

**ATTACHMENT A:
PFRS INVESTMENT PERFORMANCE
REPORT
AS OF MARCH 31, 2019**

The background features a serene sunset over a body of water. Several dark wooden posts are silhouetted against the bright orange and yellow sky. A large, light blue wave graphic curves across the bottom of the image.

Q1 2019

Oakland Police and Fire Retirement System

Quarterly Report

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TOTAL PORTFOLIO SUMMARY

As of March 31, 2019, the City of Oakland Police and Fire Retirement System (OPFRS) portfolio had an aggregate value of \$380.7 million. This represents a \$33.5 million increase in investment value and (\$2.8) million in benefit payments over the quarter. During the previous one-year period, the OPFRS Total Portfolio increased in value by \$17.4 million and withdrew (\$12.4) million for benefit payments.

Asset Allocation Trends

The asset allocation targets (see table on page 21) reflect those as of March 31, 2019. Target weightings reflect the interim phase (CRO = 10%) of the Plan's previously approved asset allocation (effective 5/31/2017).

With respect to policy targets, the portfolio ended the latest quarter **overweight Covered Calls, Cash, and Domestic Equity while underweight International Equity, Fixed Income, and Crisis Risk Offset.**

Recent Investment Performance

During the most recent quarter, the OPFRS Total Portfolio generated an absolute return of 9.6%, gross of fees, outperforming its policy benchmark by 1.0% basis points. The portfolio outperformed its benchmark by 0.6% and 1.3% basis points over the 1- and 3-year periods, respectively, while also outperforming by 20 basis points over the 5-year period.

The Total Portfolio outperformed the Median fund's return over all time periods measured. Performance differences with respect to the Median Fund continue to be attributed largely to differences in asset allocation.

	Quarter	Fiscal YTD	1 Year	3 Year	5 Year
Total Portfolio ¹	9.6	2.9	4.8	10.4	7.1
Policy Benchmark ²	8.6	2.0	4.2	9.1	6.9
Excess Return	1.0	0.9	0.6	1.3	0.2
Reference: Median Fund ³	8.8	3.1	4.2	8.3	6.0
Reference: Total Net of Fees ⁴	9.5	2.6	4.4	10.0	6.7

¹ Gross of Fees. Performance since 2005 includes securities lending.

² Evolving Policy Benchmark consists of 40% Russell 3000, 12% MSCI ACWI ex U.S., 33% Bbg BC Universal, 5% CBOE BXM, 6.7% SG Multi Asset Risk Premia, 3.3% Bbg BC Long Treasury

³ Investment Metrics < \$1 Billion Public Plan Universe.

⁴ Longer-term (>1 year) Net of fee returns are estimated based on OPFRS manager fee schedule (approximately 34 bps)



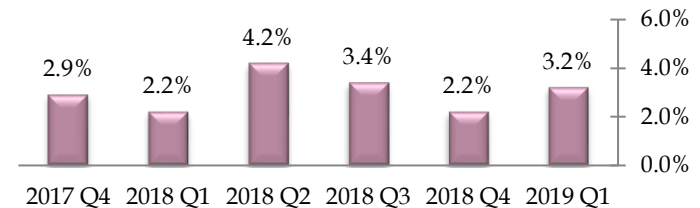
Economic & Market Overview – 1Q 2019

Overview: Real U.S. GDP increased by 3.2% in the first quarter of 2019. Growth was driven by increases in personal consumption expenditures, private inventory investment, exports, state and local government spending, and nonresidential fixed investment, while a decrease in residential fixed investment detracted from GDP growth over the quarter. At quarter-end, the unemployment rate decreased to 3.8%. The seasonally adjusted Consumer Price Index for All Urban Consumers increased by 2.3% on an annualized basis during the quarter. Commodities were up in the first quarter, but the 1-year return for a basket of commodities was negative at -5.3%. Global equity returns were strong over the quarter as the MSCI ACWI was up 12.7%. The U.S. Dollar appreciated against the Euro and Yen by 2.2% and 1.1%, respectively, but depreciated against the Pound by 2.2%.

Economic Growth

- Real GDP increased at an annualized rate of 3.2 percent in the first quarter of 2019.
- Real GDP growth was driven by increases in personal consumption expenditures, private inventory investment, exports, state and local government spending, and nonresidential fixed investments.
- GDP growth was partially offset during the quarter by a decrease in residential investment.

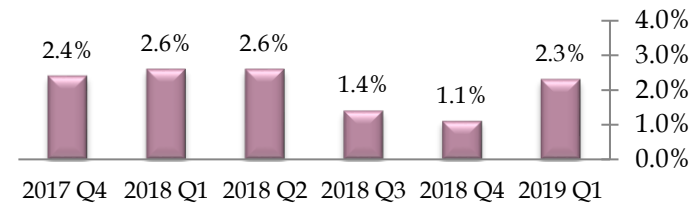
Annualized Quarterly GDP Growth



Inflation

- The Consumer Price Index for All Urban Consumers (CPI-U) increased by 2.3 percent during the first quarter on an annualized basis after seasonal adjustment.
- Quarterly percentage changes may be adjusted between data publications due to periodic updates in seasonal factors.
- Core CPI-U increased by 2.0 percent for the quarter on an annualized basis after seasonal adjustment.
- Over the last 12 months, core CPI-U increased by 2.0 percent after seasonal adjustment.

