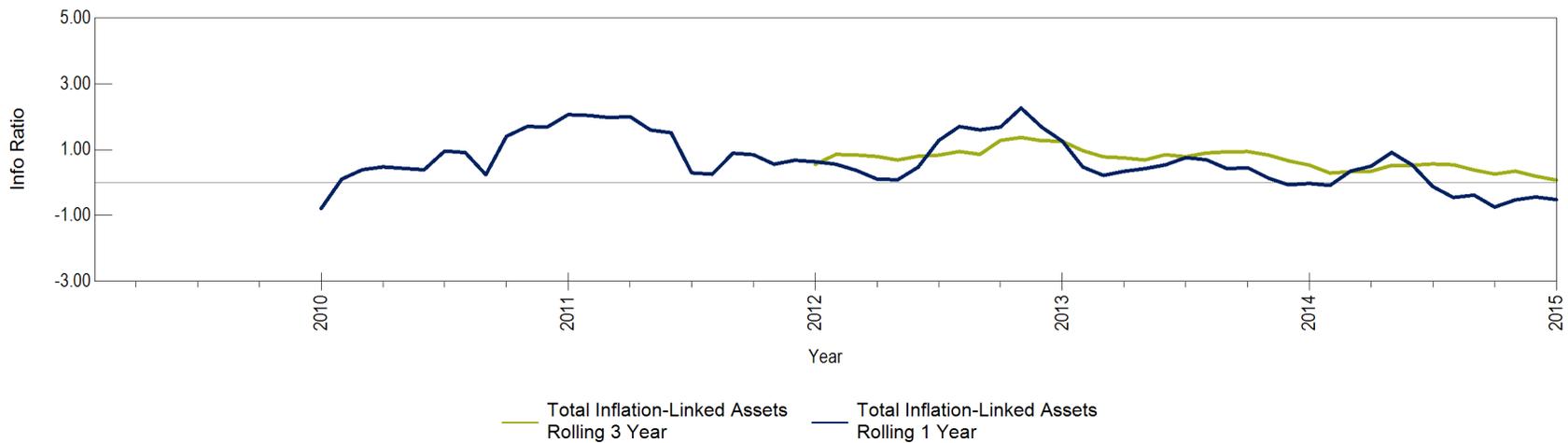
- Total Public Markets Fixed Income
- ▲ ASRS Custom Public Markets Fixed Income Benchmark
- 5th to 25th Percentile
- 25th to Median
- Median to 75th Percentile
- 75th to 95th Percentile

Asset Class Analysis - Total Inflation-Linked Assets

Rolling Annual Excess Benchmark Return

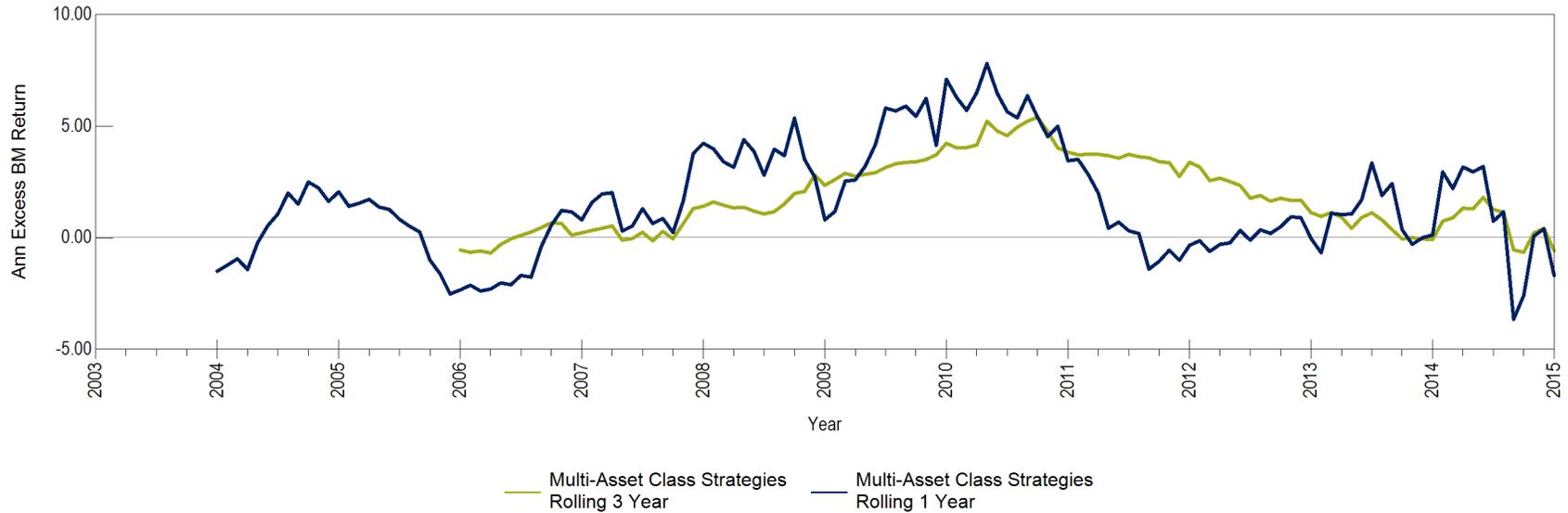


Rolling Information Ratio

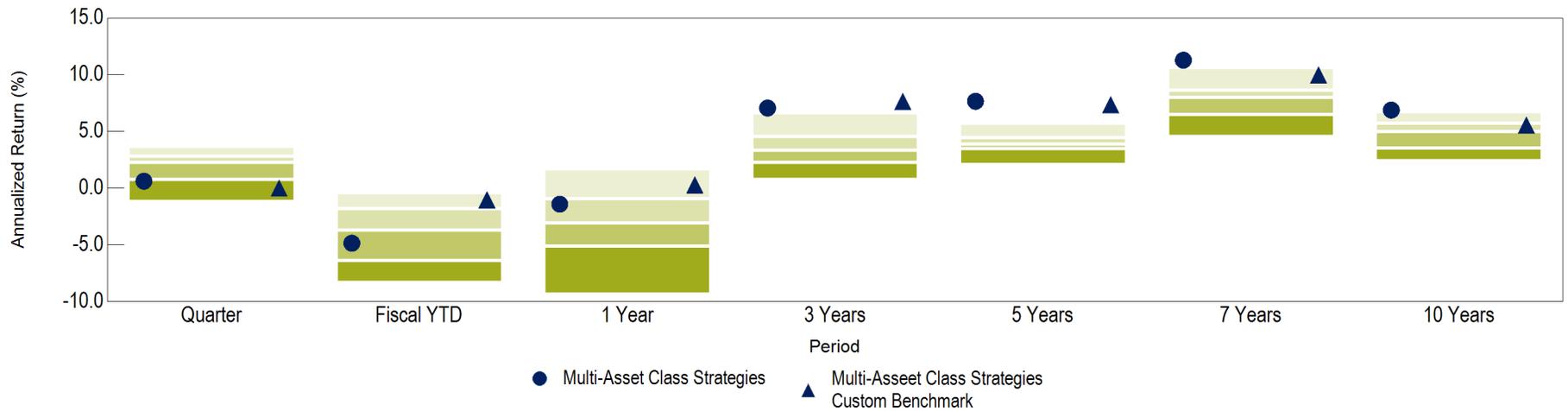


Asset Class Analysis - Multi-Asset Class Strategies

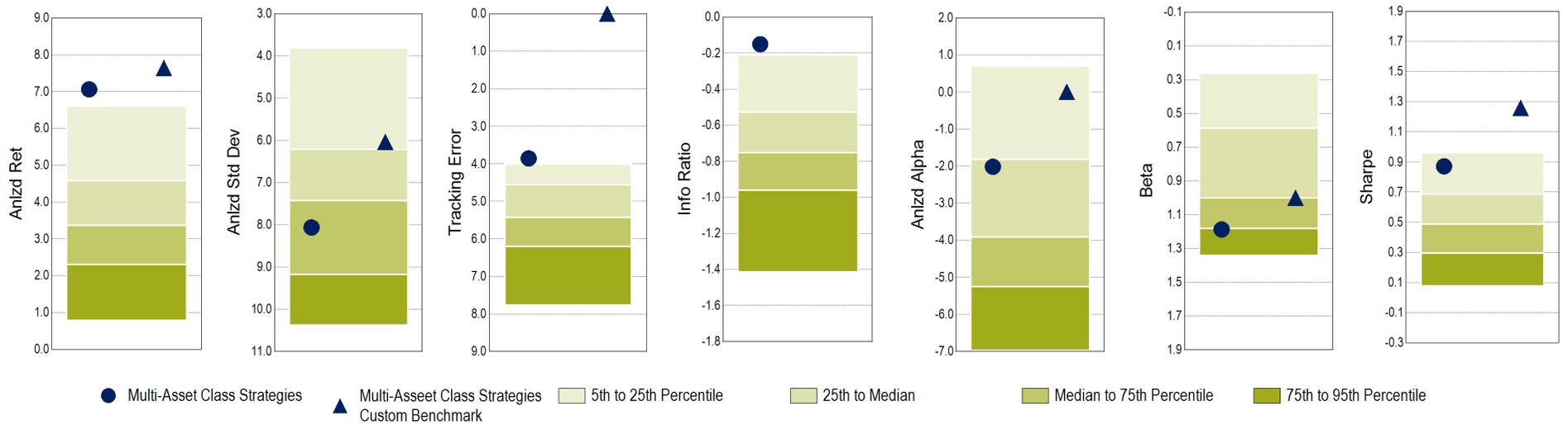
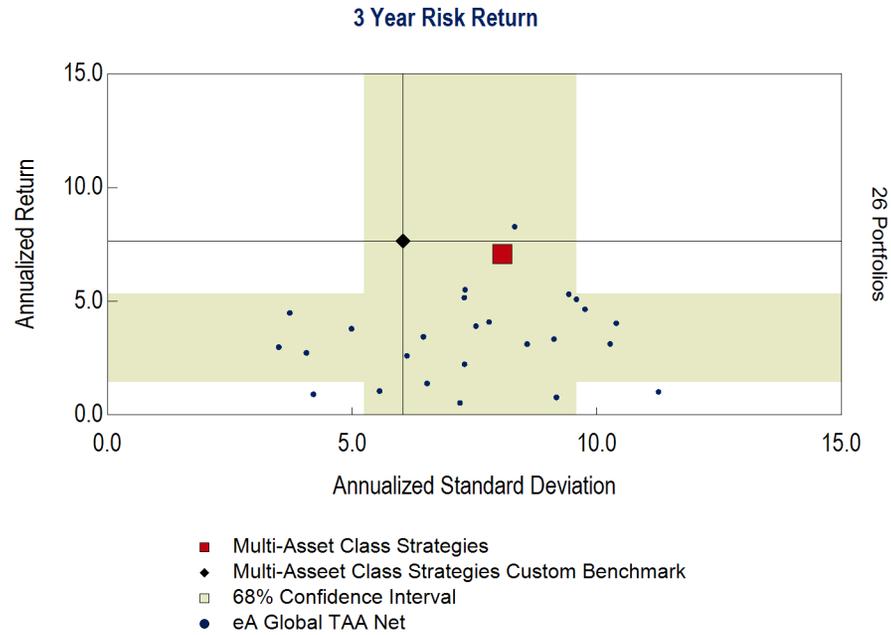
Rolling Annual Excess Benchmark Return



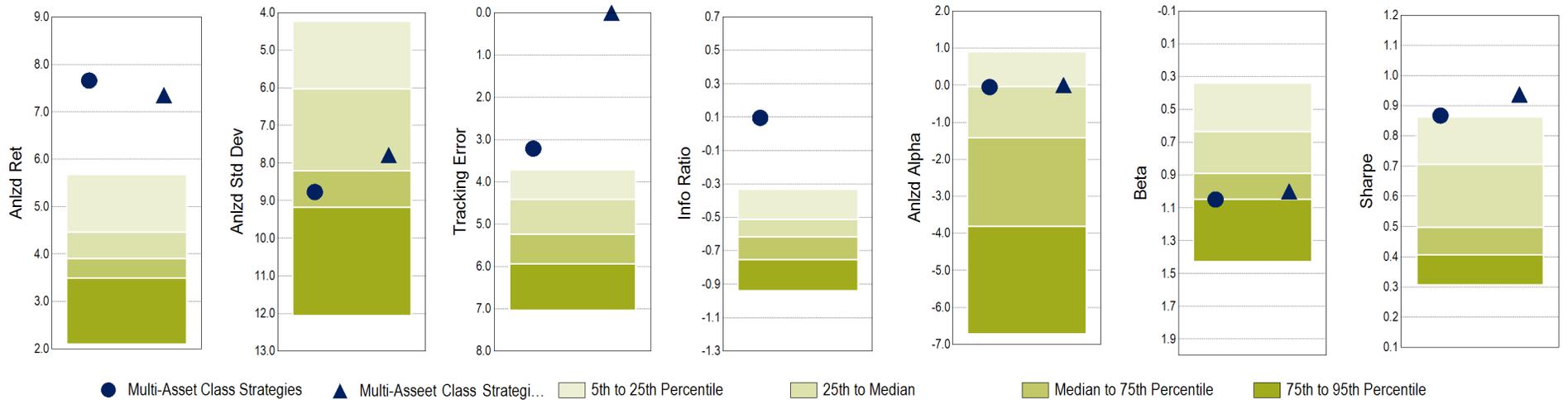
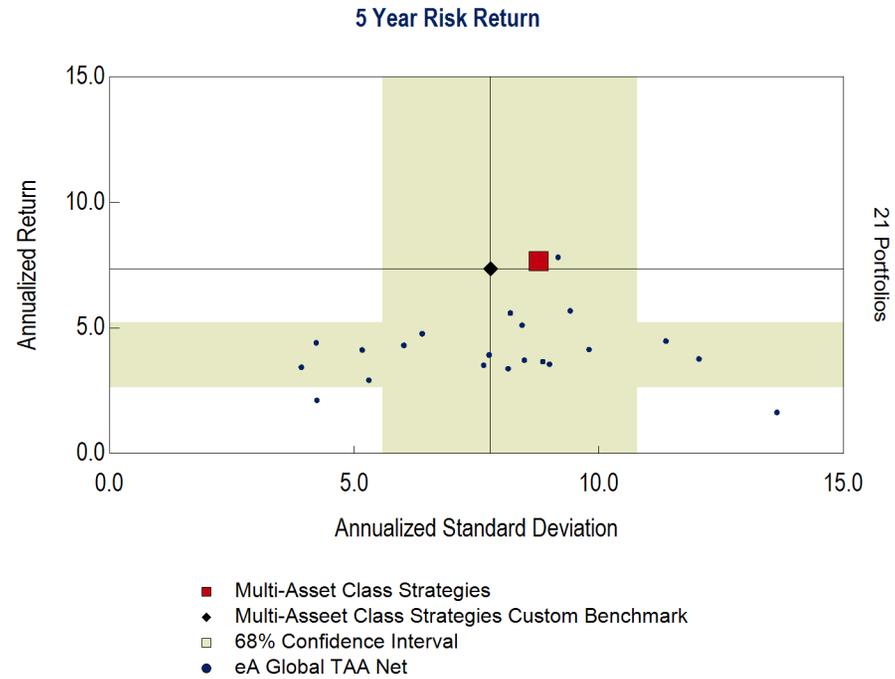
eA Global TAA Net Accounts



Asset Class Analysis - Multi-Asset Class Strategies



Asset Class Analysis - Multi-Asset Class Strategies



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

- **November 18, 2015 - Private Markets Committee**
 - Monthly Status Report, General Discussion and Deal Flow
 - Private Equity Manager Recommendation (\$50 million commitment)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
 - The ASRS has invested with this manager in a prior fund within the private debt program
 - Private Equity Manager Recommendation (\$30 million commitment)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
 - The ASRS has invested with this manager in a prior fund within the private equity program
 - 2016 Private Equity Pacing Model and Implementation Plan
 - Anticipate \$700 million of new private equity commitments in 2016
 - Committee approved the recommended commitment pace for 2016, noting that the actual amount may differ as determined by the committee as market conditions evolve throughout the year

- **November 24, 2015 - Ad-hoc Private Markets Committee**

- Private Equity Manager Recommendation – Additional Commitment (\$12.5 million; \$25 million original commitment)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
 - The Committee approved the original \$25 million commitment at the August 20, 2014 PRIVMC meeting
 - The ASRS has invested with this manager in multiple prior funds across the ASRS private markets programs
- Variance Request
 - RCLCO, in conjunction with the ASRS Private Markets Team, recommended the ASRS approve a variance request from an existing real estate manager that would allow the manager to invest in a property that does not meet the current investment criteria for the portfolio
 - The variance request is required as the investment mandate currently states that at least 60% of a project's value will be derived from retail occupancy and the manager is contemplating an investment that would allow for a higher percentage of the project to be allocated to office occupancy
 - Committee approved the recommendation

- **December 18, 2015 - Private Markets Committee**

- Monthly Status Report, General Discussion and Deal Flow
- Private Debt Manager Recommendation (\$500 million commitment)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Debt 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
 - The ASRS has invested with this manager in multiple prior funds within the private debt program

• **December 18, 2015 - Private Markets Committee (cont.)**

- Private Equity Manager Recommendation – Additional Commitment (\$15 million; \$30 million original commitment)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
 - The Committee approved the original \$25 million commitment at the March 20, 2015 PRIVMC meeting
- Private Equity Manager Recommendation – Additional Commitment (up to \$10 million; \$30 million original commitment)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
 - The Committee approved the original \$30 million commitment at the November 18, 2015 PRIVMC meeting
 - The ASRS Private Markets Team had originally requested a \$50 million commitment, but the manager was only able to grant \$30 million due to the fund's oversubscription; a larger allocation is now available
 - The ASRS has invested with this manager in a prior fund within the private equity program
- Real Estate Asset Disposition Recommendation
 - The ASRS Private Markets Team recommended the ASRS consider the disposition of a property that no longer meets the ASRS standards for continued ownership due to its size and the condition of the property. negotiation and implementation of the transaction
 - Committee approved the recommendation, delegating to staff the negotiation and implementation of the transaction
- 2016 Real Estate Pacing Model and Implementation Plan
 - Anticipate net \$200 - \$400 million of new real estate commitments in 2016
 - Includes potential disposition of existing investments totaling approximately \$300 million
 - Committee approved the recommended commitment pace for 2016, noting that the actual amount may differ as determined by the committee as market conditions evolve throughout the year

- **January 19, 2016 – Private Markets Committee**

- Monthly Status Report, General Discussion and Deal Flow
- Separately Managed Account Portfolio Review
 - RCLCO presented the results of its semi-annual portfolio review of the separately managed real estate accounts
- Private Equity Manager Recommendation (\$100 million)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
 - The ASRS has invested with this manager in multiple prior funds within the private equity program
- Private Equity Manager Recommendation (\$50 million)
 - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 8%)
 - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
 - Committee approved the recommendation
 - The ASRS has invested with this manager in a prior fund within the private equity program

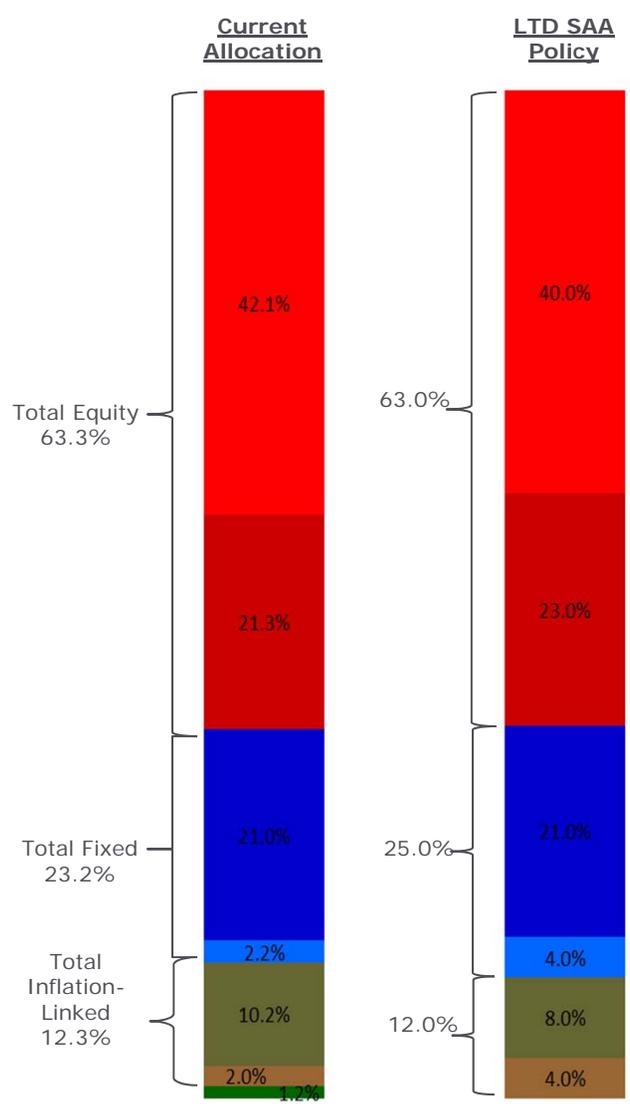
- **The Fund continues to make significant progress moving the portfolio from the Interim SAAP toward the long-term SAAP. New long-term SAAP adopted as of April 1, 2015.**
 - Current Interim SAAP includes proration of 4% Private Debt and 2% Real Estate, which are unfunded.
 - Continued build out of private markets asset classes provides opportunity to take advantage of illiquidity premium to produce expected returns in excess of what we believe can be achieved in the public markets.
- **IMD has already taken significant steps to move the Fund toward implementation of the recently approved SAAP.**
 - The largest single underweight position in the Fund is Private Debt, which was increased from a 3% SAAP target to a 10% SAAP target with an 8% - 12% range (current actual is 7.0%).
 - \$5.1 billion in commitments to private debt strategies equates to approximately 15.2% of Total Fund assets vs. the SAAP target of 10%.
 - \$5.1 billion includes \$500 million investment approved in December 2015 that is expected to close in 1Q 2016.
 - Estimate private debt asset class reaching 10% target by the end of 2016.
 - Estimate private debt asset class reaching 12% cap in 3Q 2017.
 - Multi-Asset Class Strategies (formerly GTAA) has been restructured and moved 'above the line', and now has an explicit 5% target within the SAAP.
- **ASRS Private Markets programs have added significant value at the Total Fund level over the three- and five-year time periods.**
- **Volatility is being realized across markets; Long Treasuries mandate funded in August 2015 to mitigate volatility.**
- **Tactical positioning consistent with IMD House Views.**

Independent Oversight/Compliance: LTD

Note: All of the data shown on the following pages is as of December 31, 2015 and reflects the deduction of investment manager fees, unless otherwise noted.