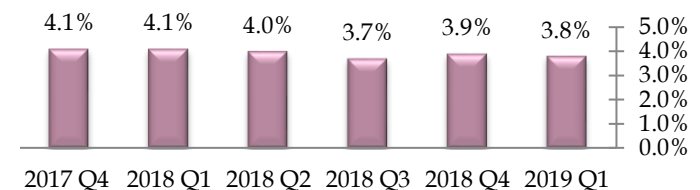
CPI-U After Seasonal Adjustment



Unemployment

- The U.S. economy gained approximately 541,000 jobs in the first quarter of 2019.
- The unemployment rate decreased to 3.8% at quarter-end.
- The majority of jobs gained occurred in education and health services, professional and business services, and leisure and hospitality. Job loss in temporary help services, retail trade, as well as manufacturing in motor vehicles and parts detracted from job growth over the quarter.

Unemployment Rate



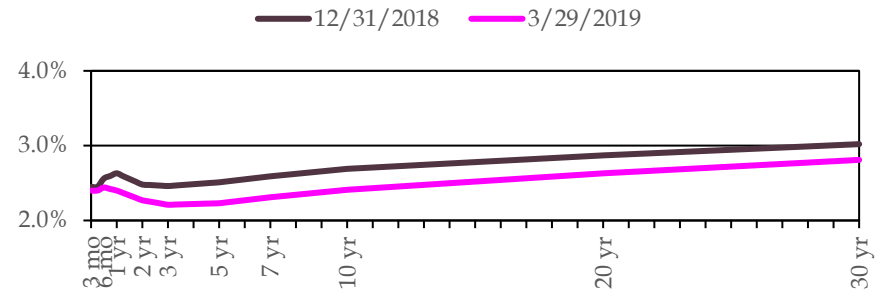


Economic & Market Overview – 1Q 2019

Interest Rates & US Dollar

- Certain parts of the yield curve remained slightly inverted over the quarter as longer term yields decreased more than shorter-term yields.
- The Federal Fund Rate was unchanged in the first quarter. The current target is between 2.25 and 2.50 percent.
- The U.S. Dollar appreciated against the Euro and Yen by 2.2% and 1.1%, respectively, but depreciated against the Pound by 2.2%.

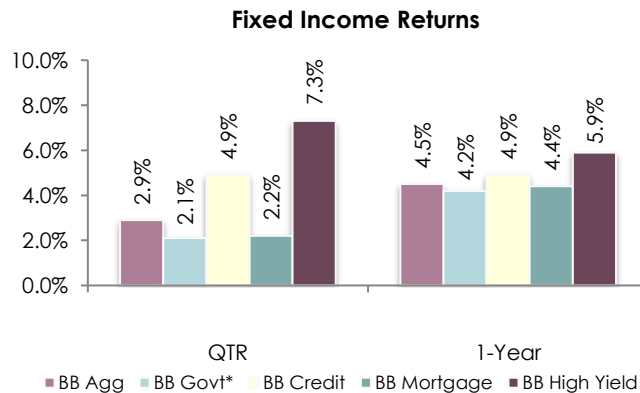
Treasury Yield Curve Changes



Source: US Treasury Department

Fixed Income

- Investment Grade bonds performed well over the quarter, generally producing returns between 2% and 5%. High Yield bonds provided the strongest performance as they were up 7.3% for the quarter.
- Over the trailing 1-year period, all bonds sectors performed favorably as they were all in excess of 4%. High Yield led all other sectors as they were up nearly 6% over the 1-year period.



*U.S. Treasuries and Agencies

US Fixed Income Sector Performance (BB Aggregate Index)			
Sector	Weight	QTR	1 Year
Governments*	42.3%	2.2%	4.2%
Agencies	2.7%	2.5%	3.8%
Inv. Grade Credit	24.7%	5.1%	4.9%
MBS	27.8%	2.2%	4.4%
ABS	0.5%	1.5%	3.7%
CMBS	2.0%	3.2%	5.4%

*U.S. Treasuries and Government Related

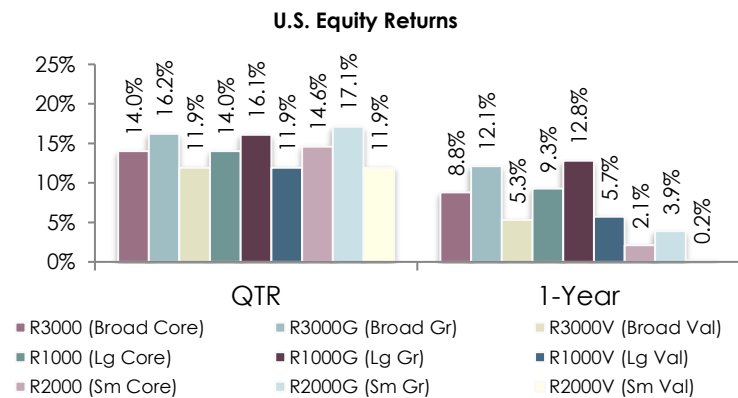




Economic & Market Overview – 1Q 2019

U.S. Equities

- U.S. equities experienced an exceptional first quarter as they provided double-digit returns across styles and market capitalizations. Growth stocks outperformed value stocks and small cap stocks outperformed large cap stocks. Small cap growth outperformed all other styles and capitalizations as they returned 17.3% over the quarter. Broad, large, and small cap value stocks each returned 11.9% over the quarter.
- During the trailing 1-year period, U.S. equities were mixed as large cap growth stocks performed well returning 12.8% over the time period, while small cap value stocks were essentially flat.

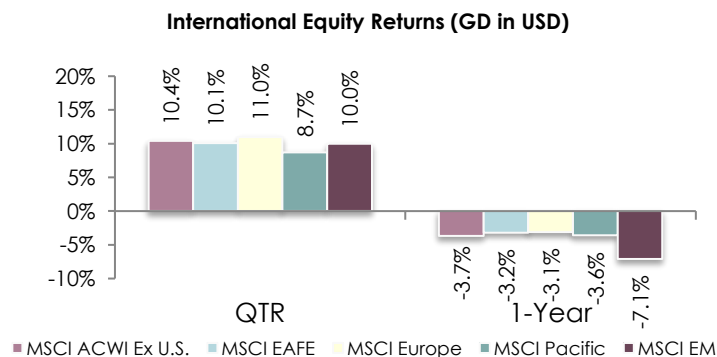


U.S. Equity Sector Performance (Russell 3000 Index)

Sector	Weight	QTR	1 Year
Information Tech.	20.5%	20.8%	18.0%
Health Care	14.4%	8.2%	14.1%
Financials	13.8%	8.8%	-4.7%
Industrials	10.4%	16.7%	2.1%
Consumer Disc.	10.2%	14.7%	10.5%
Comm. Services	9.1%	14.2%	10.5%
Consumer Staples	6.4%	11.7%	9.8%
Energy	5.0%	16.6%	-0.2%
Real Estate	3.9%	17.3%	19.3%
Utilities	3.2%	11.4%	20.3%
Materials	3.0%	11.6%	-2.3%

International Equities

- International equities provided strong performance across the board during the first quarter. Europe led all major regions with a return of 11.0% while the Pacific trailed all other major regions with a return of 8.7%.
- Over the trailing 1-year period, Europe led all other major regions with a return of -3.1%, while Emerging Markets trailed all other major regions with a -7.1% return.



International Equity Region Performance (GD in USD) (MSCI ACWI ex US)

Sector	Weight	QTR	1 Year
Europe Ex. UK	30.7%	10.7%	-4.3%
Emerging Markets	26.1%	10.0%	-7.1%
Japan	16.1%	6.9%	-7.5%
United Kingdom	11.5%	11.9%	0.0%
Pacific Ex. Japan	8.5%	12.3%	4.7%
Canada	6.8%	15.6%	3.9%