Long Term Disability Asset Allocation



	<u>Current Mkt Value</u>	<u>Current Allocation</u>	<u>LTD SAA Policy</u>	<u>Difference</u>
U.S. Equity	\$88,863,492	42.1%	40.0%	2.1%
U.S. Large Cap	\$73,864,359	35.0%	34.0%	1.0%
U.S. Small Cap	\$14,999,134	7.1%	6.0%	1.1%
International Equity	\$44,891,551	21.3%	23.0%	-1.7%
Developed Large Cap	\$27,389,729	13.0%	14.0%	-1.0%
Developed Small Cap	\$7,463,993	3.5%	3.0%	0.5%
Emerging Markets	\$10,037,829	4.8%	6.0%	-1.2%
Total Equity	\$133,755,043	63.3%	63.0%	0.3%
U.S. Fixed Income	\$44,356,776	21.0%	21.0%	0.0%
Core	\$27,276,513	12.9%	13.0%	-0.1%
High Yield	\$17,080,263	8.1%	8.0%	0.1%
Emerging Market Debt	\$4,648,166	2.2%	4.0%	-1.8%
Total Fixed Income	\$49,004,942	23.2%	25.0%	-1.8%
Real Estate	\$21,608,530	10.2%	8.0%	2.2%
Commodities	\$4,273,009	2.0%	4.0%	-2.0%
Total Inflation-Linked	\$25,881,539	12.3%	12.0%	0.3%
Cash¹	\$2,506,729	1.2%	0.0%	1.2%
Total	\$211,148,253	100.0%	100.0%	0.0%

¹Cash includes money for the upcoming monthly pension distribution.

Note: Market values include manager held cash.

ASRS LTD rebalanced to the new SAA Policy in December 2012, with an effective date of 1/1/2013.

Long Term Disability Performance Summary

	Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception (July-02)
Long Term Disability	3.7%	-1.6%	7.1%	6.8%	4.9%	6.1%
LTD SAA Policy ¹	3.3%	-2.1%	6.6%	6.6%	5.3%	6.3%
Excess Return	0.4%	0.5%	0.5%	0.2%	-0.4%	-0.2%

¹LTD SAA Policy composition can be found in the appendix.

Market Environment Update and Outlook



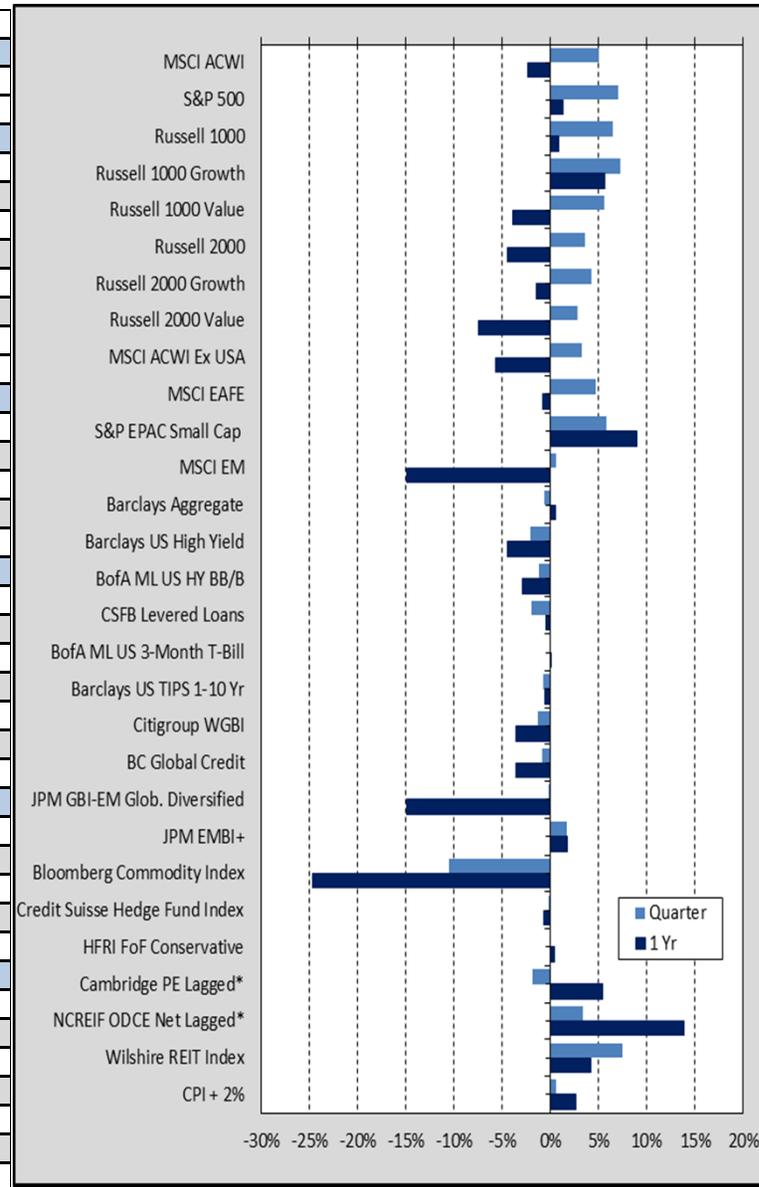
Economic Environment

- **Fourth quarter GDP growth rate (first estimate) printed at a modest 0.7%.**
 - Retail sales (ended November) at +0.9% on a year-over-year growth rate basis. In the same period last year the YoY growth rate was 4.6%.
 - The inventory-to-sales ratio ending November was flat at 1.4 and has remained relatively flat since early 2010.
 - Corporate profits (ended June) as a percent of GDP declined slightly vs first quarter GDP to 9.9% from 10.3% and remain elevated relative to historical levels.
 - The U.S. trade deficit declined slightly in November.
- **The unemployment rate fell to 5.0% in Q4 from 5.6% in Q4 2014; U-6, a broader measure of unemployment, fell to 9.9% during the fourth quarter.**
- **The Case-Shiller Home Price Index (as of 10/31) increased slightly to 175.7 from second quarter levels (170.0) and is at levels higher than that of pre-financial crisis levels of 150.9.**
- **Rolling 12-month seasonally adjusted CPI increased to 0.6% from -0.02% at the end of September; Capacity Utilization decreased to 76.5% in December from 77.9% in September.**
- **Fed Funds rate was raised to 0.50% from 0.25%; The 10-year Treasury Yield (constant maturity) finished Q4 at 2.2% flat from Q3.**
- **The Fed balance sheet remained little changed in Q4 2015, while the European Central Bank balance sheet continues to increase.**
 - ECB continues asset purchases of €60 billion per month.
- **S&P valuations decreased in December remaining above the 10-year and long-term averages**
 - Cyclically adjusted Shiller PE ratio (23.95x) is above the long-term average of 16.4x and above the 10-year average of 22.9x.
- **The U.S. Dollar continues its strength against a basket of major currencies**
 - Currency volatility has seen a sustained uptick since Q1 2015.

Arizona State Retirement System

Market Environment – Q4 2015 Overview

		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
World Equity Benchmarks						
MSCI ACWI	World	5.0%	-2.4%	7.7%	6.1%	4.8%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Domestic Equity Benchmarks						
S&P 500	Large Core	7.0%	1.4%	15.1%	12.6%	7.3%
Russell 1000	Large Core	6.5%	0.9%	15.0%	12.4%	7.4%
Russell 1000 Growth	Large Growth	7.3%	5.7%	16.8%	13.5%	8.5%
Russell 1000 Value	Large Value	5.6%	-3.8%	13.1%	11.3%	6.2%
Russell 2000	Small Core	3.6%	-4.4%	11.7%	9.2%	6.8%
Russell 2000 Growth	Small Growth	4.3%	-1.4%	14.3%	10.7%	8.0%
Russell 2000 Value	Small Value	2.9%	-7.5%	9.1%	7.7%	5.6%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
International Equity Benchmarks						
MSCI ACWI Ex USA	World ex-US	3.2%	-5.7%	1.5%	1.1%	2.9%
MSCI EAFE	Int'l Developed	4.7%	-0.8%	5.0%	3.6%	3.0%
S&P EPAC Small Cap	Small Cap Int'l	5.9%	9.0%	10.7%	6.9%	5.7%
MSCI EM	Emerging Equity	0.7%	-14.9%	-6.8%	-4.8%	3.6%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Domestic Fixed Income Benchmarks						
Barclays Aggregate	Core Bonds	-0.6%	0.5%	1.4%	3.2%	4.5%
Barclays US High Yield	High Yield	-2.1%	-4.5%	1.7%	5.0%	7.0%
BofA ML US HY BB/B	High Yield	-1.1%	-2.9%	2.2%	5.3%	6.5%
CSFB Levered Loans	Bank Loans	-2.0%	-0.4%	2.6%	3.8%	4.1%
BofA ML US 3-Month T-Bill	Cash	0.0%	0.1%	0.1%	0.1%	1.2%
Barclays US TIPS 1-10 Yr	Inflation	-0.7%	-0.5%	-1.8%	1.6%	3.5%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Global Fixed Income Benchmarks						
Citigroup WGBI	World Gov. Bonds	-1.2%	-3.6%	-2.7%	-0.1%	3.4%
BC Global Credit	Global Bonds	-0.8%	-3.5%	-0.3%	2.8%	4.3%
JPM GBI-EM Glob. Diversified	Em. Mkt. Bonds (Local)	-0.0%	-14.9%	-10.0%	-3.5%	4.3%
JPM EMBI+	Em. Mkt. Bonds	1.8%	1.8%	-0.3%	5.0%	6.7%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Alternative Benchmarks						
Bloomberg Commodity Index	Commodity	-10.5%	-24.7%	-17.3%	-13.5%	-6.4%
Credit Suisse Hedge Fund Index	Hedge Fund	-0.1%	-0.7%	4.3%	3.6%	5.0%
HFRI FoF Conservative	Fund of Funds	0.1%	0.4%	3.7%	2.3%	2.0%
Cambridge PE Lagged*	Private Equity	-1.8%	5.4%	13.5%	14.1%	12.1%
NCREIF ODCE Net Lagged*	Real Estate	3.4%	13.9%	12.4%	12.9%	5.7%
Wilshire REIT Index	REIT	7.5%	4.2%	11.8%	12.4%	7.3%
CPI + 2%	Inflation/Real Assets	0.6%	2.7%	3.0%	3.6%	3.9%



* As of 9/30/2015

Global Equity

- **U.S. equities posted solid gains in the fourth quarter as global volatility continued.**
- **Small cap stocks underperformed large cap stocks during the quarter, with the Russell 2000 Index returning 3.6%% and the Russell 1000 Index returning 6.5%.**
- **International equities underperformed U.S. markets during the quarter, returning 3.2%, as measured by the MSCI ACWI ex-U.S. Index.**
 - Developed markets returned 4.7% as measured by the MSCI EAFE Index. The Pacific Region led returns posting a 9.0% gain with New Zealand leading the group up 18.2%. Europe posted modest gains, up 2.5%
 - Emerging markets returned 0.7% as measured by the MSCI Emerging Markets Index in U.S. dollar terms. Indonesia and China led gains returning 20.8% and 13.1% respectively.

Private Equity

- **New private equity commitments totaled \$312 billion in calendar year 2015.**
 - Represents a 14% decline from the \$360 billion raised in 2014, resulting from public equity market volatility and increased economic uncertainties.
- **Buyout and Special Situations fundraising down over 20% from post crisis high in 2014.**
- **Venture capital raised approximately \$43.9 billion in calendar 2015.**
 - VC fundraising as a percent of total new PE funds is in line with historical post-dot com levels at approximately 14%.
- **Energy funds raised \$38.6 billion representing 12% of capital raised in 2015.**
 - Investors are opportunistically approaching the energy market dislocation.
- **Asian private equity commitments slowed to total 8% of total funds raised down from 11% in 2014.**
- **European commitments comprised 23% of all new PE commitments in 2015.**
 - Fifteen pan-European buyout managers with closes on over \$1 billion each raised over half of 2015 total

Market Environment

Fixed Income

- **The yield curve shifted up with intermediate yields increasing 21-39 basis points and long duration yields increasing 14 basis points.**
- **The spread between two and 10-year rates decreased to 121 basis points from 141 basis points ended December. Treasury Inflation-Protected Securities, or TIPS, returned -0.7% during the quarter, as measured by the Barclays US TIPS 1-10 Yr Index.**
- **The Barclays Long Duration Credit Index lost -0.67% as the long end of the curve ended the quarter 14 basis points higher.**
- **Long Treasuries lost -1.38% and investment-grade corporate debt lost -0.52%.**
- **The Barclays 1-3 year Government/ Credit Index returned -0.36% and US high yield bonds lost -2.1%.**
- **Emerging markets debt continued to slow in local currency and was modestly positive in US denominated terms.**
 - US dollar-denominated debt, as measured by the JP Morgan EMBI Index, gained 1.8%; local currency debt was flat, according to the JP Morgan GBI-EM Index.

Real Assets/Inflation-Linked Assets

- **Massive energy market dislocation.**
 - Seek inflation sensitive asset classes that offer positive yield
 - Oil prices trending lower.
 - Private equity and private debt opportunities may be relatively attractive.
 - Potential for public stressed/distressed credit, equity and commodity plays.
- **OPEC and Saudi Arabia have indicated a willingness to allow lower oil prices to persist in efforts to cement market share and reduce marginal supply.**
- **Select infrastructure opportunities are attractive.**
 - Target opportunistic strategies in niche sub-sectors to take advantage of market dislocations.
- **NEPC continues to believe in the long-term demand drivers in agriculture.**
 - Long-term commodity prices driven by growing emerging market demand.
 - Softness in commodity prices may provide attractive entry point.
- **Timber opportunity set limited but warrants further review**
 - 45% increase in housing starts forecasted; timber prices highly correlated

Commodities

- **Commodities retracted significantly with the Bloomberg Commodity Index posting a -10.5%.**
 - Commodities ended the year down -24.6% with 21 of the 22 single-commodity indexes posting losses.

Real Estate

- **NEPC continues to be neutral on core real estate in the US and remains positive on non-core real estate, that is, value-add and opportunistic strategies.**
- **Within U.S. core real estate, strong fundamentals continue to be the story along with attractive income spreads relative to interest rates.**
 - Real estate fundamentals and debt terms are attractive, however valuations are high and the possibility of rising interest rates and the impact on cap rates causes concern.
- **Overall, the non-core real estate investment environment in the U.S. is normalizing; however, select areas remain attractive.**
- **Europe is viewed as the best place for a marginal dollar of non-core real estate investment.**
 - Europe is emerging from multi-year recession, but recovery is slow and uneven with global markets experiencing large capital inflows.
 - Banks in EU are still overleveraged and have significant real estate exposure to jettison.

Highlights of Fourth Quarter Happenings at NEPC

After 30 Years NEPC's Founder has Transitioned to Chairman Emeritus

- NEPC's founder and chairman Richard "Dick" Charlton retired on January 1, 2016 after overseeing a decade-long succession process that involved a change in corporate structure and a planned approach to distributing his ownership shares. Dick had the foresight to begin distributing equity to partners 25 years ago and the formal succession process began in late 2007. Dick's vision for a client-focused organization continues to be the hallmark of NEPC and this deep-rooted culture will live on for generations to come. Mike Manning continues in his leadership role as Managing Partner with the guidance of our Partnership; a Partnership recognized throughout the industry for its depth, talent and culture. We are well positioned to lead in this increasingly competitive marketplace. NEPC has never been stronger.



Professional Staff Updates

- New Principals:** Lenia Ascenso, Principal and Director of Discretionary Operations; Devan Dewey, Principal and Chief Technology Officer; and Matt Lombardi, Principal and Chief Financial Officer
- We are also pleased to announce that Wyatt Crumpler joined NEPC in November as a Principal and Senior Consultant from American Beacon Advisors, Inc., and Sam Pollack joined NEPC as a Senior Consultant from DiMeo Schneider and Associates. Wyatt is a member of NEPC's Corporate consulting group and Sam is a member of NEPC's Endowment & Foundation consulting group.

Upcoming/Recent Events

- 2016 Market Outlook Webinar: January 26, 2016 at 2:00 PM EST.
- NEPC's 21st Annual Client Conference: May 10-11, 2016 in Boston at the Hynes Convention Center.
 - This year we will be offering an optional pre-conference workshop on Monday, May 9th at NEPC's Boston office.
- NEPC hosted a Manager Diversity Program event at our Boston office on October 12, 2015 in an effort to continue and enhance our firm's efforts in this area. The purpose of the gathering was to provide an opportunity for diverse managers to meet NEPC and have an open discussion about our research efforts in the arena of minority- and female-owned firms.

Highlights of Fourth Quarter Happenings at NEPC - continued

NEPC Research

Recent White Papers

- *2015 Fourth Quarter Market Thoughts*
- *Governance: The Cornerstone of Successful Investment Programs* (January 2016) – Endowment & Foundation Practice Team
- *Green Bonds: An Overview* (December 2015) – NEPC Impact Investing Committee
- *Completing the Analysis: ESG Integration* (November 2015) – NEPC Impact Investing Committee
- *NEPC's Survey on Hedge Fund Operations* (November 2015) – Hedge Fund Operational Due Diligence team
- *Market Chatter: The Rise and Fall (and Rise?) of Oil Prices* (October 2015)

NEPC Recognitions

- NEPC, LLC was awarded "Best Full-Service Investment Consulting Firm - USA" by Acquisition International for the 2016 Hedge Fund Awards ¹



NEPC Client Recognitions

- Congratulations to the following NEPC clients for their nominations as Asset Owner Finalists for the 2015 CIO Industry Innovation Awards. Five NEPC clients who won awards in their categories are also highlighted below.
 - **Foundation:** Wisconsin Alumni Research Foundation (Carrie Thome) - Category Winner; Northwest Area Foundation (Amy Jensen)
 - **Endowment:** Fordham University (Eric Wood); Texas Tech University System (Tim Barrett)
 - **Public Defined Benefit Plan Below \$15B:** Orange County Employees Retirement System (Girard Miller) - Category Winner; MoDOT and Patrol Employees' Retirement System (Larry Krummen)
 - **Public Defined Benefit Plan Between \$15B and \$100B:** Massachusetts PRIM (Michael Trotsky) - Category Winner
 - **Public Defined Benefit Plan Above \$100B:** New York City Retirement System (Scott Evans); State of Wisconsin Investment Board (David Villa)
 - **Health Care Organization:** Baylor Scott and White Health (Mark Amiri) - Category Winner; Trinity Health (Dina Richards)
 - **Next Generation:** Massachusetts PRIM (Sarah Samuels) - Category Winner

Appendix: SAA Policy History



Strategic Asset Allocation Policy (SAAP) History

- 7/1/75 – 12/31/79 – 40% S&P 500/60% Barclays Capital Aggregate
- 1/1/80 – 12/31/83 – 50% S&P 500/50% Barclays Capital Aggregate
- 1/1/84 – 12/31/91 – 60% S&P 500/40% Barclays Capital Aggregate
- 1/1/92 – 12/31/94 – 50% S&P 500/10% MSCI EAFE/40% Barclays Capital Aggregate
- 1/1/95 – 6/30/97 – 45% S&P 500/15% MSCI EAFE/40% Barclays Capital Aggregate
- 7/1/97 – 12/31/99 – 50% S&P 500/15% MSCI EAFE/35% Barclays Capital Aggregate
- 1/1/00 – 9/30/03 – 53% S&P 500/17% MSCI EAFE/30% Barclays Capital Aggregate
- 10/1/03 – 12/31/06 – 53% S&P 500/15% MSCI EAFE/ACWI ex-U.S.¹/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 1/1/07 – 10/31/2009 – 31% S&P 500/7% S&P 400/7% S&P 600/18% MSCI ACWI ex-U.S./5% Russell 2000 (lagged one quarter)/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 11/1/2009 – 6/30/2012 – 28% S&P 500/6% S&P 400/6% S&P 600/13% MSCI EAFE/2% MSCI EAFE Small Cap/3% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/24% Barclays Capital Aggregate/2% Barclays Capital High Yield/6% NCREIF ODCE (lagged one quarter)/3% Dow Jones/UBS Commodities Index
- 7/1/2012 – 3/31/2015 – 23% S&P 500/5% S&P 400/5% S&P 600/14% MSCI EAFE/3% MSCI EAFE Small Cap/6% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/13% Barclays Capital Aggregate/5% Barclays Capital High Yield/4% JP Morgan GBI-EM Global Diversified/3% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/8% NCREIF ODCE (lagged one quarter)/4% Dow Jones/UBS Commodities Index
- **4/1/2015 - present – 20% S&P 500/3% S&P 400/3% S&P 600/17% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/11% Barclays Capital Aggregate/4% Barclays Capital High Yield/10% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/10% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodities Index TR/5% Multi-Asset Class Custom Index**
- ***Interim SAA Policy:** 21% S&P 500/3% S&P 400/3% S&P 600/18% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/15% Barclays Capital Aggregate/4% Barclays Capital High Yield/6% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/8% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodity Index/5% Multi-Asset Class Custom Index

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

¹MSCI 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.

ASRS Custom Asset Class Benchmark History

- **ASRS Custom Total Equity Benchmark** was 77% S&P 500, 23% MSCI EAFE through 12/31/1999; 76% S&P 500, 24% MSCI EAFE through 9/30/2003; 78% S&P 500, 22% MSCI EAFE/ACWI ex-U.S.¹ through 12/31/2006; 49% S&P 500, 11% S&P 400, 11% S&P 600, 29% MSCI ACWI ex-U.S. through 10/31/2009; 48% S&P 500, 10% S&P 400, 10% S&P 600, 23% MSCI EAFE, 4% MSCI EAFE Small Cap, 5% MSCI Emerging Markets through 6/30/2012; 41% S&P 500, 9% S&P 400, 9% S&P 600, 25% MSCI EAFE, 5% MSCI EAFE Small Cap, 11% MSCI Emerging Markets through 3/31/2015; 40% S&P 500, 6% S&P 400, 6% S&P 600, 34% MSCI EAFE, 4% MSCI EAFE Small Cap, 10% MSCI Emerging Markets thereafter.
- **ASRS Custom Domestic Equity Benchmark** was S&P 500 through 12/31/2006; 74% S&P 500, 13% S&P 400, 13% S&P 600 through 12/31/2010; 70% S&P 500, 15% S&P 400, 15% S&P 600 through 3/31/2015.; 77% S&P 500, 11.5% S&P 400, 11.5% S&P 600 thereafter.
- **ASRS Custom International Equity Benchmark** was MSCI EAFE through 9/30/2005; MSCI ACWI ex-U.S. through 12/31/2010; 72% MSCI EAFE, 11% MSCI EAFE Small Cap and 17% MSCI Emerging Markets through 6/30/2012; 61% MSCI EAFE, 13% MSCI EAFE Small Cap and 26% MSCI Emerging Markets through 3/31/2015; 71% MSCI EAFE, 8% MSCI EAFE Small Cap and 21% MSCI Emerging Markets thereafter.
- **ASRS Custom Public Markets Fixed Income Benchmark** was Barclays Capital U.S. Aggregate Index through 12/31/2010; 93% Barclays Capital U.S. Aggregate Index, 7% Barclays Capital U.S. High Yield Bond Index through 12/31/2012; 59% Barclays Capital U.S. Aggregate Index, 23% Barclays Capital U.S. High Yield Bond Index, 18% JP Morgan GBI-EM Global Diversified through 3/31/2015; 73% Barclays Capital U.S. Aggregate Index, 27% Barclays Capital U.S. High Yield Bond Index thereafter.
- **ASRS Custom Inflation-Linked Benchmark** was 100% Barclays Capital U.S. TIPS through 7/31/2010; 50% Barclays Capital U.S. TIPS, 50% Bloomberg Commodity Index through 8/31/2010; 30% Barclays Capital U.S. TIPS, 70% Bloomberg Commodity Index through 5/31/2011; 100% Bloomberg Commodity Index thereafter.
- **Multi-Asset Class Strategies Custom Benchmark** was 56% S&P 500, 16% MSCI EAFE, 28% Barclays Capital Aggregate through 9/30/2011; 50% S&P 500, 19% MSCI EAFE, 28% Barclays Capital Aggregate, and 3% Bloomberg Commodity Index through 06/30/2012; 43% S&P 500, 25% MSCI EAFE, 28% Barclays Capital Aggregate, and 4% Bloomberg Commodity Index through 3/31/2015; market value weighted average of the benchmarks for Bridgewater (91 Day T-Bill) and Windham (52% MSCI ACWI net, 30% Citi WGBI, 9% DJ US REIT, and 9% Bloomberg Commodities Index) thereafter.
- **ASRS Cash Assetization Custom Benchmark** is 33% S&P 500, 14% Russell 2000, 25% MSCI EAFE, 28% Barclays Treasury Index through 8/24/2015; 100% Barclays US Long Treasury Index through 11/13/2015; 15% S&P 500, 15% Russell 2000, 16% MSCI EAFE, 4% MSCI Emerging Markets Index, 50% Barclays US Treasury Index thereafter.

¹MSCI 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 of dividend withholding taxes effective 1/1/2014.

Information Disclaimer and Reporting Methodology

Information Disclaimer

- 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.
- 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 within.
- Some index returns displayed in this report or used in calculation of a policy, allocation or custom benchmark may be preliminary and subject to change.
- This report is provided as a management aid for the client's internal use only. Information contained in this report does not constitute a recommendation by NEPC.
- This report may contain confidential or proprietary information and may not be copied or redistributed to any party not legally entitled to receive it.

Reporting Methodology

- The client's custodian bank is NEPC's preferred data source unless otherwise directed. NEPC generally 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 manager fees as indicated on each page.
- 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 taken into account in all 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.

Agenda Item #5



ARIZONA STATE RETIREMENT SYSTEM

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*Paul Matson
Director*

MEMORANDUM

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

FROM: Mr. Paul Matson, Director
Mr. Gary Dokes, Chief Investment Officer (CIO)
Mr. Dave Underwood, Assistant Chief Investment Officer

DATE: February 11, 2016

RE: **Agenda Item #5:** Presentation, Discussion, and Appropriate Action Regarding the Public Equity Portfolio Trade Analysis

Purpose

Staff and Mr. Jon Papa, Client Service Representative with Elkins-McSherry, will present analysis of the securities transactions conducted by the ASRS Total Fund public markets equities portfolios for 2015, 4th Quarter (9/30/15-12/31/15) period.

Recommendation

Informational only; no action required.

Background

Staff has always monitored the costs of equities securities transactions taking place among the externally-managed and internally-managed ASRS Total Fund public markets equity portfolios. Staff believes that, in addition to good fiduciary governance, maintaining effective overall costs of securities transactions at the individual portfolio level, and in the aggregate, serves to reduce degradation of strategies and investment returns derived from the asset class.

Nevertheless, there was merit in examining equities trading costs more systematically, in a cross-sectional fashion and in comparison to some measurable criteria. Toward those objectives, staff undertook during the 3rd and 4th Quarters of 2014, a review of established firms that specialize in analyzing these transactions costs in that detail. Elkins-McSherry emerged from that study as the strongest candidate to address ASRS prerequisites most competitively. Through ASRS procurement personnel, staff engaged Elkins-McSherry by the end of 1st Quarter 2015, tasking the firm with production of quarterly transactions costs analyses, initially of the public markets equity portfolios, but with consideration for potentially extending the analyses to other publically-transacted asset classes. Besides employing the analyses as an ongoing management tool, staff envisions also providing them as periodical information for both the Public Markets, and the Investment Committees.

Over the course of 2015, and as of the end January 2016, Elkins-McSherry subsequently produced analyses retroactively for each calendar quarter. Staff has reviewed them with Elkins-McSherry, in general with the external public equity investment managers, and made them available to senior ASRS management. The February 22, 2016 meeting is the inaugural presentation of the Elkins-McSherry analyses to the Committee; subsequent quarterly analyses will appear as information items in the meetings materials appendixes.

Attachments:

From Elkins-McSherry, L.L.C.

- Global Equity Trading Cost Analysis Summary – 4th Qtr. 2015
- Trade Cost Summary - Global Equity Trading – as of December 31, 2015

Arizona State Retirement System

Global Equity Trading Cost Analysis Results

4th Quarter
2015

I. Elkins/McSherry Background

Elkins/McSherry is one of the most respected firms in the financial consulting industry, having provided over 800 institutions with trading cost analyses since its inception in 1991. The Elkins/McSherry reports provide a comprehensive analysis of total transaction costs; commissions, fees and market impact. These execution costs are scored relative to institutional universes that are maintained and continually updated in the Elkins/McSherry database. Although all investment groups monitor their performance, they should also be measuring trading costs to ensure a policy of “best execution.” Costs incurred through trading are the single most expensive cost variable in a portfolio. The Elkins/McSherry trade execution reports are used as an independent monitoring and management tool designed to give investment managers, plan sponsors, and brokers a comprehensive analysis of their trading costs. Using this vast experience combined with our unmatched global equity Market and Universe data, Elkins/McSherry has produced a trading cost analysis on behalf of Arizona State Retirement System (“ASRS”). These studies evaluate global equity executions from October 1, 2015 through December 31, 2015. The analysis of ASRS trading includes 69,600,915 shares representing \$2.11 billion in principal across 29 countries.

II. Methodology

The Elkins/McSherry analysis produced on behalf of ASRS measures trading efficiency by quantifying the cost of brokerage commissions, fees and execution quality versus Full Day Volume Weighted Average Price (VWAP) benchmark. These data have been separated to summarize results, by Buy/Sell, Commissions, Market Impact, Market Cap, Country, Trade Difficulty, and Highest and Lowest cost trades. Also, these data have been separated to analyze by specific managers and brokers. Participating brokers have also been analyzed based on the highest and lowest overall cost brokers. These results are quantified in Euro and basis points (bp) as well as being displayed graphically to highlight the outcomes.

III. Elkins/McSherry Observations/Analysis

a. ASRS Trade Cost Analysis Results

TOTAL PORTFOLIO COST PERFORMANCE										
Side	COMMISSION			Fees		MARKET IMPACT		Total Cost	Total Cost/Savings Vs. Universe	E - Score
	Your Avg. Commission	Bundled Universe	All Trading Universe	Fees	Universe	Full Day VWAP	Universe Full Day VWAP		Commission+Fees Full Day VWAP	
	(bp)	(bp)	(bp)	(bp)	(bp)	(bp)	(bp)	(bp)	(bp)	
Buy	+4.70	+14.72	+7.18	+2.96	+3.19	3.92	+7.35	+3.74	21.51	0.76
Sell	+3.23	+14.53	+7.18	+0.19	+0.10	+14.78	+6.86	+18.20	3.28	0.67
Total	+3.77	+14.60	+7.18	+1.20	+1.23	+7.93	+7.04	+12.90	9.96	0.70

As shown above, overall results against the benchmark were slightly negative, with ASRS losing to the benchmark by +7.93 basis points on average. This is further compared to the Elkins/McSherry Universe, where ASRS loses to the E/M Universe by +0.89 basis points. Commissions paid by ASRS amounted to +3.77 basis points, which was 10.83 basis points better than the E/M Bundled, or Research Rate, Universe. ASRS Total Trading Cost amounted to a cost of +12.90 basis points, which is 9.96 basis points better than the Elkins Universe.

ASRS is seeing a savings in buys across 8,874 trades covering approximately \$773.81 million, of 3.92 basis points. This result is significantly better than the Universe value of +7.35 basis points. In sells, ASRS is seeing a cost of +14.78 basis points across 6,366 total trades, which is +7.92 basis points worse than the Elkins/McSherry Universe.

The majority of trades during the period analyzed were of trade sizes less than \$500,000 (14,229 trades out of 15,240). In these “Small Trades,” ASRS experienced a cost of +1.43 basis points versus the Elkins Universe value of +7.11 basis points (5.68 basis points savings). In the 562 Medium Size orders (Orders with principal value between \$500K and \$1M), ASRS experienced a cost of +6.29 basis points versus the benchmark. This was 1.07 basis points lower than the Elkins Universe. In the 449 Large Size orders (Orders with principal value of over \$1M), ASRS experienced a cost of +14.60 basis points versus the benchmark, which is +7.78 basis points higher than the Universe.

During Q2 2015, over 99% of all trades made up 0-20% of the average daily volume of the stock. Performance in these trades was in line with the Universe, with trading losing to the Full Day VWAP by +7.98 basis points on average. Less than 1% of trades made up 20-50% of the daily volume, with trading beating the Full Day VWAP by 21.68 basis points on average. Finally, for the less than 1% of trades making up 50+% of the daily volume, trading was better than the Full Day VWAP by 1.29 basis points on average.

ASRS executed through 20 managers during Q4 2015. The most popular manager for the period analyzed was E3 Model, executing 1,459 orders making up approximately \$170 million. Results for E3 Model were mixed, losing to the Full Day VWAP by +13.00 basis points and the Elkins Universe by +6.88 basis points. However, E3 Model beat the Elkins/McSherry Total Cost Universe by 4.77 basis points, due to E3 Model's commission cost beating the Elkins Bundled Commission Universe by 11.66 basis points. There were no high cost managers against the Elkins/McSherry Total Cost Universe. The lowest cost manager was Brandes Investment Partners, beating the Elkins/McSherry Total Cost Universe by 49.10 basis points.

There were two transition managers analyzed during the 4th Quarter. ASRS GTAA transition looked poor versus the Full Day VWAP benchmark, losing to the benchmark by +32.39 basis points and the Elkins/McSherry VWAP Universe by +26.27 basis points. Domestic Transition's results were good, with trading losing to the Full Day VWAP by +1.02 basis points, but beating the Elkins/McSherry Universe by 5.10 basis points. In terms of a market impact analysis on the transitions, which was done by State Street Global Markets, the transitions outperformed initial pre-trade estimates. According to commentary, SSGM sourced most of the liquidity in the early trading session. As most of the executions were sells, and the market rallied on trade date, executions will look poor against a Full Day VWAP benchmark. The full transition however, outperformed pre-trade estimates due to the legacy INTECH account outperforming.

The most popular broker during the period was Instinet, with trading totaling approximately \$520 million. Instinet lost to the benchmark by +1.50 basis points, but beat the Elkins/McSherry Total Cost Universe by 16.47 basis points. Commissions for Instinet were measured at +2.87 basis points, versus the Elkins Bundled Commission Universe value of +14.44 basis points. The highest cost broker was William Blair, losing to the Total Cost Universe by +89.08 basis points. Trading through William Blair lost to the Full Day VWAP by +100.66 basis points.

The highest cost country for the period analyzed was Ireland - Buys. Buy orders in Ireland lost to the Full Day VWAP by +85.53 bp. Commissions were low however, beating the Elkins/McSherry Bundled universe by 9.87 basis points. The lowest cost country for the period analyzed was Korea - Sells. Sell orders in Korea beat the Full Day VWAP benchmark by 67.93 basis points on average, compared to the Elkins Universe of +14.38 basis points. Sell orders in Korea beat the Elkins/McSherry Total Cost Universe by 87.93 basis points..

The highest cost non-transition trade for the period analyzed occurred on December 3, when ASRS bought \$7,134,595 worth of Synchrony Financial through E2 Model and Credit Suisse. ASRS bought the stock at 31.64 earlier in the trading session, while the Full Day VWAP was measured at 31.31 after a late day sell off. This amounted to a cost of +123.65 basis points, or +\$125,710. The lowest cost trade occurred on November 19, when ASRS bought \$1,951,094

worth of Credit Suisse Group through Brandes Investment Partners and Credit Suisse. ASRS bought the stock at 22.75, while Elkins/McSherry calculated a benchmark of 23.68. This amounted to a savings of 394.06 basis points, or \$80,040.

IV. Conclusion

Overall, ASRS' results were slightly higher, but essentially in line with the Elkins Universe for market impact, and positive against a Total Cost benchmark. Commissions were very low cost versus the Elkins/McSherry Bundled Commission Universe. Transitions did play a part into higher market impact costs during the period. If the two transition accounts were not analyzed, costs would be significantly lower than the Elkins/McSherry VWAP Universe.



Arizona State Retirement System

Trade Cost Summary - Global Equity Trading

Period End December 31, 2015





REPORT CONTENTS

Tab 1 : Executive Summary

- **Results / Methodology**
- **Performance vs. Universe / Trading Components**
- **Short Term Alpha**
- **Market Capitalization Performance**
- **Order Size Performance**
- **Implementation days / Liquidity By Trade Performance**
- **Country Performance**
- **High / Low Cost Managers**
- **Commission Review**

Tab 2 : Trade Detail

- **Manager Performance**
- **Broker Performance**

Tab 3 : High / Low Cost Trades

- **Trade Contributions**
- **10 High / Low Cost Trades**
- **5 High Cost Data Graphs**
- **5 Low Cost Data Graphs**



(+) = Cost

EXECUTIVE SUMMARY

Elkins/McSherry has been providing trading cost analysis to institutional investors since 1991, serving many of the world's largest investment managers, pension funds, banks, and broker dealers. Using this vast experience combined with an unmatched collection of global equity market and Universe data, Elkins/McSherry has produced a Trading Cost Analysis on behalf of Arizona State Retirement System. This study evaluates global equity executions from October 1, 2015 to December 31, 2015. The analysis included trading of 69,600,915 shares representing \$2.11 billion in principal across 29 countries.

Methodology :

The Elkins/McSherry analysis measures trading efficiency by quantifying the cost of brokerage commission, fees, and execution quality versus an Full Day VWAP benchmark for each of the securities traded. These data have been separated to summarize results, by Buy/Sell, Commissions, Market Impact, Short Term Alpha, Market Cap, Country, Trade Difficulty, and Highest and Lowest Cost Trades. These results are quantified in \$ and Basis Points (BP) as well as being displayed graphically to highlight the outcomes.

Results :

BENCHMARK PERFORMANCE			E - Score
Commission	Fees	Full Day VWAP	
<ul style="list-style-type: none"> Your commission cost was +3.77 bp or \$+\$795,987 (10.83 bp better than the Elkins/McSherry Universe) 	<ul style="list-style-type: none"> Your fee cost was +1.20 bp or \$+254,275 (0.02 bp better than the Elkins/McSherry Universe) 	<ul style="list-style-type: none"> Your market impact cost was +7.93 bp or \$+1,676,929 (+0.89 bp worse than the Elkins/McSherry Universe) Your overall trading cost of +12.90 bp was 9.96 bp better than the Elkins/McSherry Universe. Arizona State Retirement System trading was higher than the Elkins/McSherry Universe in 8 countries and lower than the Elkins/McSherry Universe in 21 countries. 17 of your brokers had trading cost higher than summary universe of countries (principal weighted) in which they traded. 69 of your brokers had lower trading cost. 	<ul style="list-style-type: none"> E - Score : 0.70



(+) = Cost

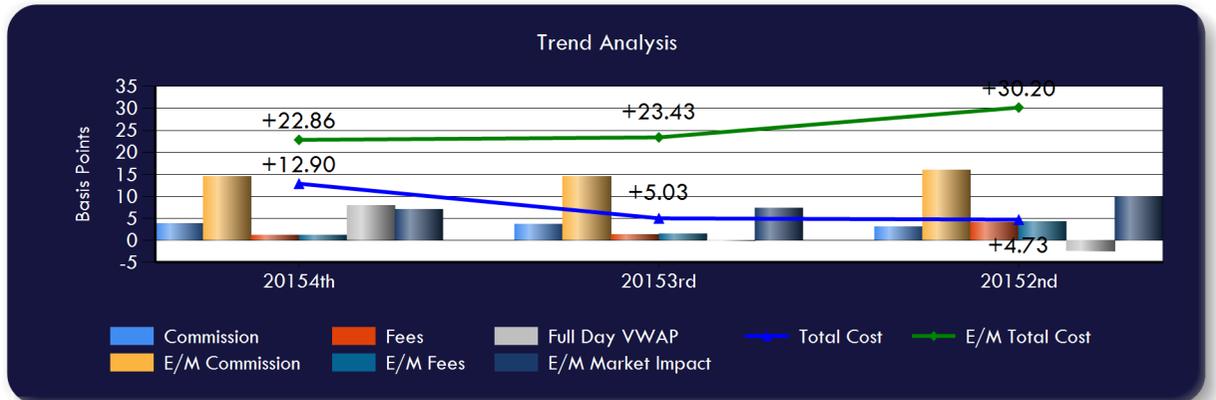
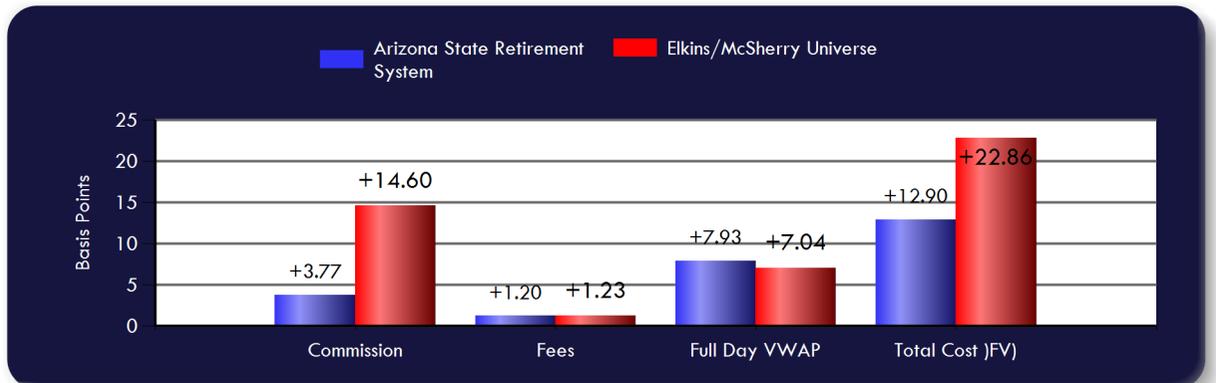
EXECUTIVE SUMMARY

TOTAL PORTFOLIO COST PERFORMANCE

Side	COMMISSION			Fees		MARKET IMPACT		Total Cost	Total Cost/Savings Vs. Universe	E - Score
	Your Avg. Commission	Bundled Universe	All Trading Universe	Fees	Universe	Full Day VWAP	Universe Full Day VWAP		Commission+Fees Full Day VWAP	
	(bp)	(bp)	(bp)	(bp)	(bp)	(bp)	(bp)	(bp)	(bp)	
Buy	+4.70	+14.72	+7.18	+2.96	+3.19	3.92	+7.35	+3.74	21.51	0.76
Sell	+3.23	+14.53	+7.18	+0.19	+0.10	+14.78	+6.86	+18.20	3.28	0.67
Total	+3.77	+14.60	+7.18	+1.20	+1.23	+7.93	+7.04	+12.90	9.96	0.70

TRADING COMPONENTS

	Buys	Sells
Trade Principal	773,809,647	1,338,142,365
Shares	33,641,302	35,959,613
Unique Names	2,051	1,683
Liquidity (% POV)	0.228	0.245
Avg. Order Size	3,791	5,649
Avg. Order Completion Time (min)	N/A	N/A
Total Number of Trades	8,874	6,366





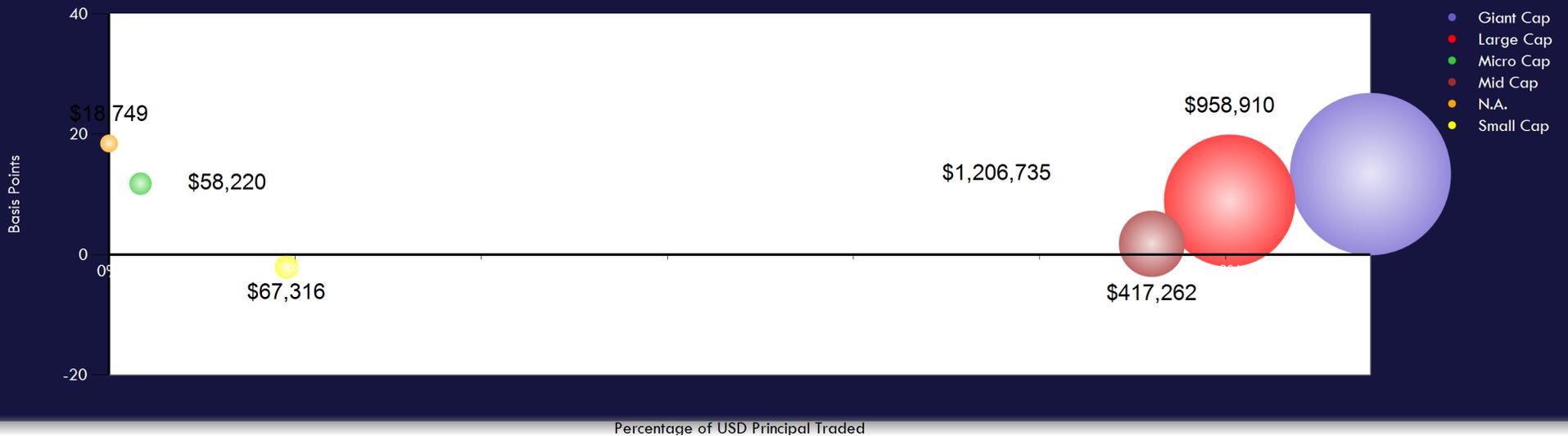
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EXECUTIVE SUMMARY