Economic & Market Overview – 1Q 2019

Market Summary – Multi-term Performance*

Indexes	Month	Quarter	1 Year	3 Years	5 Years	10 Years	20 Years
Global Equity							
MSCI AC World Index	1.3%	12.3%	3.2%	11.3%	7.0%	12.6%	5.4%
Domestic Equity							
S&P 500	1.9%	13.6%	9.5%	13.5%	10.9%	15.9%	6.0%
Russell 3000	1.5%	14.0%	8.8%	13.5%	10.4%	16.0%	6.5%
Russell 3000 Growth	2.5%	16.2%	12.1%	16.4%	13.1%	17.4%	5.6%
Russell 3000 Value	0.4%	11.9%	5.3%	10.5%	7.6%	14.5%	6.9%
Russell 1000	1.7%	14.0%	9.3%	13.5%	10.6%	16.0%	6.3%
Russell 1000 Growth	2.8%	16.1%	12.7%	16.5%	13.5%	17.5%	5.5%
Russell 1000 Value	0.6%	11.9%	5.7%	10.5%	7.7%	14.5%	6.7%
Russell 2000	-2.1%	14.6%	2.0%	12.9%	7.1%	15.4%	8.4%
Russell 2000 Growth	-1.4%	17.1%	3.9%	14.9%	8.4%	16.5%	7.1%
Russell 2000 Value	-2.9%	11.9%	0.2%	10.9%	5.6%	14.1%	9.4%
Russell Microcap	-3.0%	13.1%	-2.4%	12.3%	5.0%	15.0%	---
Alerian MLP Index	3.4%	16.8%	15.1%	5.7%	-4.7%	10.1%	11.5%
CBOE BXM Index	1.8%	6.8%	3.3%	7.4%	5.9%	9.0%	5.0%
International Equity							
MSCI AC World Index ex USA	0.7%	10.4%	-3.7%	8.6%	3.0%	9.3%	5.0%
MSCI EAFE	0.7%	10.1%	-3.2%	7.8%	2.8%	9.5%	4.4%
MSCI Pacific	0.8%	8.7%	-3.6%	9.1%	5.2%	9.3%	4.4%
MSCI Europe	0.7%	11.0%	-3.1%	7.2%	1.6%	9.6%	4.4%
MSCI EM (Emerging Markets)	0.9%	10.0%	-7.1%	11.1%	4.1%	9.3%	8.7%
Fixed Income							
BB Universal	1.8%	3.3%	4.5%	2.6%	3.0%	4.4%	5.0%
Global Agg. - Hedged	1.8%	3.0%	4.9%	2.8%	3.6%	4.1%	4.7%
BB Aggregate Bond	1.9%	2.9%	4.5%	2.0%	2.7%	3.8%	4.7%
BB Government	1.9%	2.1%	4.2%	1.1%	2.1%	2.4%	4.3%
BB Credit Bond	2.4%	4.9%	4.9%	3.5%	3.6%	6.2%	5.5%
BB Mortgage Backed Securities	1.5%	2.2%	4.4%	1.8%	2.6%	3.1%	4.6%
BB High Yield	0.9%	7.3%	5.9%	8.6%	4.7%	11.3%	6.8%
BB WGIL All Maturities - Hedged	3.1%	3.9%	4.0%	4.4%	4.5%	4.8%	---
Emerging Markets Debt	1.4%	5.4%	4.4%	5.4%	4.8%	8.5%	9.1%
Real Estate							
NCREIF	0.5%	1.4%	7.5%	8.0%	10.2%	8.7%	8.5%
FTSE NAREIT All Equity Index	4.2%	16.7%	19.9%	8.1%	9.9%	18.3%	10.7%
Commodity Index							
Bloomberg Commodity Index	-0.2%	6.3%	-5.3%	2.2%	-8.9%	-2.6%	1.8%

*Performance is annualized for periods greater than one year



Economic & Market Overview – 1Q 2019

Annual Asset Class Performance

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	YTD
Best	34.5	32.6	39.8	36.3	79.0	35.9	29.9	18.6	33.6	27.4	15.2	18.3	37.8	8.3	16.8
	20.2	28.0	16.1	24.0	76.4	19.2	16.0	17.9	27.6	25.1	4.4	17.5	25.6	0.0	14.0
	14.0	26.9	12.7	5.2	57.5	16.9	13.9	16.8	23.4	12.6	0.5	12.7	24.6	-1.3	12.3
	11.4	26.1	12.5	-2.4	35.4	16.1	13.6	16.4	23.3	12.3	0.5	11.6	21.1	-1.8	10.1
	8.1	21.5	12.2	-10.4	32.5	15.2	7.8	15.6	13.3	6.0	-0.4	9.3	8.5	-2.3	10.0
	6.5	16.1	11.6	-26.4	28.3	13.2	4.4	11.0	12.8	4.8	-1.2	8.5	7.8	-5.2	7.4
	6.3	15.7	11.6	-36.9	11.4	9.4	1.0	7.0	7.4	4.7	-1.4	5.1	7.5	-8.9	4.7
	6.1	11.8	9.8	-37.3	5.9	8.2	-6.9	4.8	-2.0	3.6	-1.8	4.7	3.5	-10.0	3.2
	2.8	4.3	7.0	-41.8	1.5	8.2	-8.7	4.2	-2.3	2.5	-4.6	2.6	3.0	-12.4	2.9
	2.7	1.8	5.1	-43.1	-12.9	6.5	-11.7	3.6	-8.6	-1.8	-14.6	1.5	-4.5	-13.4	1.7
Worst	2.4	0.5	2.2	-53.2	-30.7	6.3	-18.2	-14.3	-12.7	-4.5	-32.6	1.3	-6.5	-14.2	-5.8

MSCI ACWI	Russell 3000 Index	Alerian MLP Index	MSCI EAFE Index	MSCI Emerging Markets	BB Agg	ICE BofAML High Yield	BB Long Treasury	BB TIPS Index	CS MF 18% Vol Index	NCREIF ODCE
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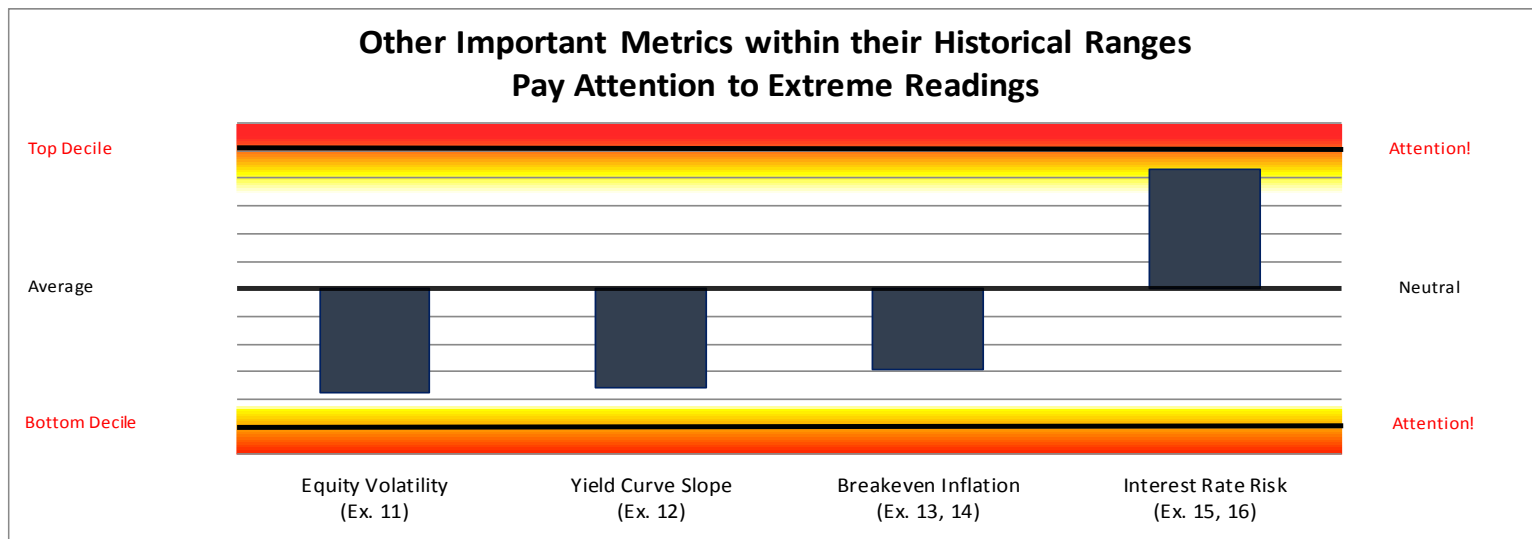
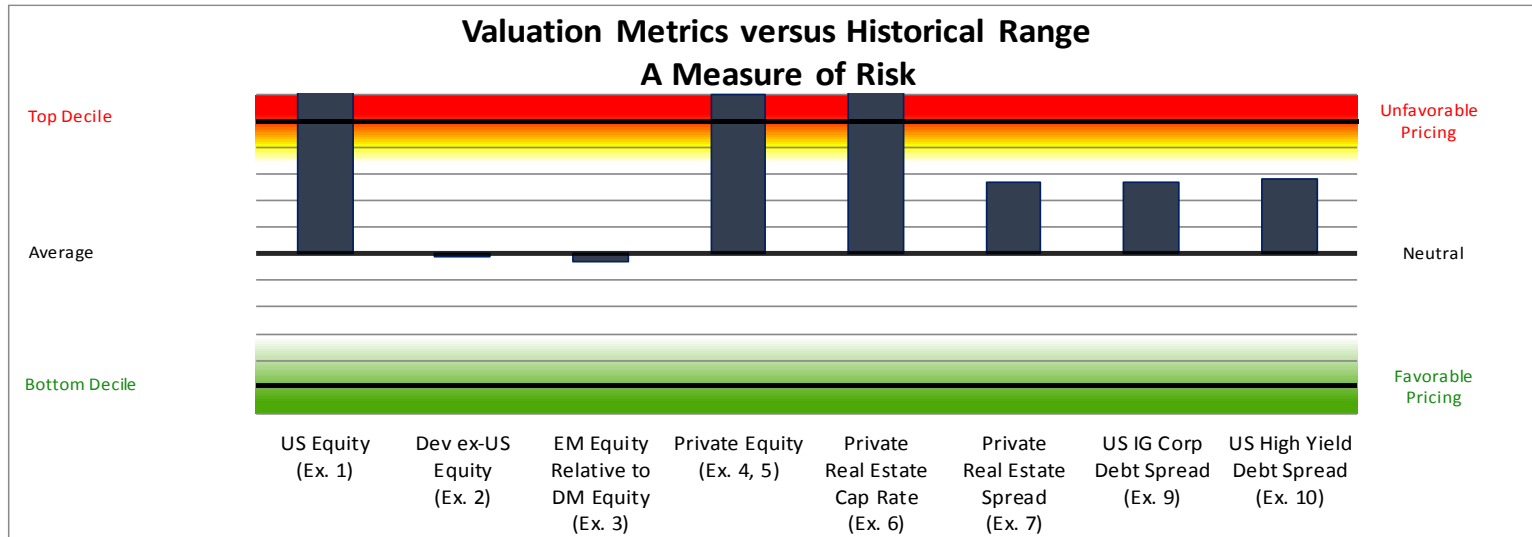
Takeaways