MARKET CAPITALIZATION

Market Cap	% Traded	Avg. Principal Per Order	COMMISSION		MARKET IMPACT		Total Cost	Total Cost/Savings	E - Score	Market Cap Definition
			Your Commission	Bundled Universe	Full Day VWAP	Universe Full Day VWAP				
	(%)	(\$)	(bp)	(bp)	(bp)	(bp)	(bp)	(bp)		
Giant Cap	34.28 %	531,575	+2.30	+14.50	+13.36	+6.64	+16.65	5.42	0.64	Over \$25 Billion
Large Cap	30.50 %	200,225	+4.03	+14.72	+8.95	+7.55	+14.88	9.42	0.61	\$5 Billion to \$25 Billion
Mid Cap	28.41 %	93,020	+4.34	+14.55	+1.78	+6.81	+6.95	15.23	0.89	\$1 Billion to \$5 Billion
Small Cap	5.17 %	31,124	+7.31	+14.77	2.07	+7.71	+6.17	17.28	0.63	\$250 Million to \$1 Billion
Micro Cap	1.24 %	40,934	+10.18	+14.77	+11.78	+7.68	+22.15	1.02	0.54	Under \$250 Million
N.A.	0.40 %	135,699	+3.70	+14.36	+18.46	+6.12	+22.26	+1.71	1.25	

Total Cost by Market Cap: (USD)





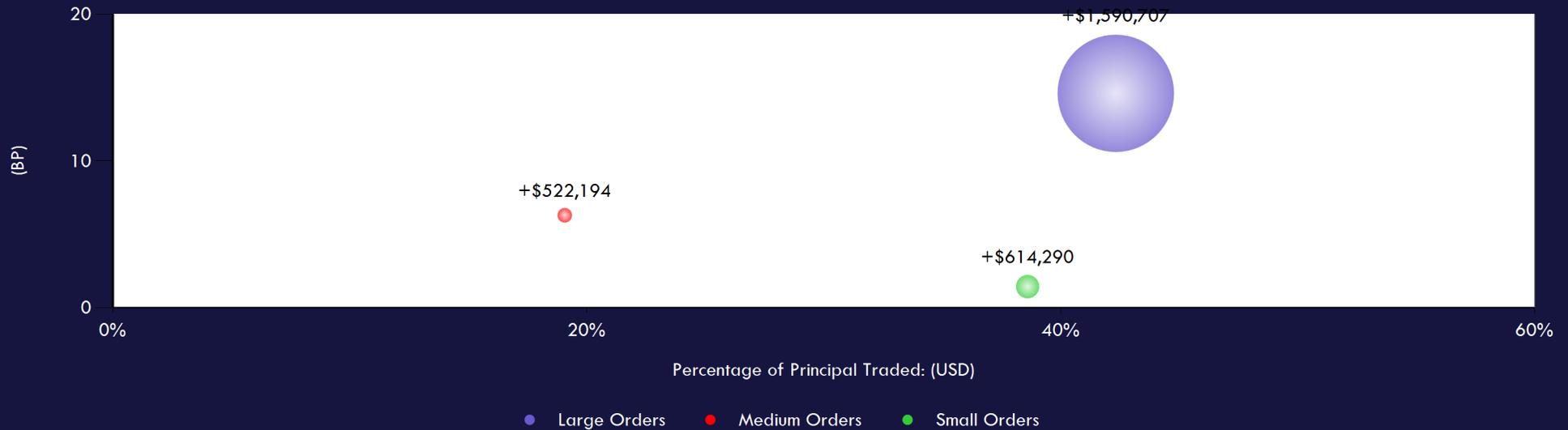
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EXECUTIVE SUMMARY

ORDER SIZE EVALUATION

Order Size	Total # Of Orders	Avg. Principal Per Order (\$)	Avg. Order Completion Time (min)	COMMISSION		MARKET IMPACT		Total Cost	Total Cost/Savings	E - Score	Absolute Size (Principal)
				Your Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	(bp)	Commission+Fees+ Full Day VWAP Vs. Universe (bp)		
Large Orders	449	1,990,940	N/A	+2.69	+14.54	+14.60	+6.82	+17.76	4.02	0.71	1M or Greater
Medium Orders	562	716,575	N/A	+4.31	+14.70	+6.29	+7.36	+12.94	11.69	0.78	Between 500k - 1M
Small Orders	14,229	57,299	N/A	+4.68	+14.61	+1.43	+7.11	+7.52	15.66	0.66	500K or Less

Total Cost By Order Size: (USD)





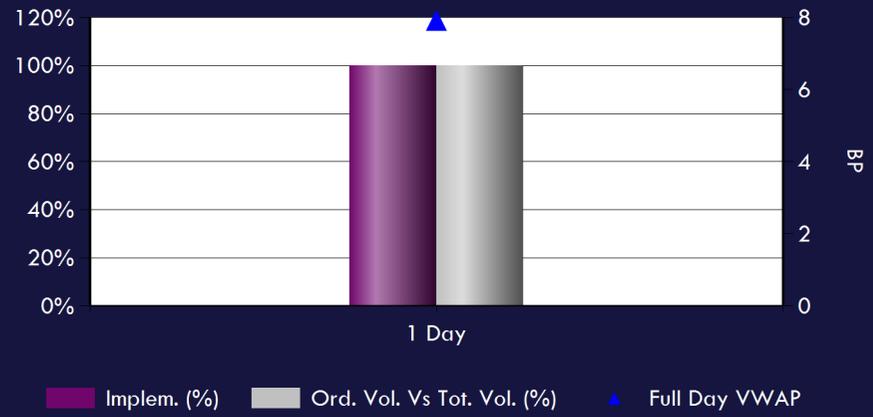
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EXECUTIVE SUMMARY

IMPLEMENTATION DAYS BY TRADE

Period	Percent Traded (%)	Order Vol. Vs Total Vol. (%)	Full Day VWAP (bp)	E - Score
1 Day	100.00	100%	+7.93	0.70

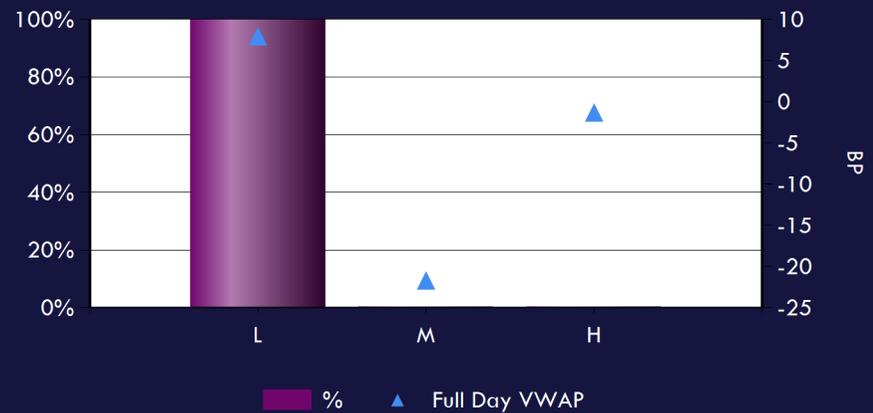
Implementation Days



TRADE DIFFICULTY

Methodology	Liquid. Cat.	Percent Traded (%)	Full Day VWAP (bp)	E - Score
50%+ of daily vol.	H	0%	1.29	1.05
0%~20% of daily vol.	L	100%	+7.98	0.70
20%~50% of daily vol.	M	0%	21.68	0.94

Avg. % of Daily Volume



EXECUTIVE SUMMARY

COUNTRY PERFORMANCE

Country	Principal (\$ Millions)	Total Principal Traded (%)	COMMISSION		FEES		MARKET IMPACT		Total Cost Diff. From Universe (bp)	E - Score
			Commission (bp)	Bundled Universe Commission (bp)	Fees (bp)	Universe Fees (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)		
HIGHEST COST COUNTRIES - Total Cost Universe Difference										
IRELAND - BUYS	2	0.11%	+9.56	+19.43	+100.02	+100.00	+85.53	+15.29	+60.39	0.51
AUSTRIA	6	0.27%	+11.09	+13.85	+0.00	+0.00	+47.52	+16.17	+28.58	0.61
GERMANY	12	0.58%	+7.89	+14.38	+0.00	+0.00	+29.93	+9.62	+13.83	0.68
KOREA - BUYS	<1	0.01%	+4.00	+20.46	+0.00	+0.00	+40.31	+12.66	+11.19	0.80
FRANCE - BUYS	19	0.89%	+8.15	+15.88	+19.36	+20.00	+24.86	+7.03	+9.46	0.58
ITALY - SELLS	11	0.52%	+9.30	+17.32	+0.00	+1.33	+27.85	+13.31	+5.18	0.76
ISRAEL	<1	0.03%	+13.99	+19.15	+0.00	+0.02	+15.89	+8.14	+2.56	0.49
PORTUGAL	<1	0.04%	+7.73	+15.01	+0.00	+0.00	+24.12	+15.95	+0.90	0.35

EXECUTIVE SUMMARY

COUNTRY PERFORMANCE

Country	Principal (\$ Millions)	Total Principal Traded (%)	COMMISSION		FEES		MARKET IMPACT		Total Cost Diff. From Universe (bp)	E - Score
			Commission (bp)	Bundled Universe Commission (bp)	Fees (bp)	Universe Fees (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)		
LOWEST COST COUNTRIES - Total Cost Universe Difference										
KOREA - SELLS	<1	0.03%	+8.00	+16.49	+30.00	+27.13	67.93	+14.38	87.93	0.59
FINLAND	<1	0.01%	+3.07	+14.67	+0.00	+0.06	18.87	+12.36	42.89	0.31
SPAIN	10	0.47%	+8.98	+15.85	+0.00	+0.00	9.62	+25.61	42.10	0.53
SWITZERLAND	24	1.14%	+6.81	+14.66	+0.00	+0.02	22.69	+10.71	41.27	0.57
BRAZIL	4	0.19%	+19.41	+27.19	+3.25	+1.91	18.32	+12.79	37.55	0.42
JAPAN	84	4.00%	+9.45	+17.14	+0.00	+0.02	0.37	+16.50	24.58	0.30
NETHERLANDS	17	0.80%	+10.34	+13.50	+0.00	+0.11	10.22	+7.09	20.58	0.56
NEW ZEALAND	<1	0.00%	+8.00	+14.53	+0.00	+0.00	+21.63	+33.96	18.85	0.51
CANADA	<1	0.02%	+6.50	+16.21	+0.00	+0.01	+5.67	+14.53	18.58	0.62
FRANCE - SELLS	20	0.93%	+11.64	+14.98	+0.00	+0.01	2.96	+11.04	17.35	0.65
BELGIUM	2	0.09%	+3.03	+15.24	+0.00	+0.01	+9.69	+13.83	16.36	0.35
U.K. - SELLS	23	1.11%	+7.96	+15.17	+0.06	+0.03	0.39	+7.88	15.45	0.59
AUSTRALIA	3	0.12%	+3.68	+14.72	+0.00	+0.25	+10.59	+14.10	14.81	0.39
SINGAPORE	6	0.26%	+12.46	+17.53	+3.66	+3.34	0.62	+9.25	14.61	0.64
NORWAY	3	0.12%	+12.36	+15.08	+0.00	+0.15	+16.12	+27.86	14.61	0.43
SWEDEN	18	0.86%	+7.99	+15.87	+0.00	+0.00	1.00	+5.43	14.31	0.68
DENMARK	7	0.32%	+8.50	+14.97	+0.00	+0.00	+15.45	+22.57	13.59	0.82
ITALY - BUYS	3	0.15%	+5.75	+18.17	+9.34	+12.00	+20.31	+16.59	11.36	0.51
HONG KONG	6	0.27%	+12.55	+15.79	+10.78	+9.94	+1.93	+8.78	9.26	0.55
U.S.	1,796	85.05%	+2.81	+14.36	+0.12	+0.07	+8.61	+6.12	9.00	0.73
U.K. - BUYS	34	1.61%	+9.56	+15.13	+46.53	+50.00	+12.08	+8.49	5.45	0.60



(+) = Cost

TRADE CYCLE DETAIL

1 HIGHEST COST MANAGER (Full Day VWAP)



Manager	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION		MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
ASRS GTAA TRANSITION	444	705	21.03%	629,897	0.72	+1.33	+14.36	+32.39	+6.12	+13.33	-	37.57	-

NOTES

- Managers above made up 21.03 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

10 LOWEST COST MANAGER (Full Day VWAP)

						COMMISSION		MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
Manager	Principal Traded	Total Orders Traded	% Principal	Avg. Principal	E - Score	Commission	Bundled Universe	Full Day VWAP	Universe Full Day VWAP	Commission+Fees+Full Day VWAP Vs. Universe	20153rd	20152nd	20151st
	(\$ Millions)			(\$)		(bp)	(bp)	(bp)	(bp)	(bp)	(bp)	(bp)	(bp)
DOMESTIC TRANSITION	243	1,547	11.51%	157,074	0.35	+1.70	+14.36	+1.02	+6.12	17.64	22.37	25.47	-
TIMESQUARE CAPITAL	114	1,073	5.41%	106,399	0.63	+11.68	+14.36	9.62	+6.12	18.39	20.71	26.57	-
TRINITY STREET	56	94	2.67%	600,950	0.28	+11.22	+16.47	0.46	+14.79	20.68	13.59	43.18	-
AQR CAPITAL	30	521	1.44%	58,538	0.26	+1.03	+15.95	+5.58	+13.30	23.33	20.47	24.37	-
DIMENSIONAL FUND ADV	12	931	0.56%	12,738	0.59	+4.02	+15.86	+1.24	+12.96	23.70	15.14	20.21	-
THOMPSON SIEGEL WALM	28	155	1.34%	183,229	0.68	+10.93	+16.21	9.13	+13.65	27.96	28.99	40.27	-
E4 MODEL	162	1,285	7.65%	125,805	1.18	+3.16	+14.36	10.98	+6.12	28.29	0.95	+1.21	-
E6	35	3,496	1.67%	10,068	0.80	+3.62	+14.36	12.99	+6.12	29.84	+3.79	5.20	-
INTECH LARGE CAP	115	199	5.44%	577,057	0.80	+3.37	+14.36	13.27	+6.12	30.34	24.09	12.45	-
BRANDES INVESTMENT P	33	34	1.58%	981,881	0.49	+11.23	+16.52	31.92	+12.01	49.10	1.19	16.85	-

NOTES

- Manager above made up 39.28 % of principal traded.



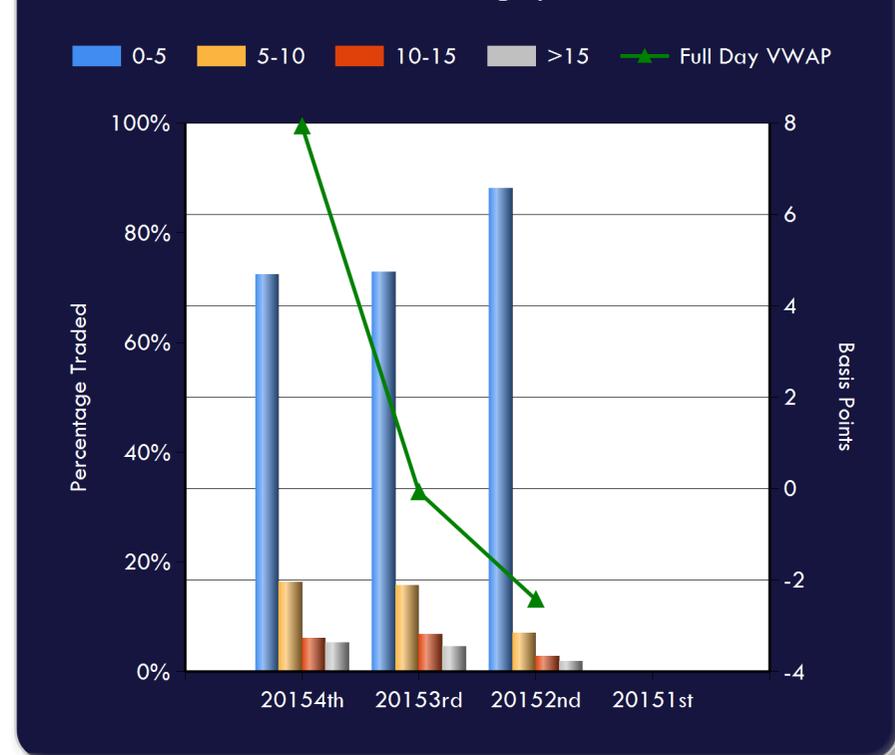
(+) = Cost

COMMISSION REVIEW

COMMISSION REVIEW - Top 20 Brokers (Commission \$)

Broker	Total Commission	Commission (bp)	Bundled Universe (bp)	All Trading Universe (bp)	Commission Trends		
					20153rd (bp)	20152nd (bp)	20151st (bp)
INSTINET	149,277	+2.87	+14.44	+7.15	+3.73	+2.87	-
STATE STRE	61,158	+1.37	+14.36	+7.15	+2.26	+0.62	-
CREDIT SUI	54,440	+3.18	+14.53	+7.20	+4.56	+1.95	-
CITIGROUP	46,528	+3.10	+14.44	+7.18	+3.39	+3.72	-
ITG	39,001	+2.66	+14.51	+7.22	+3.32	+4.12	-
BNP PARIBA	32,687	+3.02	+14.35	+7.15	+4.20	+5.47	-
JP MORGAN	28,955	+7.59	+15.03	+7.21	+4.24	+4.45	-
MERRILL LY	28,131	+5.07	+15.63	+7.24	+1.90	+3.34	-
KNIGHT CAP	26,651	+14.22	+14.40	+7.16	+5.33	+2.44	-
MORGAN STA	24,219	+6.80	+16.55	+7.86	+6.41	+3.78	-
DAIWA SECU	22,288	+11.81	+17.14	+6.51	+8.02	+11.56	-
BARCLAYS	22,277	+5.06	+14.56	+7.27	+2.04	+6.85	-
DEUTSCHE B	21,261	+9.08	+15.18	+7.10	+4.81	+3.82	-
JEFFERIES	19,958	+6.73	+14.85	+7.18	+2.13	+2.87	-
UBS	19,641	+6.32	+14.68	+7.22	+5.16	+5.50	-
GOLDMAN SA	18,991	+6.66	+15.32	+7.32	+4.30	+3.10	-
SC BERNSTE	17,279	+5.86	+14.74	+7.42	+7.46	+7.07	-
CREDIT AGR	11,686	+15.36	+17.17	+6.59	+14.97	+10.54	-
RAYMOND JA	10,455	+13.87	+14.36	+7.15	+6.28	+9.03	-
WEEDEN & C	8,014	+2.14	+14.36	+7.15	+6.81	+6.44	-

Commission Category Trend





(+) = Cost

TRADE CYCLE DETAIL

MANAGER PERFORMANCE (FULL DAY VWAP)



Manager	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION		MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
ASRS GTAA TRANSITION	444	705	21.03%	629,897	0.72	+1.33	+14.36	+32.39	+6.12	+13.33	-	37.57	-
DOMESTIC TRANSITION	243	1,547	11.51%	157,074	0.35	+1.70	+14.36	+1.02	+6.12	17.64	22.37	25.47	-
E3 MODEL	170	1,459	8.05%	116,590	1.17	+2.70	+14.36	+13.00	+6.12	4.77	36.01	34.34	-
E4 MODEL	162	1,285	7.65%	125,805	1.18	+3.16	+14.36	10.98	+6.12	28.29	0.95	+1.21	-
AMERICAN CENTURY	153	289	7.24%	529,332	0.62	+8.95	+15.57	+15.82	+10.74	2.31	+2.29	0.37	-
E2 MODEL	138	1,035	6.54%	133,358	1.01	+1.91	+14.36	+8.79	+6.12	9.79	6.71	22.44	-
E8 MODEL	125	447	5.91%	279,379	0.43	+1.42	+14.36	+4.27	+6.12	14.77	21.94	12.34	-
INTECH LARGE CAP	115	199	5.44%	577,057	0.80	+3.37	+14.36	13.27	+6.12	30.34	24.09	12.45	-
TIMESQUARE CAPITAL	114	1,073	5.41%	106,399	0.63	+11.68	+14.36	9.62	+6.12	18.39	20.71	26.57	-
LSV-US LARGE CAP VAL	82	331	3.89%	247,997	0.60	+1.44	+14.36	+7.32	+6.12	11.67	25.78	21.63	-

NOTES

- Manager above made up 82.66 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

MANAGER PERFORMANCE (FULL DAY VWAP)



Manager	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION		MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
E7 MODEL	69	358	3.26%	192,582	0.50	+2.03	+14.36	+10.76	+6.12	7.68	12.80	7.88	-
TRINITY STREET	56	94	2.67%	600,950	0.28	+11.22	+16.47	0.46	+14.79	20.68	13.59	43.18	-
WELLINGTON MANAGEMEN	46	445	2.17%	103,079	0.52	+5.50	+14.36	+8.19	+6.12	6.77	25.50	14.30	-
DIMENSIONAL FUND ADV	38	650	1.79%	58,045	0.59	+3.76	+14.36	+2.90	+6.12	13.82	+12.18	11.14	-
E6	35	3,496	1.67%	10,068	0.80	+3.62	+14.36	12.99	+6.12	29.84	+3.79	5.20	-
BRANDES INVESTMENT P	33	34	1.58%	981,881	0.49	+11.23	+16.52	31.92	+12.01	49.09	1.19	16.85	-
AQR CAPITAL	30	521	1.44%	58,538	0.26	+1.03	+15.95	+5.58	+13.30	23.34	20.47	24.37	-
THOMPSON SIEGEL WALM	28	155	1.34%	183,229	0.68	+10.93	+16.21	9.13	+13.66	27.96	28.99	40.27	-
FRANKLIN TEMPLETON	18	186	0.84%	95,547	0.57	+15.74	+14.67	5.09	+7.70	11.66	6.38	+12.68	-
DIMENSIONAL FUND ADV	12	931	0.56%	12,738	0.59	+4.02	+15.86	+1.24	+12.96	23.70	15.14	20.21	-

NOTES

- Manager above made up 17.34 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

BROKER PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
INSTINET	520	2,912	24.64%	178,692	0.91	149,277	+2.87	+14.44	+1.50	+6.40	16.47	17.51	13.99	-
STATE STREET BANK	446	736	21.12%	606,177	0.72	61,158	+1.37	+14.36	+32.25	+6.12	+13.23	22.26	25.73	-
CREDIT SUISSE	171	1,192	8.11%	143,751	0.49	54,440	+3.18	+14.53	+0.12	+6.74	17.91	+2.87	26.90	-
CITIGROUP	150	2,419	7.11%	62,072	0.95	46,528	+3.10	+14.44	+5.25	+6.40	12.47	15.11	33.25	-
ITG	147	1,569	6.95%	93,602	0.48	39,001	+2.66	+14.51	+6.78	+6.54	11.55	15.06	24.28	-
BNP PARIBAS	108	807	5.13%	134,137	0.37	32,687	+3.02	+14.35	+1.62	+6.79	16.41	7.83	17.23	-
MERRILL LYNCH	56	291	2.63%	190,737	0.38	28,131	+5.07	+15.63	+5.50	+10.73	16.97	24.64	23.49	-
BARCLAYS	44	2,154	2.08%	20,421	0.85	22,277	+5.06	+14.56	+7.87	+6.91	8.57	4.10	19.24	-
JP MORGAN CHASE	38	148	1.81%	257,611	0.76	28,955	+7.59	+15.03	+7.20	+9.70	9.94	26.96	27.28	-
WEEDEN & CO	37	57	1.77%	655,659	1.48	8,014	+2.14	+14.36	48.95	+6.12	67.19	+1.18	36.78	-