- Although March was a relatively muted period for most asset classes, the month capped off a historically strong quarter for most risk-based assets. Across the globe, the strong returns for broad equity markets in Q1 2019 effectively nullified the material drawdowns seen in Q4 2018. During the quarter, U.S. equity markets outperformed Non-U.S. markets, with most U.S. indices producing returns in the low-to-mid teens.
- Due to the strong rebound in public market risk-based assets to start 2019, private market assets are likely to show only a modest impact from the volatile trailing six-month period.
- U.S. equity markets remain expensive whereas Non-U.S. equity markets remain reasonably valued.
- The U.S. yield curve continued to flatten during the first quarter, with intermediate and long rates compressing by roughly 20-30 bps over the quarter. The yield curve is currently at its flattest point since the Great Financial Crisis.
- Implied equity market volatility decreased during the first quarter, as the VIX Index finished the quarter meaningfully below the long-term historical average.
- The Market Sentiment Indicator^[1] remained neutral (gray).
- **Market uncertainty is higher than numbers might indicate.** Diverging global economic growth, nuanced monetary policies, and ongoing geopolitical turmoil has resulted in increased uncertainty in the global capital markets. Moreover, equity and credit markets are currently producing different macroeconomic signals when compared to sovereign bond markets.

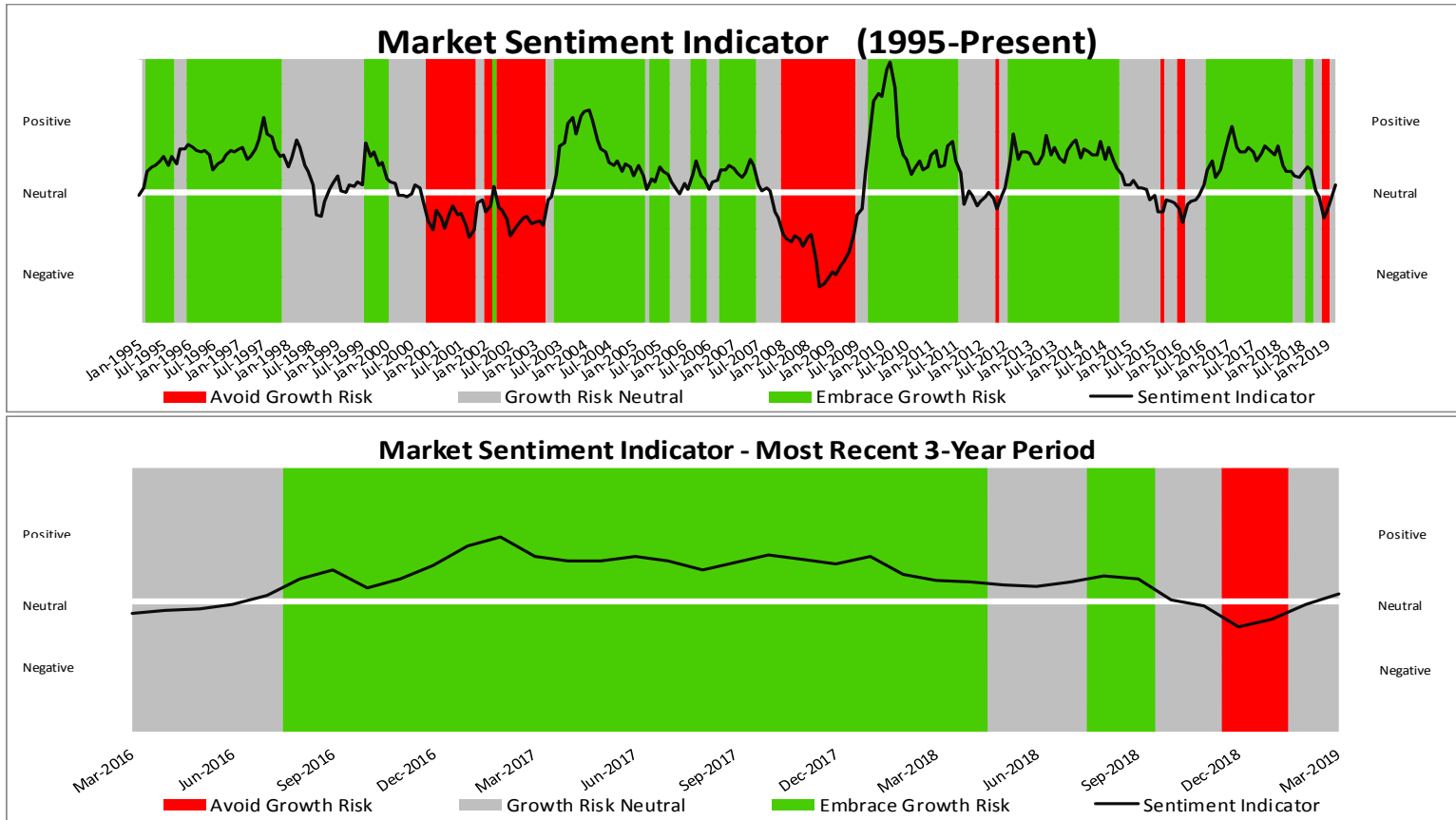
^[1] See Appendix for the rationale for selection and calculation methodology used for the risk metrics.