NOTES

- Brokers above made up 81.35 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

BROKER PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
MORGAN STANLEY	36	272	1.69%	130,957	0.55	24,219	+6.80	+16.55	1.55	+10.38	21.66	15.74	33.84	-
UBS	31	115	1.47%	270,223	0.47	19,641	+6.32	+14.68	4.55	+7.58	20.45	1.58	8.03	-
JEFFERIES & CO	30	484	1.40%	61,230	0.56	19,958	+6.73	+14.85	+8.01	+8.34	8.53	26.75	14.51	-
SC BERNSTEIN	29	121	1.40%	243,691	0.53	17,279	+5.86	+14.74	+1.54	+9.04	18.35	10.11	11.76	-
GOLDMAN SACHS	29	243	1.35%	117,395	0.49	18,991	+6.66	+15.32	+5.02	+10.44	14.31	24.47	21.57	-
DEUTSCHE BANK	23	75	1.11%	312,204	0.46	21,261	+9.08	+15.18	+5.57	+10.92	11.55	23.53	36.39	-
DAIWA SECURITIES	19	179	0.89%	105,390	0.32	22,288	+11.81	+17.14	3.57	+16.50	25.42	+25.77	17.64	-
KNIGHT CAPITAL	19	175	0.89%	107,096	0.49	26,651	+14.22	+14.40	16.78	+6.32	23.25	22.72	19.74	-
GUZMAN & CO	18	35	0.86%	516,377	0.66	7,229	+4.00	+14.36	+1.11	+6.12	15.34	21.83	-	-
ROSENBLATT SECURITIE	14	35	0.67%	403,911	0.36	5,655	+4.00	+14.36	+6.48	+6.12	9.98	14.32	14.15	-

NOTES

- Brokers above made up 11.72 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

BROKER PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
LIQUIDNET	13	111	0.60%	114,387	0.65	5,966	+4.70	+14.50	16.71	+6.43	32.93	17.07	24.51	-
RBC CAPITAL MARKETS	12	169	0.56%	69,646	0.57	7,598	+6.46	+14.36	+8.41	+6.12	5.60	29.72	30.58	-
CREDIT AGRICOLE	8	16	0.36%	475,557	0.16	11,686	+15.36	+17.17	+3.83	+15.98	13.93	25.09	32.09	-
RAYMOND JAMES	8	77	0.36%	97,869	0.58	10,455	+13.87	+14.36	+1.26	+6.12	5.33	41.53	9.83	-
BAIRD, ROBERT W	7	40	0.31%	165,701	0.63	7,045	+10.63	+14.36	16.17	+6.12	26.01	36.30	21.71	-
JONES TRADING	6	32	0.27%	180,953	0.51	3,321	+5.73	+14.36	14.46	+6.12	29.12	32.66	19.26	-
OPPENHEIMER & CO INC	5	52	0.24%	99,086	0.71	4,927	+9.56	+14.36	+10.54	+6.12	0.30	24.10	22.38	-
COWEN & CO	5	38	0.24%	132,696	0.67	6,233	+12.36	+14.36	3.28	+6.12	11.34	190.06	+10.35	-
STIFEL NICOLAUS & CO	5	54	0.23%	91,712	0.78	5,096	+10.29	+14.36	26.89	+6.12	37.03	5.50	21.66	-
HSBC BANK	5	5	0.22%	939,954	0.66	5,251	+11.17	+15.09	0.03	+8.59	12.56	14.67	+45.91	-

NOTES

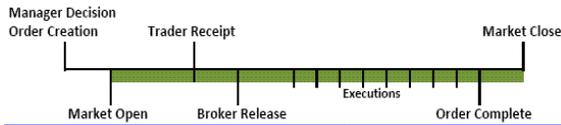
- Brokers above made up 3.40 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

BROKER PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
LOOP CAPITAL MARKETS	5	64	0.22%	71,822	0.80	3,777	+8.22	+14.36	11.57	+6.12	23.82	23.24	-	-
BTIG LLC	4	44	0.20%	96,505	0.50	6,383	+15.03	+14.36	7.91	+6.12	13.34	22.46	30.60	-
WILLIAM BLAIR	4	53	0.20%	77,914	0.89	3,670	+8.89	+14.36	+100.66	+6.12	+89.08	12.92	23.95	-
CAPITAL INSTL SVCS	4	8	0.19%	511,223	0.47	1,814	+4.44	+14.36	+2.90	+6.12	13.13	9.89	-	-
SUNGARD BROKERAGE	4	20	0.17%	179,419	0.38	291	+0.81	+14.36	16.91	+6.12	36.49	36.49	23.58	-
EXANE	3	5	0.16%	691,765	1.01	4,151	+12.00	+15.62	+42.17	+11.66	+26.50	+7.67	20.13	-
MIZUHO	3	8	0.15%	396,727	0.19	3,088	+9.73	+16.88	1.03	+15.52	23.70	29.21	28.53	-
SOCIETE GENERALE	3	88	0.15%	35,683	0.85	2,882	+9.18	+15.36	+47.96	+9.28	+32.51	28.99	1.60	-
REDBURN PARTNERS LLP	3	3	0.14%	1,017,101	0.43	4,133	+13.54	+16.12	+1.16	+12.14	14.21	22.43	30.06	-
FRANK RUSSELL	3	10	0.13%	274,129	0.31	2,080	+7.59	+14.36	+1.02	+6.12	11.80	+25.04	5.07	-

NOTES

- Brokers above made up 1.71 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

BROKER PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
D CARNEGIE AG	3	6	0.12%	432,856	0.34	3,117	+12.00	+15.87	+10.65	+5.43	+1.35	-	-	-
NOMURA	3	3	0.12%	840,656	0.43	2,522	+10.00	+17.14	7.00	+16.50	30.66	34.98	27.07	-
PIPER JAFFRAY	2	18	0.11%	130,871	0.67	3,184	+13.51	+14.36	45.20	+6.12	52.14	27.11	24.26	-
WELLS FARGO	2	13	0.11%	172,642	0.74	2,475	+11.03	+14.36	+5.23	+6.12	4.15	36.22	17.13	-
KEPLER EQUITIES	2	5	0.11%	447,982	0.58	2,688	+12.00	+15.88	+33.70	+7.03	+22.79	+63.05	+3.52	-
PERSHING	2	3	0.09%	663,575	0.41	2,786	+13.99	+15.14	+31.50	+8.37	+22.01	10.12	12.91	-
CANTOR FITZGERALD	2	32	0.09%	61,881	0.73	1,914	+9.67	+14.36	8.31	+6.12	19.09	22.49	22.28	-
JOH BERENBERG GOSSLE	2	1	0.09%	1,964,570	0.12	2,947	+15.00	+14.98	2.03	+11.04	13.06	-	7.72	-
KEYBANC	2	17	0.09%	106,446	0.80	1,037	+5.73	+14.36	26.66	+6.12	41.33	+2.93	228.22	-
PARETO FONDS	2	3	0.08%	528,728	0.47	2,379	+15.00	+15.08	+15.87	+27.86	12.22	-	-	-

NOTES

- Brokers above made up 1.01 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

BROKER PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
ISI GROUP INC	1	21	0.07%	69,827	0.84	360	+2.45	+14.36	+10.80	+6.12	7.21	+1.74	7.40	-
ROYAL BANK OF CANADA	1	3	0.06%	456,420	1.27	1,369	+10.00	+15.13	+78.93	+8.49	+65.39	57.56	+9.62	-
LIBERUM CAPITAL LTD	1	3	0.06%	454,228	0.41	2,044	+15.00	+15.13	+41.22	+8.49	+32.71	20.82	-	-
CONVERGEX	1	12	0.06%	100,300	0.67	891	+7.40	+15.58	17.65	+6.63	32.47	46.54	0.07	-
SG SECURITIES	1	93	0.05%	10,862	0.63	371	+3.68	+16.97	+17.45	+15.00	10.70	30.19	20.41	-
MACQUARIE	<1	5	0.04%	156,137	0.28	506	+6.49	+14.36	+25.64	+6.12	+11.61	12.44	39.95	-
MKM PARTNERS	<1	3	0.03%	236,857	0.42	568	+7.99	+14.36	+23.47	+6.12	+11.07	-	-	-
STEPHENS & CO INC	<1	5	0.03%	140,882	0.45	477	+6.78	+14.36	+6.82	+6.12	6.88	+9.82	+2.55	-
MITSUBISHI UFJ SECS	<1	1	0.03%	703,006	0.11	703	+10.00	+17.14	3.69	+16.50	27.35	-	-	-
BB&T SECURITIES	<1	6	0.03%	116,763	0.72	860	+12.28	+14.36	18.43	+6.12	26.55	62.52	2.82	-

NOTES

- Brokers above made up 0.47 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

BROKER PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
PAREL	<1	1	0.03%	664,450	0.28	997	+15.00	+15.85	+30.00	+25.61	+3.54	8.71	-	-
NATL FINANCIAL SERVS	<1	19	0.03%	34,520	0.41	1,023	+15.60	+14.36	3.36	+6.12	8.19	-	-	-
SCOTIA CAPITAL	<1	5	0.03%	126,633	0.18	638	+10.08	+14.36	+2.53	+6.12	7.82	-	-	-
AUTONOMOUS LLP	<1	1	0.03%	595,616	0.93	893	+15.00	+17.32	34.95	+13.31	51.91	-	-	-
CSI US INSTITUTIONAL	<1	2	0.03%	292,276	0.59	558	+9.54	+14.36	9.79	+6.12	20.63	-	+8.47	-
JB CAPITAL MKTS	<1	2	0.02%	258,851	N/A	777	+15.00	+15.85	4.46	+25.61	30.92	-	-	-
PANMURE GORDON	<1	4	0.02%	126,774	N/A	761	+15.00	+15.17	33.58	+7.88	41.53	-	-	-
FRIEDMAN BILLINGS	<1	4	0.02%	119,840	0.68	372	+7.77	+14.36	+8.93	+6.12	3.86	-	24.12	-
SUNTRUST CAPITAL MAR	<1	5	0.02%	77,038	0.45	1,371	+35.59	+14.36	+12.78	+6.12	+27.94	0.46	19.42	-
BMO CAPITAL MARKETS	<1	3	0.01%	88,420	0.64	550	+20.73	+14.36	83.52	+6.12	83.30	16.09	+49.57	-

NOTES

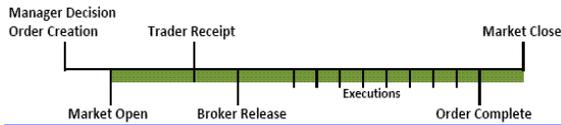
- Brokers above made up 0.25 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

BROKER PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
ALBERT FRIED & CO	<1	4	0.01%	53,016	0.42	147	+6.93	+14.36	+12.70	+6.12	0.89	+6.72	57.46	-
JANNEY MONTGOMERY	<1	2	0.01%	104,312	0.21	338	+16.18	+14.36	+4.68	+6.12	+0.32	-	-	-
STURDIVANT & CO INC	<1	3	0.01%	53,465	0.91	150	+9.35	+14.36	89.73	+6.12	100.84	+47.75	31.61	-
ABEL NOSER CORP	<1	1	0.01%	138,267	0.93	111	+8.04	+14.36	+57.36	+6.12	+44.84	-	-	-
DAVIDSON D.A. & CO	<1	1	0.01%	134,520	0.37	103	+7.63	+14.36	+11.59	+6.12	1.33	-	-	-
BURKE & QUICK PART	<1	2	0.01%	65,455	0.25	14	+1.06	+14.36	+5.09	+6.12	14.39	-	21.82	-
CANACCORD GENUITY	<1	1	0.01%	122,186	0.04	53	+4.33	+14.36	3.55	+6.12	19.76	9.73	+7.71	-
LUMINEX TRADING	<1	1	0.00%	90,445	0.49	3	+0.30	+14.36	5.60	+6.12	25.85	-	-	-
B.RILEY & CO	<1	1	0.00%	72,486	0.40	26	+3.61	+14.36	45.45	+6.12	62.39	+91.61	38.04	-
HEIGHT SECURITIES	<1	1	0.00%	68,477	0.08	25	+3.58	+14.36	10.18	+6.12	26.96	11.17	+28.49	-

NOTES

- Brokers above made up 0.06 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

BROKER PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
ALLEN & CO	<1	1	0.00%	61,903	0.70	138	+22.36	+14.36	38.85	+6.12	37.04	-	47.44	-
KEEFE BRUYETTE WOODS	<1	2	0.00%	26,065	0.41	79	+15.06	+14.36	+33.66	+6.12	+28.16	+47.16	18.05	-
BREAN CAPITAL LLC	<1	1	0.00%	51,196	0.22	73	+14.27	+14.36	1.81	+6.12	8.09	11.83	24.89	-
CUTTONE COMPANY	<1	2	0.00%	22,180	0.35	63	+14.20	+14.36	+39.23	+6.12	+32.88	-	-	-
SANDLER ONEILL	<1	1	0.00%	43,033	0.18	40	+9.37	+14.36	7.72	+6.12	18.90	-	-	-
EUROZ SECURITIES LIM	<1	1	0.00%	808	N/A	0	+0.00	+14.72	619.18	+14.10	648.25	-	-	-

NOTES

- Brokers above made up 0.01 % of principal traded.



(+) = Cost

TRADE CYCLE DETAIL

AMERICAN CENTURY PERFORMANCE (FULL DAY VWAP)



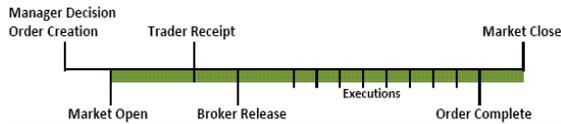
Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	153	289	7.24%	529,332	0.80	136,964	+8.95	+15.57	+15.82	+10.74	2.31	+2.29	0.37	-
CREDIT SUISSE	19	27	0.90%	701,538	0.48	14,667	+7.74	+15.82	2.45	+11.01	21.49	+9.19	14.32	-
SC BERNSTEIN	17	57	0.82%	304,345	0.62	9,718	+5.60	+14.82	0.74	+9.61	22.93	11.59	3.21	-
JP MORGAN CHASE	14	31	0.65%	443,627	0.92	11,500	+8.36	+15.49	+26.08	+10.13	+8.77	15.57	23.72	-
MORGAN STANLEY	11	14	0.52%	789,735	0.58	8,490	+7.68	+15.88	+13.10	+9.09	4.26	6.58	17.26	-
CITIGROUP	9	22	0.43%	413,991	0.80	7,712	+8.47	+15.46	+22.29	+10.08	+5.14	+34.60	+4.01	-
BNP PARIBAS	8	12	0.40%	699,570	0.61	10,777	+12.84	+14.35	+42.63	+14.02	+27.22	0.05	10.37	-
MERRILL LYNCH	7	15	0.33%	464,257	0.31	3,820	+5.49	+15.52	+23.22	+8.81	2.79	7.01	5.61	-
DAIWA SECURITIES	7	13	0.32%	516,585	0.46	6,716	+10.00	+17.14	6.79	+16.50	30.45	-	-	-
BARCLAYS	7	10	0.31%	654,677	0.80	8,094	+12.36	+15.39	+35.78	+10.06	+22.53	12.94	20.23	-
DEUTSCHE BANK	6	10	0.29%	618,371	0.65	7,325	+11.84	+15.41	+21.48	+16.58	+1.04	+55.74	12.32	-



(+) = Cost

TRADE CYCLE DETAIL

AQR CAPITAL PERFORMANCE (FULL DAY VWAP)



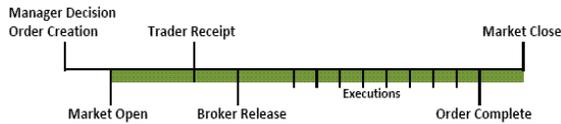
Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	30	521	1.44%	58,538	0.28	3,144	+1.03	+15.95	+5.58	+13.30	23.34	20.47	24.37	-
MORGAN STANLEY	10	180	0.46%	53,789	0.29	950	+0.98	+16.08	+6.85	+13.82	22.45	22.27	20.53	-
MERRILL LYNCH	9	126	0.43%	71,868	0.23	813	+0.90	+16.04	+6.56	+13.25	22.61	15.59	25.36	-
GOLDMAN SACHS	8	153	0.39%	53,149	0.27	783	+0.96	+16.01	+5.52	+14.26	24.38	22.25	23.66	-
INSTINET	3	54	0.16%	61,182	0.21	338	+1.02	+14.84	1.02	+10.07	26.63	22.48	30.27	-
CONVERGEX	<1	7	0.01%	43,701	0.28	245	+8.00	+19.15	+8.96	+8.14	10.35	-	19.54	-
BNP PARIBAS	<1	1	0.00%	19,152	0.36	15	+8.00	+19.15	+11.20	+8.14	8.11	-	-	-



(+) = Cost

TRADE CYCLE DETAIL

ASRS GTAA TRANSITION PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	444	705	21.03%	629,897	0.72	58,969	+1.33	+14.36	+32.39	+6.12	+13.33	-	37.57	-
STATE STREET BANK	444	705	21.03%	629,897	0.72	58,969	+1.33	+14.36	+32.39	+6.12	+13.33	-	-	-



(+) = Cost

TRADE CYCLE DETAIL

BRANDES INVESTMENT PARTNERS INT PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	33	34	1.58%	981,881	0.30	37,490	+11.23	+16.52	31.92	+12.01	49.09	1.19	16.85	-
MORGAN STANLEY	5	4	0.25%	1,300,327	0.76	7,313	+14.06	+21.68	44.57	+12.36	63.50	30.92	31.41	-
DEUTSCHE BANK	4	3	0.21%	1,498,516	0.35	4,496	+10.00	+17.14	15.77	+16.50	39.43	+22.66	-	-
GOLDMAN SACHS	4	7	0.18%	529,772	0.79	2,968	+8.00	+15.38	+32.83	+10.23	+15.22	35.28	25.52	-
MERRILL LYNCH	4	3	0.18%	1,235,998	0.39	4,227	+11.40	+14.86	+9.71	+10.60	4.36	35.72	+9.99	-
JEFFERIES & CO	3	3	0.13%	937,558	0.32	3,776	+13.42	+14.48	6.74	+9.61	17.49	22.10	+29.56	-
DAIWA SECURITIES	2	1	0.10%	2,084,481	0.30	2,084	+10.00	+17.14	8.32	+16.50	31.98	+78.22	-	-
JOH BERENBERG GOSSLE	2	1	0.09%	1,964,570	0.12	2,947	+15.00	+14.98	2.03	+11.04	13.06	-	-	-
CREDIT SUISSE	2	1	0.09%	1,951,094	N/A	0	+0.00	+14.66	394.06	+10.71	419.45	+37.56	21.74	-
PERSHING	2	2	0.08%	794,796	0.24	2,384	+15.00	+15.13	+1.28	+8.49	7.32	12.06	12.91	-
SC BERNSTEIN	<1	1	0.04%	853,334	0.18	1,280	+15.00	+15.13	+2.80	+8.49	5.72	+14.42	8.20	-



(+) = Cost

TRADE CYCLE DETAIL

DIMENSIONAL FUND ADVISORS EQFD PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	38	650	1.79%	58,045	0.20	14,177	+3.76	+14.36	+2.90	+6.12	13.82	+12.18	11.14	-
INSTINET	26	439	1.22%	58,902	0.62	9,299	+3.60	+14.36	+1.84	+6.12	15.04	+20.42	10.45	-
JEFFERIES & CO	9	171	0.42%	51,846	0.55	3,321	+3.75	+14.36	+10.51	+6.12	6.24	3.89	11.14	-
KNIGHT CAPITAL	3	35	0.14%	83,133	0.42	1,480	+5.09	+14.36	11.03	+6.12	26.38	15.87	19.08	-
CANTOR FITZGERALD	<1	3	0.00%	24,119	0.20	63	+8.76	+14.36	+47.45	+6.12	+35.78	-	16.85	-
JONES TRADING	<1	1	0.00%	13,065	1.21	10	+7.46	+14.36	74.29	+6.12	87.37	18.57	18.28	-
ROSENBLATT SECURITIE	<1	1	0.00%	10,433	1.97	4	+4.21	+14.36	165.91	+6.12	182.25	-	64.09	-



(+) = Cost

TRADE CYCLE DETAIL

DIMENSIONAL FUND ADVISORS INTL PERFORMANCE (FULL DAY VWAP)



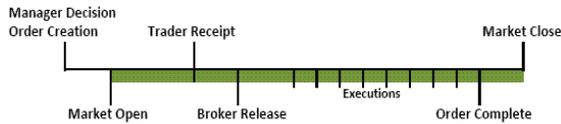
Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	12	931	0.56%	12,738	0.55	4,770	+4.02	+15.86	+1.24	+12.96	23.70	15.14	20.21	-
JEFFERIES & CO	3	234	0.15%	13,144	0.55	1,282	+4.17	+15.83	+0.95	+12.66	23.57	16.54	23.55	-
INSTINET	3	203	0.12%	12,645	0.55	1,012	+3.94	+15.60	+10.71	+13.09	14.36	8.71	24.06	-
ITG	2	133	0.08%	13,263	0.51	697	+3.95	+15.28	+7.29	+10.86	15.12	15.01	3.87	-
SOCIETE GENERALE	1	86	0.07%	16,565	0.57	602	+4.23	+15.13	8.09	+11.21	30.23	18.99	11.81	-
DAIWA SECURITIES	1	149	0.07%	9,471	0.67	507	+3.60	+17.14	+10.71	+16.50	19.35	41.40	23.24	-
SG SECURITIES	1	93	0.05%	10,862	0.63	371	+3.68	+16.97	+17.45	+15.00	10.70	30.19	16.80	-
KNIGHT CAPITAL	<1	31	0.03%	17,914	0.97	222	+4.00	+15.60	55.49	+12.84	80.03	+12.26	-	-
GOLDMAN SACHS	<1	1	0.00%	50,516	N/A	76	+15.00	+15.79	355.58	+8.78	364.31	-	-	-
EUROZ SECURITIES LIM	<1	1	0.00%	808	N/A	0	+0.00	+14.72	619.18	+14.10	648.25	-	-	-



(+) = Cost

TRADE CYCLE DETAIL

DOMESTIC TRANSITION PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	243	1,547	11.51%	157,074	0.28	41,335	+1.70	+14.36	+1.02	+6.12	17.64	22.37	25.47	-
BNP PARIBAS	81	515	3.85%	157,754	0.28	13,787	+1.70	+14.36	5.80	+6.12	24.47	-	-	-
ITG	81	516	3.83%	156,741	0.38	13,774	+1.70	+14.36	+4.02	+6.12	14.65	-	-	-
CREDIT SUISSE	81	516	3.83%	156,728	0.40	13,774	+1.70	+14.36	+4.88	+6.12	13.78	-	-	-



(+) = Cost

TRADE CYCLE DETAIL

E2 MODEL PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	138	1,035	6.54%	133,358	1.42	26,361	+1.91	+14.36	+8.79	+6.12	9.79	6.71	22.44	-
CITIGROUP	69	490	3.26%	140,680	1.31	12,673	+1.84	+14.36	2.35	+6.12	20.98	21.23	20.61	-
ITG	34	484	1.61%	70,244	0.61	5,838	+1.72	+14.36	+24.92	+6.12	+6.09	-	30.99	-
CREDIT SUISSE	30	44	1.40%	671,702	0.73	6,258	+2.12	+14.36	+12.53	+6.12	5.85	8.94	190.20	-
INSTINET	3	9	0.13%	313,527	1.20	768	+2.72	+14.36	+4.28	+6.12	13.38	18.24	27.50	-
BARCLAYS	2	7	0.10%	300,606	1.08	771	+3.66	+14.36	+47.33	+6.12	+30.59	+3.01	22.18	-
BNP PARIBAS	<1	1	0.03%	612,945	1.42	53	+0.86	+14.36	+85.03	+6.12	+65.35	4.97	24.03	-



(+) = Cost

TRADE CYCLE DETAIL

E3 MODEL PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	170	1,459	8.05%	116,590	1.26	45,857	+2.70	+14.36	+13.00	+6.12	4.77	36.01	34.34	-
INSTINET	148	612	6.99%	241,116	1.26	42,012	+2.85	+14.36	+8.47	+6.12	9.14	41.50	35.42	-
CITIGROUP	12	227	0.56%	51,910	0.39	2,054	+1.74	+14.36	+17.90	+6.12	0.81	62.12	43.74	-
BARCLAYS	11	620	0.51%	17,353	0.78	1,791	+1.66	+14.36	+70.23	+6.12	+51.42	65.49	+424.77	-



(+) = Cost

TRADE CYCLE DETAIL

E4 MODEL PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	162	1,285	7.65%	125,805	0.46	51,026	+3.16	+14.36	10.98	+6.12	28.29	0.95	+1.21	-
INSTINET	139	438	6.56%	316,436	1.28	42,383	+3.06	+14.36	11.30	+6.12	28.70	18.87	+192.49	-
CITIGROUP	17	403	0.80%	41,741	0.55	6,552	+3.89	+14.36	22.73	+6.12	39.29	+1.26	15.15	-
CREDIT SUISSE	4	436	0.19%	9,211	0.62	1,233	+3.07	+14.36	4.12	+6.12	21.54	+3.57	9.89	-
BARCLAYS	2	8	0.11%	277,922	0.46	858	+3.86	+14.36	+85.73	+6.12	+69.07	+0.78	0.59	-



(+) = Cost

TRADE CYCLE DETAIL

E6 PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	35	3,496	1.67%	10,068	0.56	12,743	+3.62	+14.36	12.99	+6.12	29.84	+3.79	5.20	-
BARCLAYS	18	1,480	0.86%	12,213	0.97	6,415	+3.55	+14.36	30.28	+6.12	47.19	10.57	+30.91	-
CITIGROUP	9	1,219	0.41%	7,061	0.73	3,418	+3.97	+14.36	+21.05	+6.12	+4.53	+29.95	+6.56	-
INSTINET	6	667	0.29%	9,029	0.50	2,053	+3.41	+14.36	6.04	+6.12	23.09	+2.16	11.99	-
ITG	2	130	0.12%	19,169	0.56	857	+3.44	+14.36	22.21	+6.12	39.25	23.85	107.96	-



(+) = Cost

TRADE CYCLE DETAIL

E7 MODEL PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	69	358	3.26%	192,582	0.61	13,975	+2.03	+14.36	+10.76	+6.12	7.68	12.80	7.88	-
INSTINET	56	130	2.63%	427,862	0.48	11,334	+2.04	+14.36	+11.26	+6.12	7.16	33.71	7.64	-
ITG	8	116	0.37%	67,276	0.61	1,577	+2.02	+14.36	6.88	+6.12	25.35	2.08	9.54	-
BNP PARIBAS	6	112	0.26%	49,270	0.59	1,064	+1.93	+14.36	+30.71	+6.12	+12.12	17.60	-	-



(+) = Cost

TRADE CYCLE DETAIL

ES MODEL PERFORMANCE (FULL DAY VWAP)



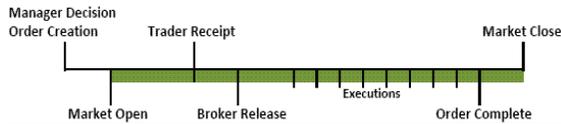
Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	125	447	5.91%	279,379	0.41	17,686	+1.42	+14.36	+4.27	+6.12	14.77	21.94	12.34	-
INSTINET	116	303	5.50%	383,450	0.41	16,297	+1.40	+14.36	+3.99	+6.12	15.07	21.18	11.59	-
BNP PARIBAS	9	144	0.41%	60,397	0.73	1,389	+1.60	+14.36	+8.08	+6.12	10.80	21.57	20.76	-



(+) = Cost

TRADE CYCLE DETAIL

FRANKLIN TEMPLETON PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	18	186	0.84%	95,547	0.53	27,975	+15.74	+14.67	5.09	+7.70	11.66	6.38	+12.68	-
ITG	4	65	0.21%	66,866	0.43	7,321	+16.85	+14.73	6.41	+7.36	11.55	16.69	31.70	-
MERRILL LYNCH	3	49	0.16%	67,282	1.01	5,247	+15.92	+15.89	14.70	+8.80	23.38	+9.95	25.50	-
CITIGROUP	3	3	0.14%	983,603	0.65	4,426	+15.00	+13.50	4.61	+7.09	10.31	4.19	-	-
BNP PARIBAS	3	21	0.14%	139,638	0.64	4,357	+14.86	+14.20	+4.26	+7.99	3.06	+14.15	+67.74	-
CREDIT SUISSE	1	14	0.07%	104,156	0.53	2,187	+15.00	+15.13	0.54	+8.49	8.92	14.26	4.91	-
JP MORGAN CHASE	1	3	0.06%	444,210	0.14	990	+7.43	+14.46	4.66	+6.51	18.10	-	-	-
NATL FINANCIAL SERVS	<1	19	0.03%	34,520	0.41	1,023	+15.60	+14.36	3.36	+6.12	8.19	-	-	-
STATE STREET BANK	<1	4	0.02%	114,914	0.12	1,704	+37.08	+14.36	+6.53	+6.12	+23.06	-	-	-
DEUTSCHE BANK	<1	3	0.01%	58,481	0.34	386	+21.99	+16.12	+0.42	+12.68	6.42	-	-	-
MORGAN STANLEY	<1	1	0.00%	86,628	0.26	130	+15.00	+15.13	10.24	+8.49	18.68	-	-	-



(+) = Cost

TRADE CYCLE DETAIL

INTECH LARGE CAP PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	115	199	5.44%	577,057	0.37	38,658	+3.37	+14.36	13.27	+6.12	30.34	24.09	12.45	-
WEEDEN & CO	37	53	1.75%	696,381	1.49	7,488	+2.03	+14.36	49.80	+6.12	68.16	-	-	-
GUZMAN & CO	18	35	0.86%	516,377	0.66	7,229	+4.00	+14.36	+1.11	+6.12	15.34	21.83	-	-
ROSENBLATT SECURITIE	14	34	0.67%	415,484	0.36	5,651	+4.00	+14.36	+6.61	+6.12	9.85	14.32	14.11	-
CREDIT SUISSE	10	11	0.46%	874,946	0.36	3,850	+4.00	+14.36	+10.36	+6.12	6.09	0.56	10.28	-
DEUTSCHE BANK	9	24	0.42%	369,178	0.33	3,544	+4.00	+14.36	+7.06	+6.12	9.42	27.61	32.54	-
UBS	8	17	0.36%	447,226	0.37	3,041	+4.00	+14.36	+6.52	+6.12	9.95	19.48	11.61	-
SC BERNSTEIN	6	6	0.27%	958,786	0.35	2,301	+4.00	+14.36	+17.25	+6.12	+0.79	15.75	-	-
JEFFERIES & CO	4	7	0.20%	589,896	0.42	1,652	+4.00	+14.36	14.02	+6.12	30.48	12.99	4.19	-
CAPITAL INSTL SVCS	4	7	0.19%	572,861	0.47	1,604	+4.00	+14.36	+4.04	+6.12	12.43	12.17	-	-
INSTINET	3	3	0.15%	1,065,343	0.06	1,278	+4.00	+14.36	4.51	+6.12	21.05	74.95	14.37	-



(+) = Cost

TRADE CYCLE DETAIL

LSV-US LARGE CAP VALUE PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	82	331	3.89%	247,997	0.52	11,805	+1.44	+14.36	+7.32	+6.12	11.67	25.78	21.63	-
CITIGROUP	27	24	1.27%	1,117,476	0.80	4,913	+1.83	+14.36	+27.30	+6.12	+8.76	52.62	31.72	-
CREDIT SUISSE	17	98	0.81%	174,055	0.55	1,794	+1.05	+14.36	+1.43	+6.12	17.99	16.00	21.14	-
UBS	12	50	0.55%	233,901	0.52	1,233	+1.05	+14.36	8.94	+6.12	28.32	25.52	22.66	-
MERRILL LYNCH	9	39	0.43%	232,055	0.31	790	+0.87	+14.36	+1.43	+6.12	18.12	29.84	20.84	-
ITG	6	55	0.28%	108,577	0.61	608	+1.02	+14.36	+0.56	+6.12	18.90	25.89	23.41	-
MORGAN STANLEY	4	31	0.17%	117,903	0.57	911	+2.49	+14.36	+2.81	+6.12	15.25	9.87	18.64	-
SUNGARD BROKERAGE	4	20	0.17%	179,419	0.38	291	+0.81	+14.36	16.91	+6.12	36.49	36.49	23.58	-
JP MORGAN CHASE	3	8	0.14%	358,003	0.41	1,040	+3.63	+14.36	1.86	+6.12	18.77	26.93	17.90	-
LIQUIDNET	1	6	0.07%	230,989	0.45	224	+1.62	+14.36	9.68	+6.12	28.58	30.53	-	-



(+) = Cost

TRADE CYCLE DETAIL

THOMPSON SIEGEL WALMSLEY PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	28	155	1.34%	183,229	0.44	31,053	+10.93	+16.21	9.13	+13.66	27.96	28.99	40.27	-
JP MORGAN CHASE	7	27	0.35%	270,343	0.66	7,232	+9.91	+15.72	2.67	+17.18	25.67	49.37	94.93	-
ITG	6	41	0.29%	151,615	0.81	5,925	+9.53	+17.39	5.00	+13.23	25.76	42.98	41.01	-
MORGAN STANLEY	3	15	0.13%	186,942	0.69	4,577	+16.32	+16.66	15.48	+10.26	26.15	5.70	34.74	-
MERRILL LYNCH	2	9	0.11%	261,689	0.98	3,177	+13.49	+14.86	15.99	+14.39	31.75	22.97	38.20	-
SC BERNSTEIN	2	17	0.08%	103,849	0.53	1,412	+8.00	+15.79	+0.43	+19.53	26.82	33.51	26.41	-
UBS	2	10	0.08%	164,870	0.70	1,889	+11.45	+15.40	43.03	+9.02	55.90	+17.86	18.78	-
CITIGROUP	1	6	0.06%	219,089	0.42	1,469	+11.17	+17.71	0.83	+9.08	15.96	59.18	+26.62	-
CONVERGEX	<1	5	0.04%	179,540	0.80	646	+7.20	+14.36	26.72	+6.12	40.01	46.54	+16.50	-
LIQUIDNET	<1	2	0.04%	440,373	0.14	470	+5.34	+14.36	1.82	+6.12	17.04	+21.00	-	-
INSTINET	<1	3	0.04%	248,577	0.52	373	+5.00	+17.53	0.74	+9.25	21.86	-	-	-



(+) = Cost

TRADE CYCLE DETAIL

TIMESQUARE CAPITAL MANAGEMENT PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	114	1,073	5.41%	106,399	0.80	133,381	+11.68	+14.36	9.62	+6.12	18.39	20.71	26.57	-
KNIGHT CAPITAL	15	104	0.71%	143,222	0.49	24,886	+16.71	+14.36	14.33	+6.12	18.07	26.35	17.79	-
RBC CAPITAL MARKETS	11	164	0.54%	70,025	0.58	7,176	+6.25	+14.36	+6.06	+6.12	8.15	32.59	30.06	-
CREDIT SUISSE	7	28	0.31%	236,083	0.46	9,715	+14.70	+14.36	1.01	+6.12	6.83	+164.23	15.45	-
JP MORGAN CHASE	6	45	0.28%	129,660	0.61	5,626	+9.64	+14.36	+6.66	+6.12	4.14	+5.24	24.66	-
JONES TRADING	6	30	0.27%	188,004	0.50	3,189	+5.65	+14.36	15.80	+6.12	30.54	31.78	19.80	-
RAYMOND JAMES	6	63	0.26%	88,328	0.67	9,405	+16.90	+14.36	+0.50	+6.12	3.07	44.59	11.65	-
LIQUIDNET	5	67	0.26%	81,139	0.82	3,309	+6.09	+14.36	57.01	+6.12	71.42	23.96	43.23	-
OPPENHEIMER & CO INC	5	51	0.24%	98,262	0.70	4,790	+9.56	+14.36	+9.55	+6.12	1.31	23.40	22.44	-
LOOP CAPITAL MARKETS	5	64	0.22%	71,822	0.80	3,777	+8.22	+14.36	11.57	+6.12	23.82	23.24	-	-
COWEN & CO	5	35	0.22%	131,134	0.72	5,920	+12.90	+14.36	5.32	+6.12	12.84	192.27	+11.90	-



(+) = Cost

TRADE CYCLE DETAIL

TRINITY STREET PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	56	94	2.67%	600,950	0.14	63,385	+11.22	+16.47	0.46	+14.79	20.68	13.59	43.18	-
MERRILL LYNCH	19	31	0.92%	626,064	0.34	7,763	+4.00	+16.37	+6.10	+12.70	19.45	41.18	47.99	-
INSTINET	10	21	0.48%	485,635	0.13	15,297	+15.00	+17.14	0.04	+16.50	18.70	24.51	27.71	-
DAIWA SECURITIES	9	16	0.41%	540,844	0.16	12,980	+15.00	+17.14	2.27	+16.50	20.93	14.68	15.22	-
CREDIT AGRICOLE	7	10	0.33%	695,304	0.14	10,430	+15.00	+17.14	+4.45	+16.50	14.21	24.04	-	-
GOLDMAN SACHS	5	7	0.25%	752,116	0.49	7,897	+15.00	+14.98	34.36	+11.04	45.39	+32.93	54.11	-
PARETO FONDS	2	3	0.08%	528,728	0.47	2,379	+15.00	+15.08	+15.87	+27.86	12.22	-	-	-
REDBURN PARTNERS LLP	2	1	0.07%	1,570,241	0.34	2,355	+15.00	+14.98	15.08	+11.04	26.11	-	-	-
UBS	1	2	0.07%	746,279	0.79	2,239	+15.00	+15.60	21.72	+21.45	43.78	+42.27	+19.14	-
LIBERUM CAPITAL LTD	1	3	0.06%	454,228	0.41	2,044	+15.00	+15.13	+41.22	+8.49	+32.71	20.82	-	-



(+) = Cost

TRADE CYCLE DETAIL

WELLINGTON MANAGEMENT CO PERFORMANCE (FULL DAY VWAP)



Broker	Principal Traded (\$ Millions)	Total Orders Traded	% Principal	Avg. Principal (\$)	E - Score	COMMISSION			MARKET IMPACT		TOTAL COST/SAVINGS	Commission+Fees+Full Day VWAP Vs. Universe TREND		
						Commission (\$)	Commission (bp)	Bundled Universe (bp)	Full Day VWAP (bp)	Universe Full Day VWAP (bp)	Commission+Fees+Full Day VWAP Vs. Universe (bp)	20153rd (bp)	20152nd (bp)	20151st (bp)
GRAND TOTAL	46	445	2.17%	103,079	0.18	25,232	+5.50	+14.36	+8.19	+6.12	6.77	25.50	14.30	-
JP MORGAN CHASE	4	32	0.21%	140,392	0.48	1,548	+3.44	+14.36	6.23	+6.12	23.22	+1.38	20.42	-
GOLDMAN SACHS	4	52	0.20%	81,162	0.60	2,398	+5.68	+14.36	+10.23	+6.12	4.53	+24.73	67.32	-
JEFFERIES & CO	4	41	0.19%	99,771	0.58	1,955	+4.78	+14.36	+21.51	+6.12	+5.86	41.20	+12.91	-
MORGAN STANLEY	3	24	0.13%	116,428	0.66	1,510	+5.40	+14.36	+13.26	+6.12	1.79	10.35	16.60	-
BAIRD, ROBERT W	3	14	0.13%	192,865	0.63	2,205	+8.17	+14.36	+24.41	+6.12	+12.07	61.38	+54.33	-
SC BERNSTEIN	3	24	0.12%	105,690	0.47	1,526	+6.02	+14.36	20.95	+6.12	35.39	39.55	0.75	-
LIQUIDNET	2	27	0.11%	84,658	0.63	361	+1.58	+14.36	+38.32	+6.12	+19.47	66.04	25.50	-
RAYMOND JAMES	2	14	0.09%	140,802	0.33	1,050	+5.33	+14.36	+3.41	+6.12	11.72	25.03	5.77	-
UBS	2	21	0.09%	85,772	0.34	816	+4.53	+14.36	+0.36	+6.12	15.56	11.94	15.83	-
ISI GROUP INC	1	20	0.07%	73,066	0.84	345	+2.36	+14.36	+11.15	+6.12	6.95	115.32	11.45	-



(+) = Cost

TRADE DETAIL ANALYSIS

Largest Principal Volume Traded

							Market Impact
Name	# Orders	Shares	Net Principal (\$)	Principal (\$)	% of Volume	E - Score	Full Day VWAP (bp)
APPLE INC COMMON STOCK USD.000	11	383,500	39,901,945	42,459,442	0.10%	0.60	+27.64
MICROSOFT CORP COMMON STOCK US	19	758,600	33,638,972	40,677,758	0.18%	0.57	+4.66
FACEBOOK INC A COMMON STOCK US	12	192,600	17,390,862	20,152,361	0.09%	0.97	+28.83
ALTRIA GROUP INC COMMON STOCK	15	344,000	18,237,118	19,769,503	0.54%	1.11	+65.96
GILEAD SCIENCES INC COMMON STO	8	185,000	17,875,016	18,948,936	0.34%	0.68	+27.29
ALLERGAN PLC COMMON STOCK USD.	10	58,906	15,576,842	17,852,361	0.20%	1.00	+46.66
LOWE S COS INC COMMON STOCK US	12	225,600	3,971,354	16,871,724	0.54%	0.44	+25.37
CVS HEALTH CORP COMMON STOCK U	10	159,900	13,611,560	15,092,442	0.23%	1.11	+103.79
WALT DISNEY CO/THE COMMON STOC	9	121,300	12,998,890	13,655,479	0.18%	0.98	+20.80
ELI LILLY + CO COMMON STOCK	15	140,300	10,491,524	11,840,758	0.37%	0.50	9.74

Names Most Traded - Total Orders (\$)

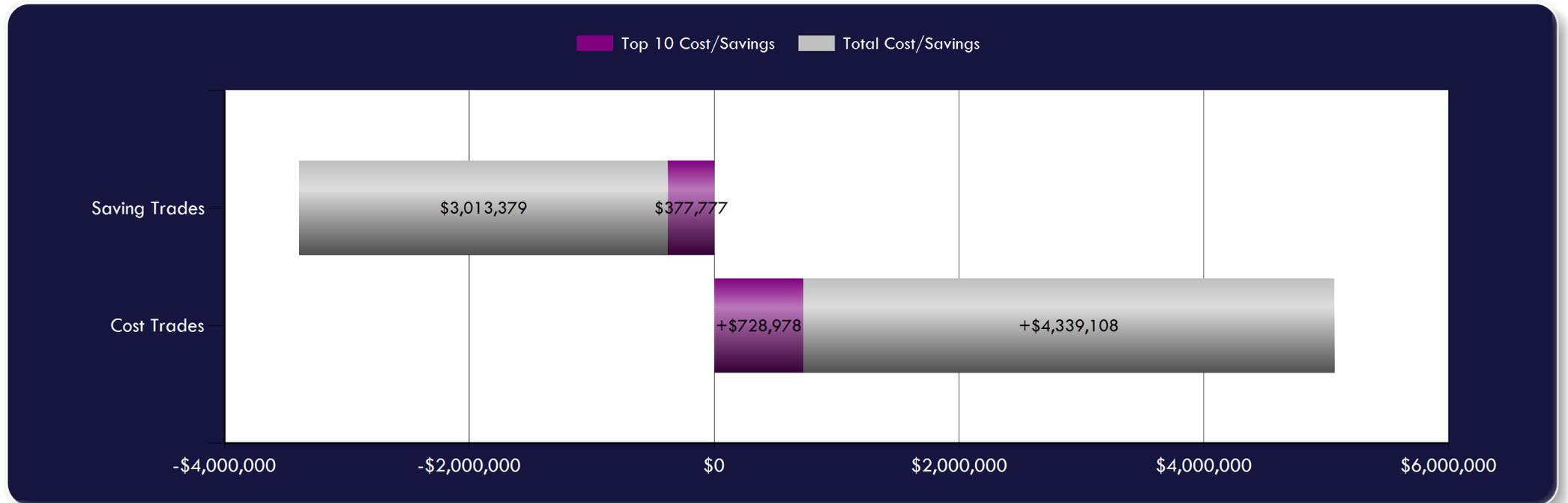
							Market Impact
Name	# Orders	Shares	Net Principal (\$)	Commission (bp)	% of Volume	E - Score	Full Day VWAP (bp)
DIANA SHIPPING INC COMMON STOC	61	428,682	-2,057,067	+42.82	1.49%	0.27	6.26
AMEC FOSTER WHEELER PLC COMMON	59	676,766	-4,616,870	+13.33	0.55%	0.55	11.98
JACK HENRY + ASSOCIATES INC CO	56	130,490	7,515,724	+3.78	0.57%	0.67	+5.28
DIGITALGLOBE INC COMMON STOCK	50	144,500	2,386,428	+26.70	0.35%	0.51	10.67
AMDOCS LTD COMMON STOCK GBP.00	41	53,800	3,131,129	+1.25	0.22%	0.48	10.44
SYNCHRONOSS TECHNOLOGIES INC C	36	92,300	-3,324,272	+9.29	0.73%	0.47	2.37
CAL MAINE FOODS INC COMMON STO	36	41,200	-2,242,657	+1.29	0.19%	0.67	+26.20
WISDOMTREE INVESTMENTS INC COM	36	136,447	1,773,692	+19.60	0.20%	0.69	35.84
UNITED THERAPEUTICS CORP COMMO	35	18,188	-2,645,513	+0.52	0.10%	0.69	2.00
UNIVERSAL HEALTH SERVICES B CO	32	34,002	2,233,022	+1.65	0.18%	0.83	46.72