Risk Overview



Market Sentiment



Information Behind Current Sentiment Reading

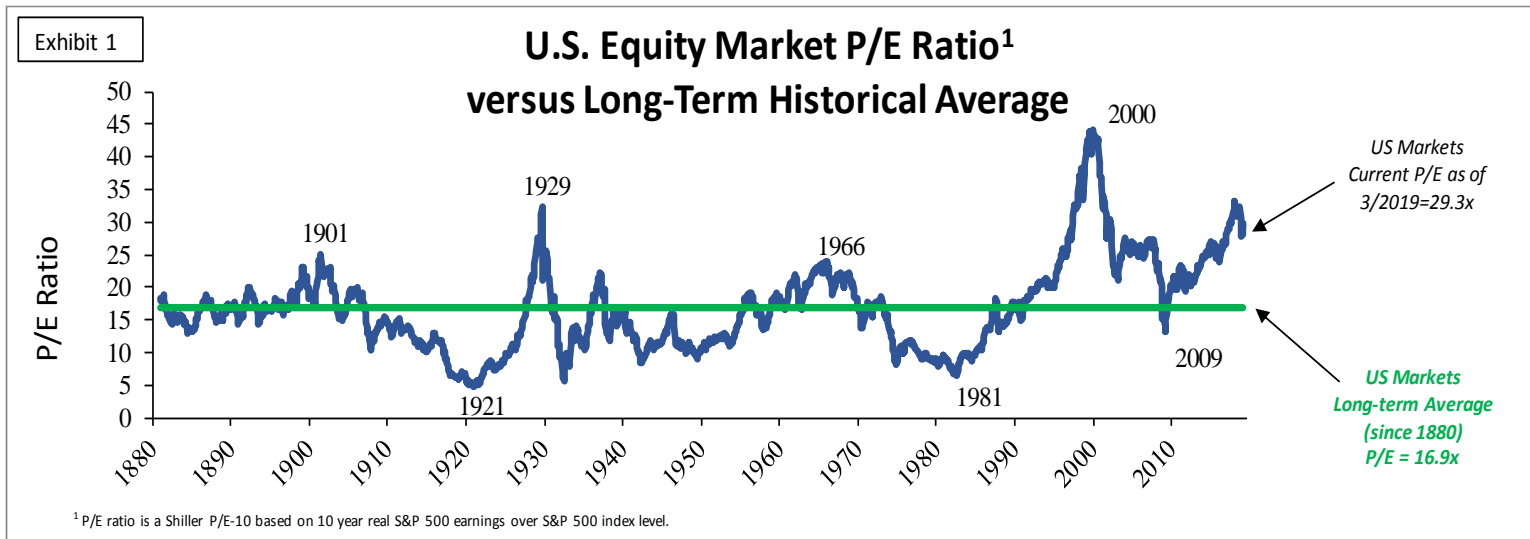
Bond Spread Momentum Trailing-Twelve Months
 Equity Return Momentum Trailing-Twelve Months
 Agreement Between Bond Spread and Equity Spread Momentum Measures?

Growth Risk Visibility (Current Overall Sentiment)

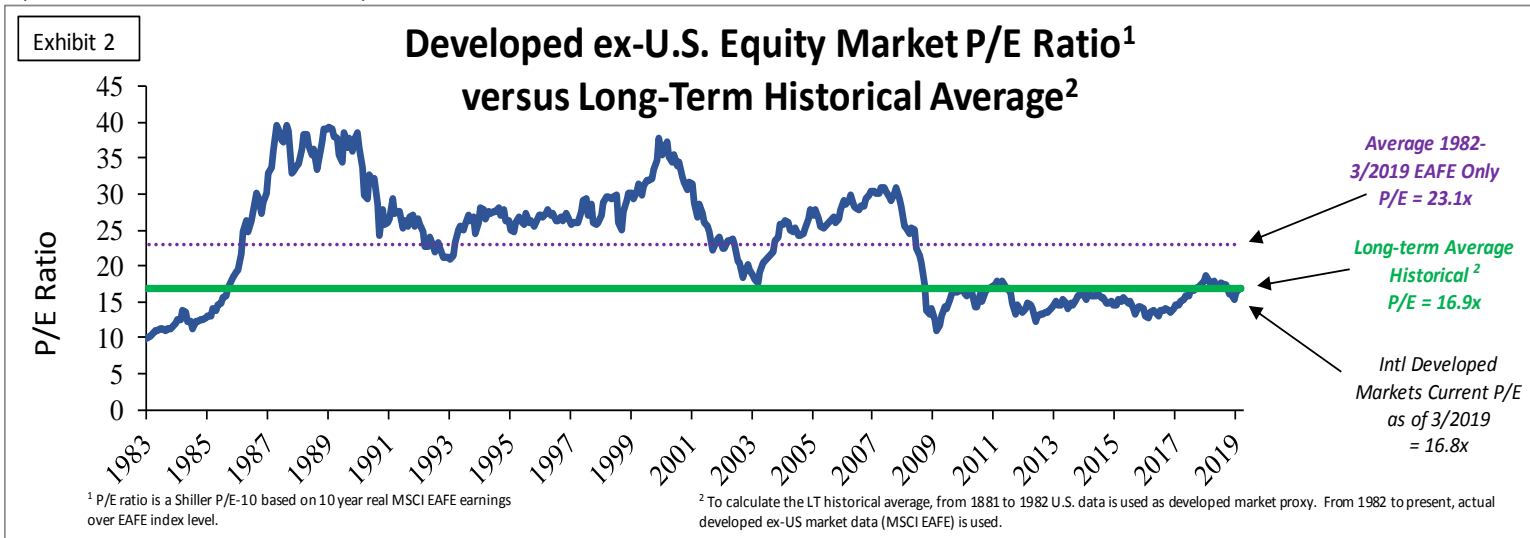
Negative	Red
Positive	Green
Disagree	Grey
Neutral	Grey