(+) = Cost

TRADE CONTRIBUTIONS

Cost/Savings Performance				
Category	Principal USD	# of Trades	Avg. Market Impact (bp)	Percentage of all Cost/Savings
10 High Cost Trades	83,109,901	10	+102.90	14.38%
Cost Trades	1,231,668,321	7,988	+46.51	100.00%
Saving Trades	880,271,319	7,249	45.96	100.00%
10 Low Cost Trades	21,842,654	10	220.65	11.14%





(+) = Cost

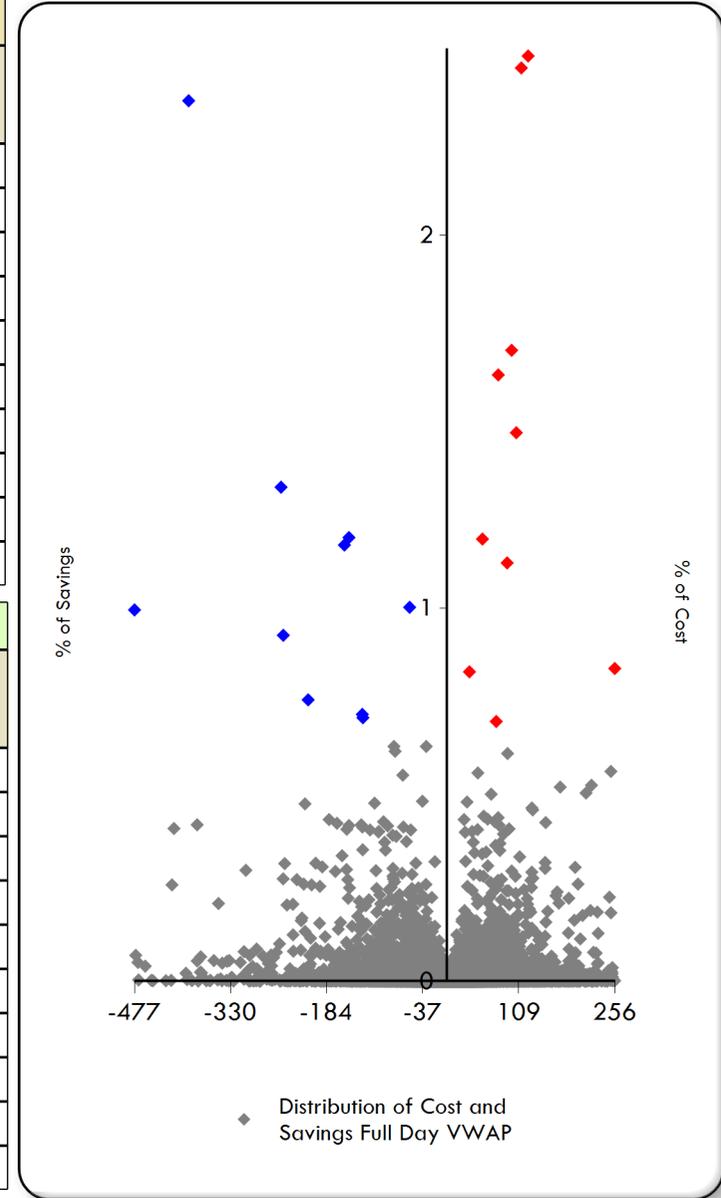
TRADE LEVEL DETAILS

10 High Cost Trades (Full Day VWAP)

Side	Country	Security	Trade Date	Principal (\$)	Cost (%)	E - Score	Full Day VWAP (bp)	Manager	Exbroker
Sell	US	CVS HEALTH	20151216	10,040,641	2.48%	1.19	+123.65	ASRS	STATE
Sell	US	ALTRIA GRO	20151216	10,838,164	2.45%	1.16	+113.16	ASRS	STATE
Sell	US	APPLE INC	20151215	8,621,203	1.69%	1.29	+98.40	ASRS	STATE
Sell	US	FACEBOOK I	20151216	10,470,840	1.63%	0.86	+78.04	ASRS	STATE
Buy	US	SYNCHRONY	20151203	7,134,595	1.47%	0.68	+105.53	E2 MO	CREDI
Sell	US	ALLERGAN P	20151216	11,082,937	1.19%	0.69	+53.91	ASRS	STATE
Buy	US	ILLUMINA I	20151117	6,260,625	1.12%	1.30	+91.56	E2 MO	CITIG
Buy	US	J2 GLOBAL	20151211	1,704,268	0.84%	1.91	+255.71	E3 MO	BARCL
Sell	US	GILEAD SCI	20151216	12,281,592	0.83%	0.68	+34.09	ASRS	STATE
Sell	US	UNION PACI	20151216	4,675,035	0.70%	0.91	+74.92	ASRS	STATE

10 Low Cost Trades (Full Day VWAP)

Side	Country	Security	Trade Date	Principal (\$)	Savings (%)	E - Score	Full Day VWAP (bp)	Manager	Exbroker
Buy	SWI	CREDIT SUI	20151119	1,951,094	2.36%	N/A	394.06	BRAND	CREDI
Sell	US	J2 GLOBAL	20151211	1,818,369	1.32%	1.88	253.15	E6	BARCL
Buy	US	COMPUTER S	20151130	2,654,671	1.19%	0.69	149.63	E4 MO	CITIG
Sell	US	FACEBOOK I	20151116	2,569,788	1.17%	0.81	156.63	INTEC	WEEDE
Sell	US	MICROSOFT	20151116	5,978,668	1.00%	1.05	57.13	INTEC	WEEDE
Buy	US	PAYCOM SOF	20151112	674,400	1.00%	N/A	476.62	TIMES	BARCL
Buy	US	CDK GLOBAL	20151218	1,226,368	0.93%	1.56	249.81	E3 MO	INSTI
Buy	US	CASEY S GE	20151218	1,181,400	0.75%	1.13	211.81	E3 MO	INSTI
Sell	US	AMSURG COR	20151014	1,898,258	0.71%	0.04	129.35	E6	BARCL
Sell	US	MARKETAXES	20151030	1,889,638	0.71%	0.96	128.34	E6	BARCL



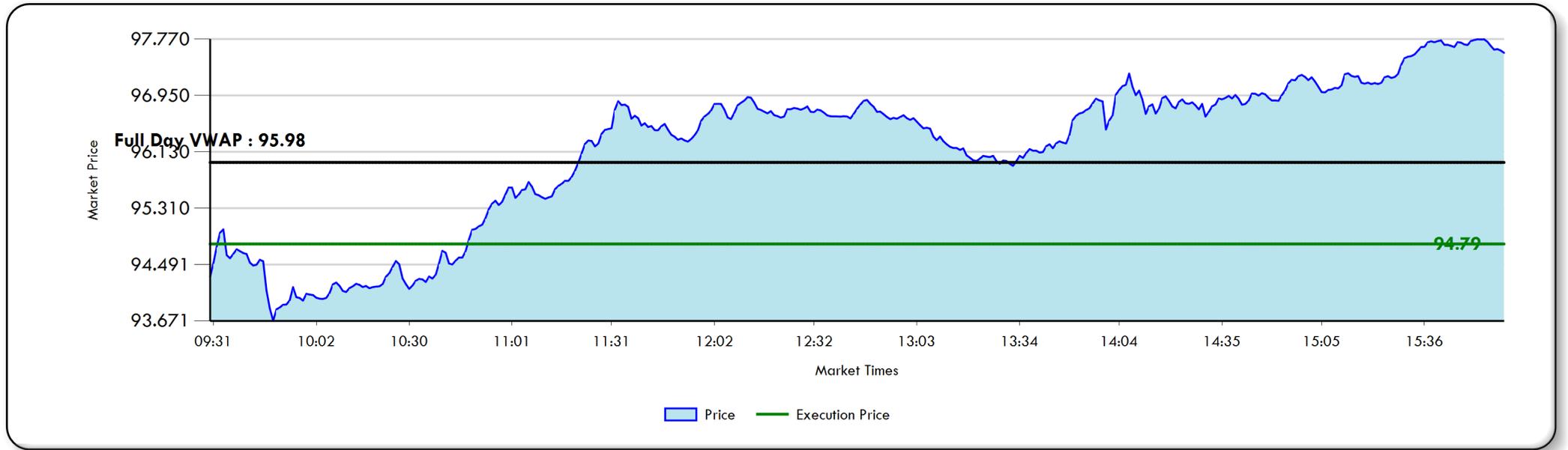


(+) = Cost

TRADE LEVEL DETAIL - HIGH COST

CVS HEALTH CORP COMMON STOCK U - 20151216

Side	Manager	Broker	Country	Currency	CUSIP	Time In	Time Out	Principal	Client Price	Full Day VWAP	Cost Full Day VWAP	Cost Full Day VWAP	E - Score	Volume
								(\$)			(\$)	(bp)		(%)
S	ASRS GTAA TRANSITION	STATE STREET BANK	US	USD	2577609	12/16/2015 09:30:00	12/16/2015 16:00:00	10,040,641	94.79	95.98	+125,710	+123.65	1.19	1.29



NOTES

- Out of all your high cost trades that lost to Full Day VWAP, this order made up 2.48% of your market impact cost.

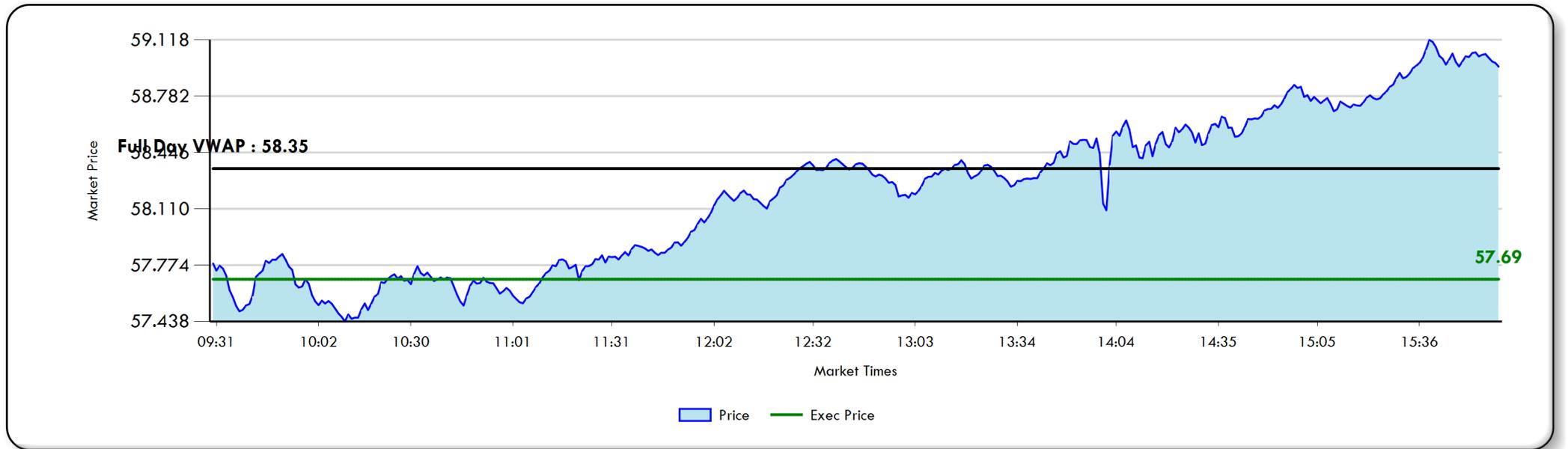


(+) = Cost

TRADE LEVEL DETAIL - HIGH COST

ALTRIA GROUP INC COMMON STOCK - 20151216

Side	Manager	Broker	Country	Currency	CUSIP	Time In	Time Out	Principal	Client Price	Full Day VWAP	Cost Full Day VWAP	Cost Full Day VWAP	E - Score	Volume
								(\$)			(\$)	(bp)		(%)
S	ASRS GTAA TRANSITION	STATE STREET BANK	US	USD	2692632	12/16/2015 09:30:00	12/16/2015 16:00:00	10,838,164	57.69	58.35	+124,047	+113.15	1.16	3.77



NOTES

- Out of all your high cost trades that lost to Full Day VWAP, this order made up 2.45% of your market impact cost.

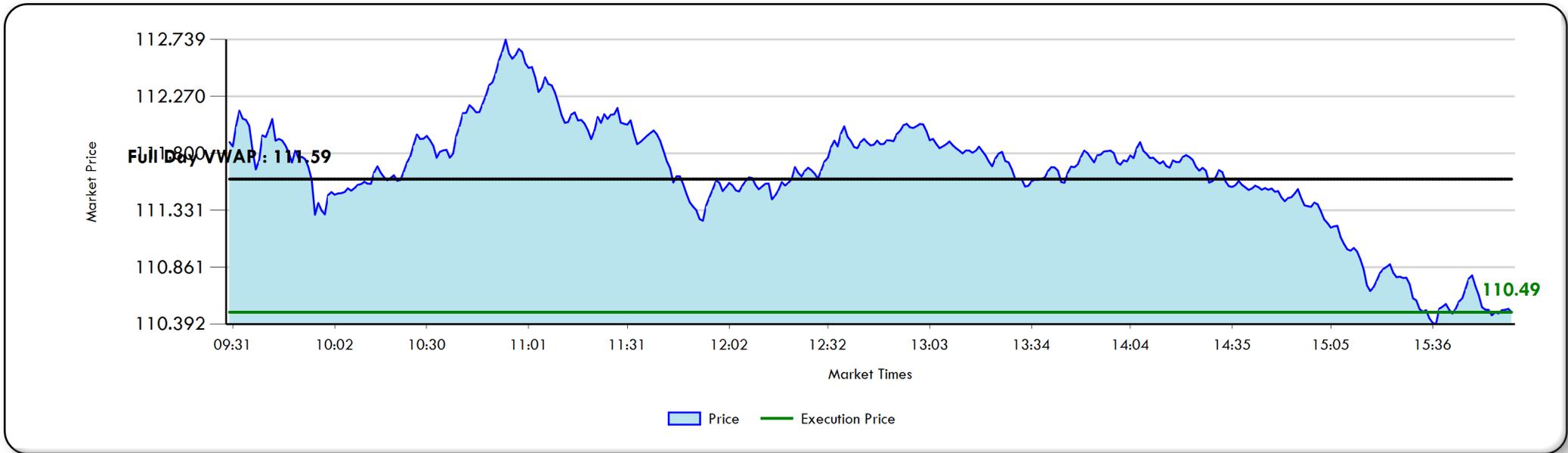


(+) = Cost

TRADE LEVEL DETAIL - HIGH COST

APPLE INC COMMON STOCK USD.000 - 20151215

Side	Manager	Broker	Country	Currency	CUSIP	Time In	Time Out	Principal	Client Price	Full Day VWAP	Cost Full Day VWAP	Cost Full Day VWAP	E - Score	Volume
								(\$)			(\$)	(bp)		(%)
S	ASRS GTAA TRANSITION	STATE STREET BANK	US	USD	2046251	12/15/2015 09:30:00	12/15/2015 16:00:00	8,621,203	110.49	111.59	+85,679	+98.40	1.29	0.21



NOTES

- Out of all your high cost trades that lost to Full Day VWAP, this order made up 1.69% of your market impact cost.

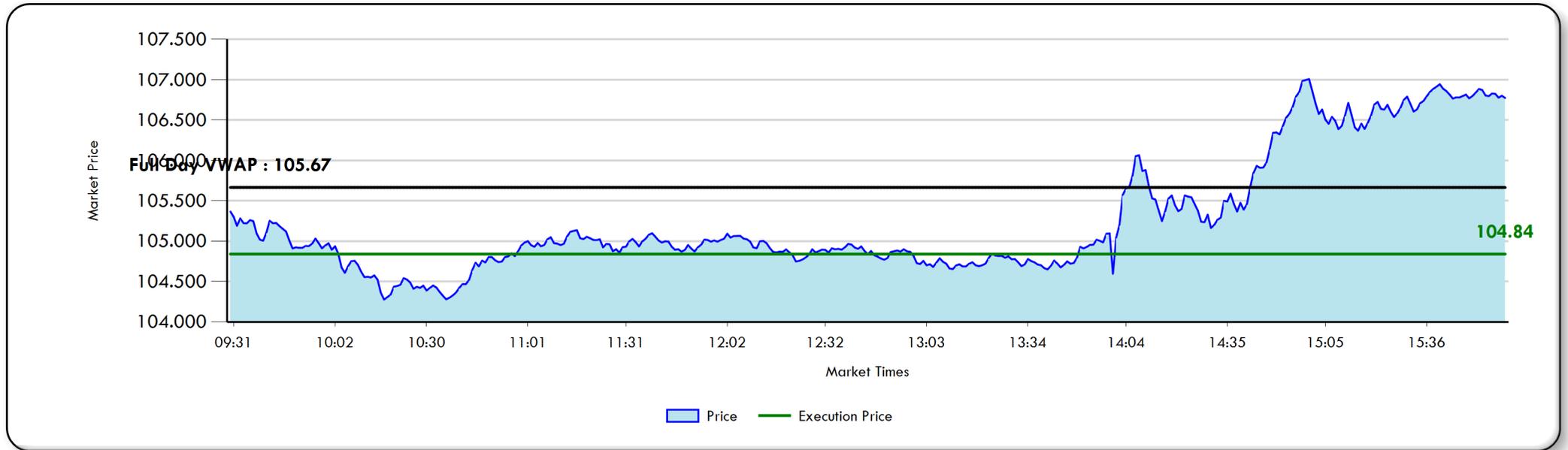


(+) = Cost

TRADE LEVEL DETAIL - HIGH COST

FACEBOOK INC A COMMON STOCK US - 20151216

Side	Manager	Broker	Country	Currency	CUSIP	Time In	Time Out	Principal	Client Price	Full Day VWAP	Cost Full Day VWAP	Cost Full Day VWAP	E - Score	Volume
								(\$)			(\$)	(bp)		(%)
S	ASRS GTAA TRANSITION	STATE STREET BANK	US	USD	B7TL820	12/16/2015 09:30:00	12/16/2015 16:00:00	10,470,840	104.84	105.67	+82,362	+78.04	0.86	0.64



NOTES

- Out of all your high cost trades that lost to Full Day VWAP, this order made up 1.63% of your market impact cost.

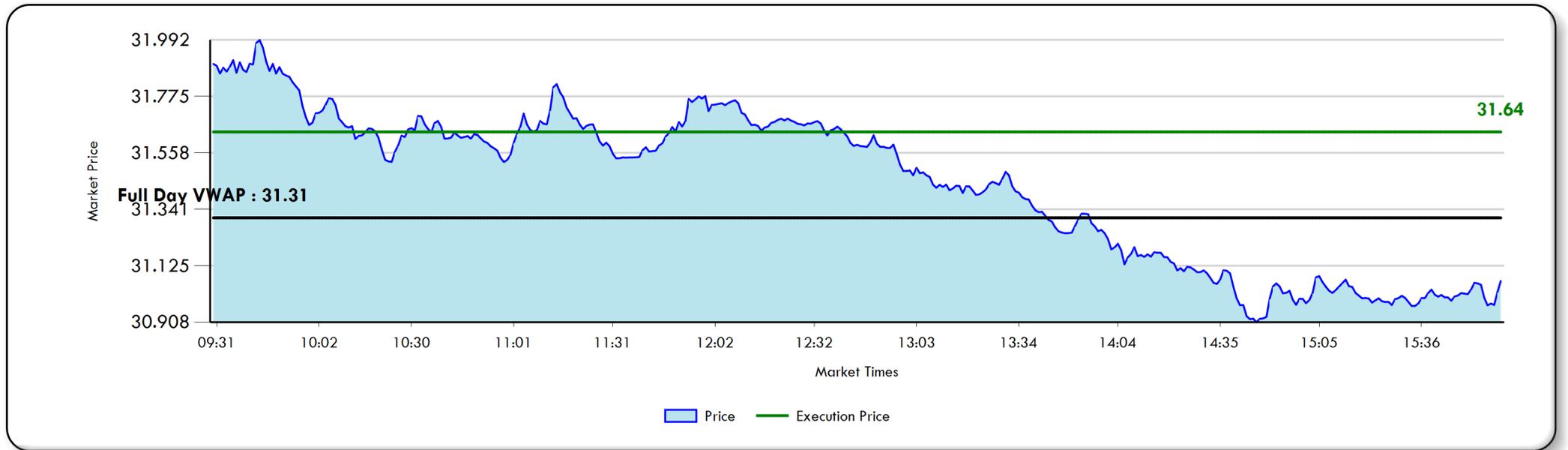


(+) = Cost

TRADE LEVEL DETAIL - HIGH COST

SYNCHRONY FINANCIAL COMMON STO - 20151203

Side	Manager	Broker	Country	Currency	CUSIP	Time In	Time Out	Principal	Client Price	Full Day VWAP	Cost Full Day VWAP	Cost Full Day VWAP	E - Score	Volume
								(\$)			(\$)	(bp)		(%)
B	E2 MODEL	CREDIT SUISSE	US	USD	BP96PS6	12/03/2015 09:30:00	12/03/2015 16:00:00	7,134,595	31.64	31.31	+74,505	+105.53	0.68	1.85



NOTES

- Out of all your high cost trades that lost to Full Day VWAP, this order made up 1.47% of your market impact cost.

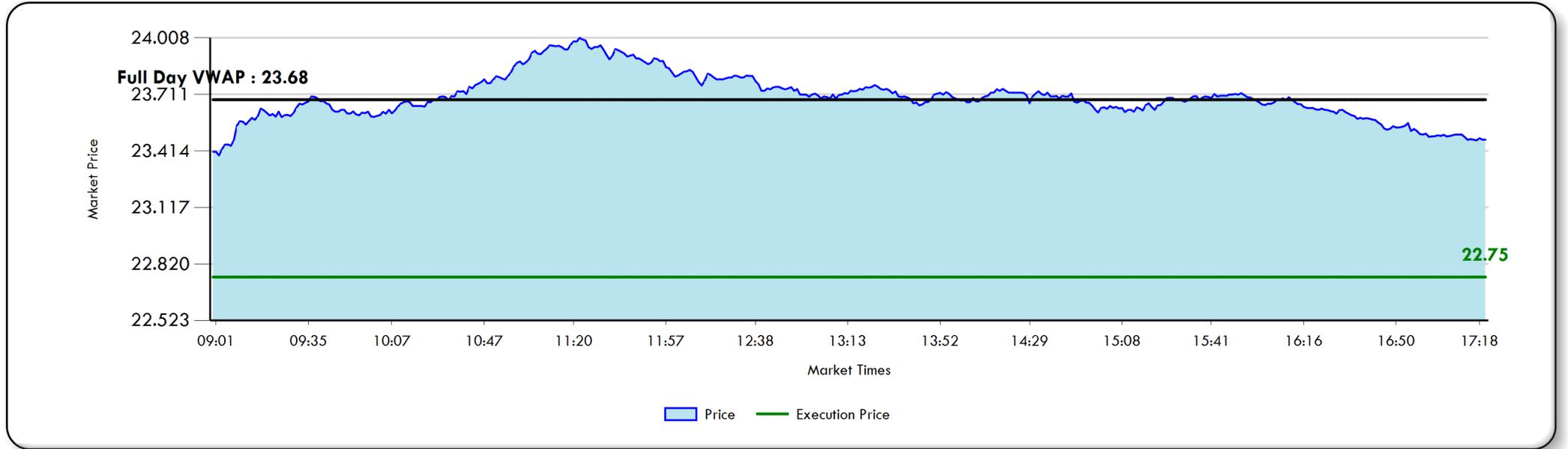


(+) = Cost

TRADE LEVEL DETAIL - LOW COST

CREDIT SUISSE GROUP AG REG COM - 20151119

Side	Manager	Broker	Country	Currency	CUSIP	Time In	Time Out	Principal	Client Price	Full Day VWAP	Cost Full Day VWAP	Cost Full Day VWAP	E - Score	Volume
								(\$)			(\$)	(bp)		(%)
B	BRANDES INVESTMENT PARTNERS INT	CREDIT SUISSE	SWI	CHF	7171589	11/19/2015 09:00:00	11/19/2015 17:20:00	1,951,094	22.75	23.68	80,040	394.06	N/A	2.11



NOTES

- Out of all your low cost trades that beat to Full Day VWAP, this order made up 2.36% of your market impact cost.

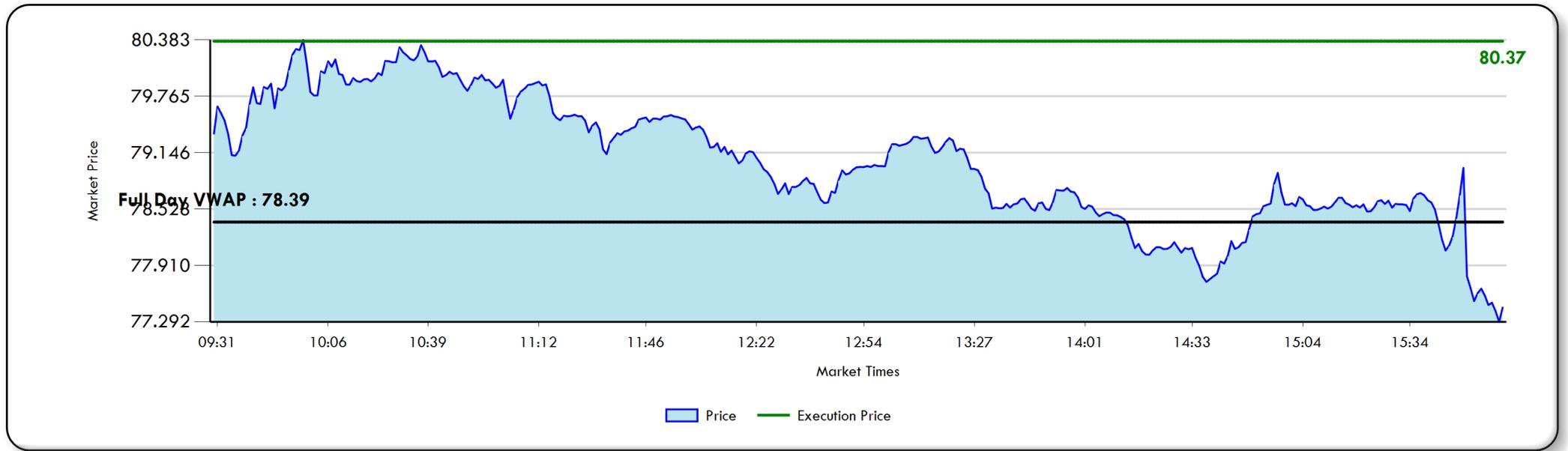


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TRADE LEVEL DETAIL - LOW COST

J2 GLOBAL INC COMMON STOCK USD - 20151211

Side	Manager	Broker	Country	Currency	CUSIP	Time In	Time Out	Principal	Client Price	Full Day VWAP	Cost Full Day VWAP	Cost Full Day VWAP	E - Score	Volume
								(\$)			(\$)	(bp)		(%)
S	E6	BARCLAYS	US	USD	B75DGJ3	12/11/2015 09:30:00	12/11/2015 16:00:00	1,818,369	80.37	78.39	44,895	253.14	1.88	2.28



NOTES

- Out of all your low cost trades that beat to Full Day VWAP, this order made up 1.32% of your market impact cost.

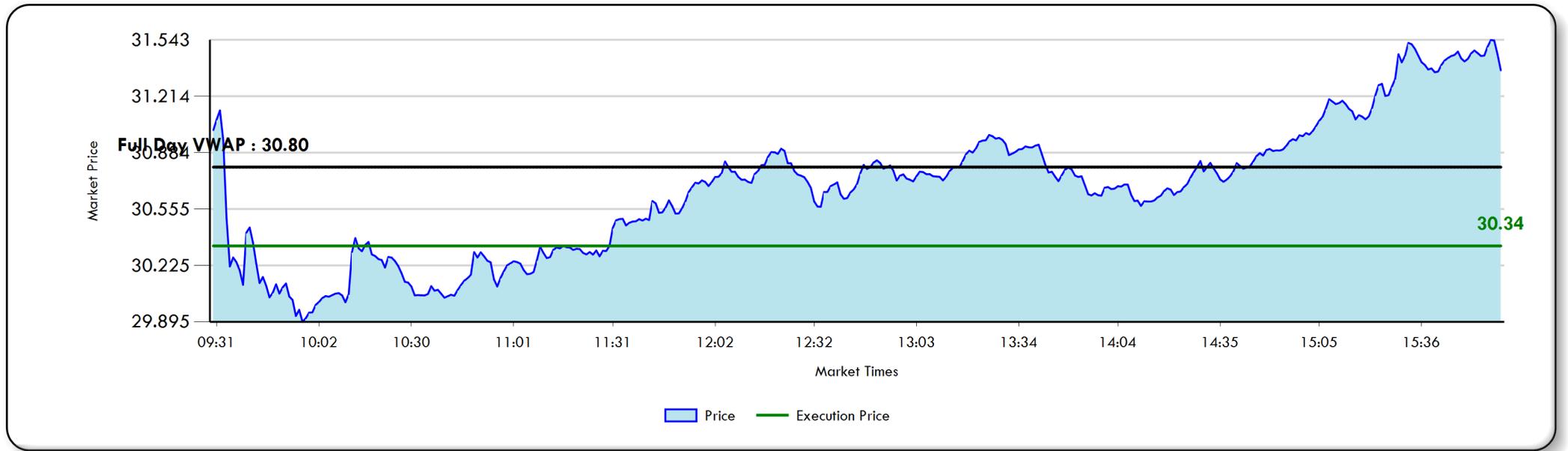


(+) = Cost

TRADE LEVEL DETAIL - LOW COST

COMPUTER SCIENCES CORP COMMON - 20151130

Side	Manager	Broker	Country	Currency	CUSIP	Time In	Time Out	Principal	Client Price	Full Day VWAP	Cost Full Day VWAP	Cost Full Day VWAP	E - Score	Volume
								(\$)			(\$)	(bp)		(%)
B	E4 MODEL	CITIGROUP	US	USD	2215200	11/30/2015 09:30:00	11/30/2015 16:00:00	2,654,671	30.34	30.80	40,325	149.63	0.69	0.86



NOTES

- Out of all your low cost trades that beat to Full Day VWAP, this order made up 1.19% of your market impact cost.

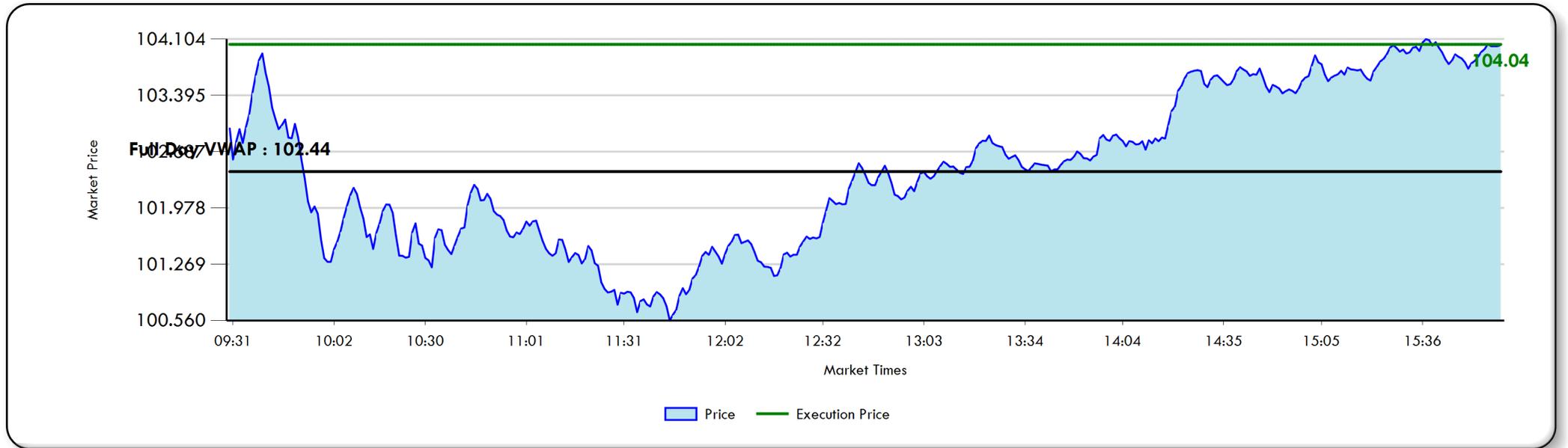


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TRADE LEVEL DETAIL - LOW COST

FACEBOOK INC A COMMON STOCK US - 20151116

Side	Manager	Broker	Country	Currency	CUSIP	Time In	Time Out	Principal	Client Price	Full Day VWAP	Cost Full Day VWAP	Cost Full Day VWAP	E - Score	Volume
								(\$)			(\$)	(bp)		(%)
S	INTECH LARGE CAP	WEEDEN & CO	US	USD	B7TL820	11/16/2015 09:30:00	11/16/2015 16:00:00	2,569,788	104.04	102.44	39,630	156.63	0.81	0.06



NOTES

- Out of all your low cost trades that beat to Full Day VWAP, this order made up 1.17% of your market impact cost.

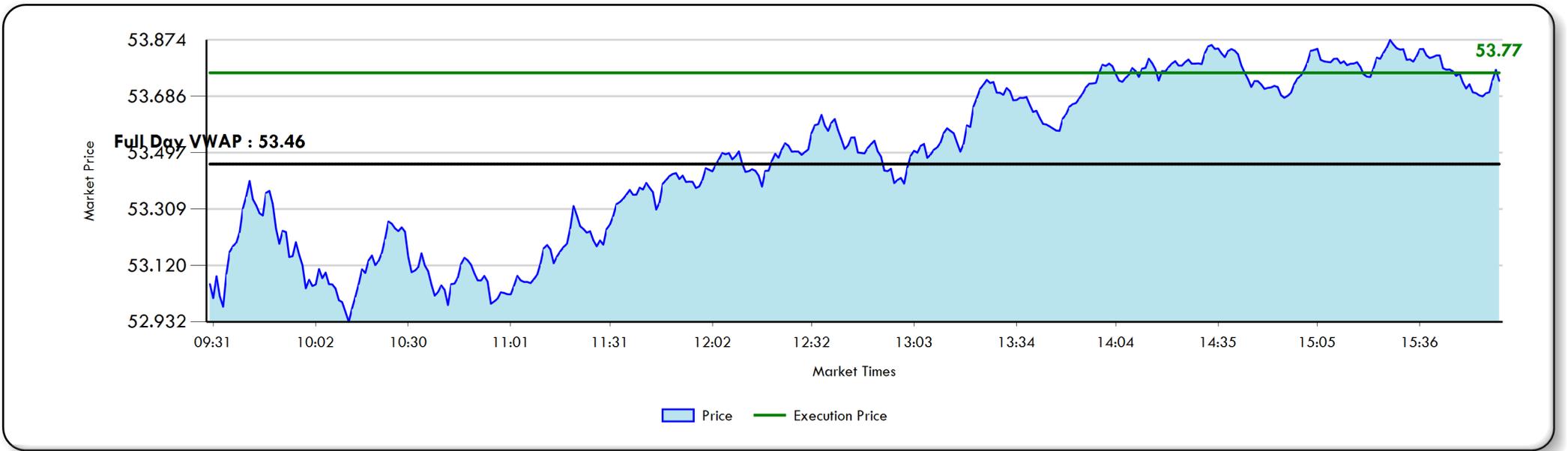


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TRADE LEVEL DETAIL - LOW COST

MICROSOFT CORP COMMON STOCK US - 20151116

Side	Manager	Broker	Country	Currency	CUSIP	Time In	Time Out	Principal	Client Price	Full Day VWAP	Cost Full Day VWAP	Cost Full Day VWAP	E - Score	Volume
								(\$)			(\$)	(bp)		(%)
S	INTECH LARGE CAP	WEEDEN & CO	US	USD	2588173	11/16/2015 09:30:00	11/16/2015 16:00:00	5,978,668	53.77	53.46	33,964	57.13	1.05	0.51



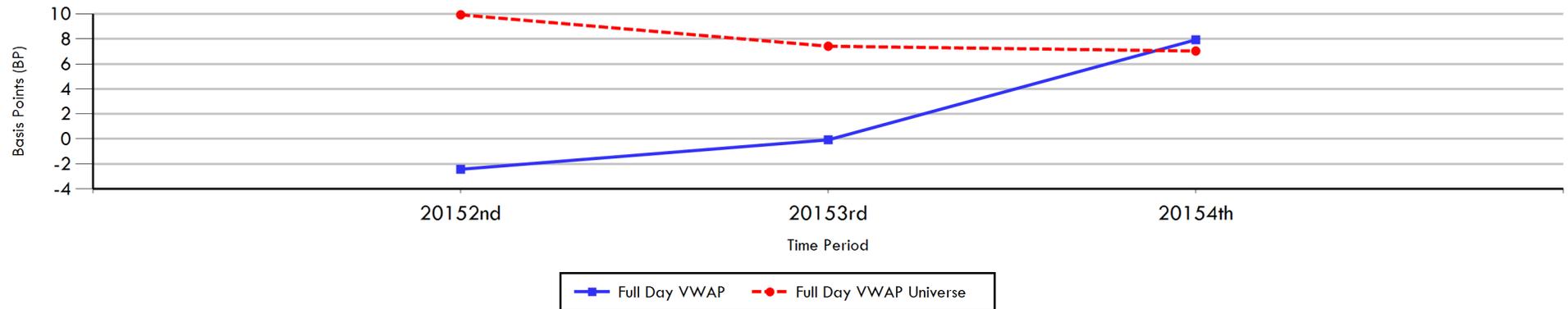
NOTES

- Out of all your high cost trades that lost to Full Day VWAP, this order made up 1.00% of your market impact cost.

TRADE HISTORY

Period	Total Principal (\$)	Commission (bp)	Commission Universe (bp)	Fees (bp)	Fees Universe (bp)	Full Day VWAP (bp)	Full Day VWAP Universe (bp)	Total Cost/Savings Vs. Universe (bp)
20152nd	6,684,755,111	+3.03	+15.94	+4.12	+4.34	2.43	+9.93	25.48
20153rd	2,286,114,686	+3.72	+14.54	+1.38	+1.47	0.08	+7.42	18.40
20154th	2,111,952,012	+3.77	+14.60	+1.20	+1.23	+7.93	+7.04	9.96

TRADE HISTORY





Elkins/McSherry Global Universe

Country	Price	Commission	Fees	Market Impact	Total
ARGENTINA	2.97 BP	42.15 BP	0.00 BP	24.97 BP	67.12 BP
AUSTRALIA	4.92 BP	14.72 BP	0.25 BP	14.10 BP	29.07 BP
AUSTRIA	16.30 BP	13.85 BP	0.00 BP	16.17 BP	30.02 BP
BELGIUM	45.73 BP	15.24 BP	0.01 BP	13.83 BP	29.08 BP
BRAZIL	6.02 BP	27.19 BP	1.91 BP	12.79 BP	41.89 BP
CANADA	18.41 BP	16.21 BP	0.01 BP	14.53 BP	30.75 BP
CHILE	0.24 BP	21.31 BP	0.45 BP	10.69 BP	32.45 BP
CHINA	2.40 BP	13.61 BP	5.65 BP	13.30 BP	32.56 BP
COLOMBIA	1.50 BP	21.01 BP	0.21 BP	13.93 BP	35.15 BP
CZECH REPUBLIC	25.32 BP	19.82 BP	0.00 BP	9.42 BP	29.24 BP
DENMARK	37.64 BP	14.97 BP	0.00 BP	22.57 BP	37.54 BP
EGYPT	2.26 BP	25.12 BP	18.22 BP	14.94 BP	58.28 BP
FINLAND	15.82 BP	14.67 BP	0.06 BP	12.36 BP	27.09 BP
FRANCE - BUYS	46.64 BP	15.88 BP	20.00 BP	7.03 BP	42.91 BP
FRANCE - SELLS	37.66 BP	14.98 BP	0.01 BP	11.04 BP	26.03 BP
GERMANY	40.88 BP	14.38 BP	0.00 BP	9.62 BP	24.00 BP
GREECE	1.58 BP	16.89 BP	3.05 BP	42.74 BP	62.68 BP
HONG KONG	1.51 BP	15.79 BP	9.94 BP	8.78 BP	34.51 BP
HUNGARY	9.40 BP	17.19 BP	0.04 BP	12.46 BP	29.69 BP
INDIA	7.08 BP	16.95 BP	10.63 BP	17.89 BP	45.47 BP



Elkins/McSherry Global Universe

Country	Price	Commission	Fees	Market Impact	Total
INDONESIA	0.37 BP	19.94 BP	9.51 BP	15.59 BP	45.04 BP
IRELAND - BUYS	1.74 BP	19.43 BP	100.00 BP	15.29 BP	134.72 BP
IRELAND - SELLS	3.89 BP	14.36 BP	0.41 BP	14.26 BP	29.03 BP
ISRAEL	5.63 BP	19.15 BP	0.02 BP	8.14 BP	27.31 BP
ITALY - BUYS	3.94 BP	18.17 BP	12.00 BP	16.59 BP	46.76 BP
ITALY - SELLS	5.57 BP	17.32 BP	1.33 BP	13.31 BP	31.96 BP
JAPAN	15.02 BP	17.14 BP	0.02 BP	16.50 BP	33.66 BP
KOREA - BUYS	70.89 BP	20.46 BP	0.00 BP	12.66 BP	33.12 BP
KOREA - SELLS	77.50 BP	16.49 BP	27.13 BP	14.38 BP	58.00 BP
LUXEMBOURG	84.13 BP	4.99 BP	0.00 BP	15.58 BP	20.57 BP
MALAYSIA	1.62 BP	21.87 BP	3.46 BP	15.99 BP	41.32 BP
MEXICO	2.53 BP	17.20 BP	0.00 BP	7.48 BP	24.68 BP
NETHERLANDS	20.41 BP	13.50 BP	0.11 BP	7.09 BP	20.70 BP
NEW ZEALAND	3.11 BP	14.53 BP	0.00 BP	33.96 BP	48.49 BP
NORWAY	9.36 BP	15.08 BP	0.15 BP	27.86 BP	43.09 BP
PERU	2.55 BP	23.22 BP	1.33 BP	20.20 BP	44.75 BP
PHILIPPINES	1.01 BP	20.67 BP	28.34 BP	9.61 BP	58.62 BP
POLAND	9.59 BP	18.56 BP	0.00 BP	21.03 BP	39.59 BP
PORTUGAL	1.77 BP	15.01 BP	0.00 BP	15.95 BP	30.96 BP
RUSSIA	0.02 BP	17.62 BP	0.03 BP	23.58 BP	41.23 BP



Elkins/McSherry Global Universe

Country	Price	Commission	Fees	Market Impact	Total
SINGAPORE	2.70 BP	17.53 BP	3.34 BP	9.25 BP	30.12 BP
SOUTH AFRICA - BUYS	6.91 BP	16.77 BP	21.78 BP	10.46 BP	49.01 BP
SOUTH AFRICA - SELLS	11.32 BP	16.09 BP	0.02 BP	20.15 BP	36.26 BP
SPAIN	5.69 BP	15.85 BP	0.00 BP	25.61 BP	41.46 BP
SWEDEN	11.12 BP	15.87 BP	0.00 BP	5.43 BP	21.30 BP
SWITZERLAND	88.46 BP	14.66 BP	0.02 BP	10.71 BP	25.39 BP
TAIWAN - BUYS	1.89 BP	16.37 BP	0.00 BP	6.84 BP	23.21 BP
TAIWAN - SELLS	2.17 BP	15.52 BP	26.92 BP	16.53 BP	58.97 BP
THAILAND	2.26 BP	18.74 BP	0.87 BP	9.40 BP	29.01 BP
TURKEY	4.18 BP	19.28 BP	0.02 BP	11.04 BP	30.34 BP
U.K. - BUYS	8.26 BP	15.13 BP	50.00 BP	8.49 BP	73.62 BP
U.K. - SELLS	9.28 BP	15.17 BP	0.03 BP	7.88 BP	23.08 BP
U.S.	41.04 BP	14.36 BP	0.07 BP	6.12 BP	20.55 BP
VENEZUELA	10.50 BP	43.22 BP	9.10 BP	31.03 BP	83.35 BP
TOTAL: 54	15.75 BP	17.99 BP	6.79 BP	14.95 BP	39.72 BP

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Arizona State Retirement System

Investment Beliefs

FRAME OF REFERENCE

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

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

INVESTMENT BELIEFS

1. Asset Class Decisions are Key

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

2. Theories and Concepts Must be Sound

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

3. House Capital Market Views Are Imperative

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

4. Investment Strategies Must be Forward Looking

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

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

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

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

5. Public Markets are Generally Informationally Efficient

Asset Class Valuations

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

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.