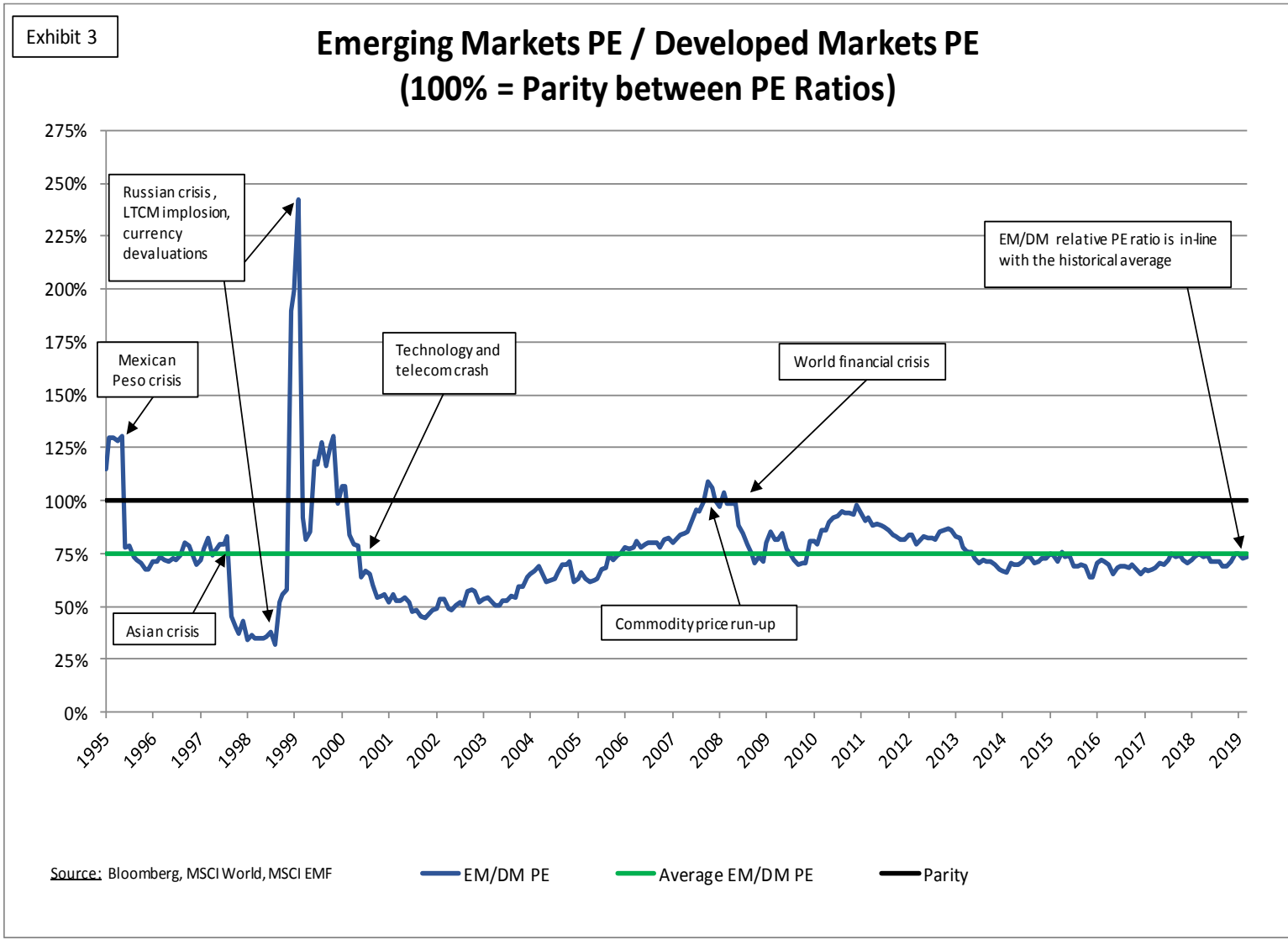
Developed Public Equity Markets



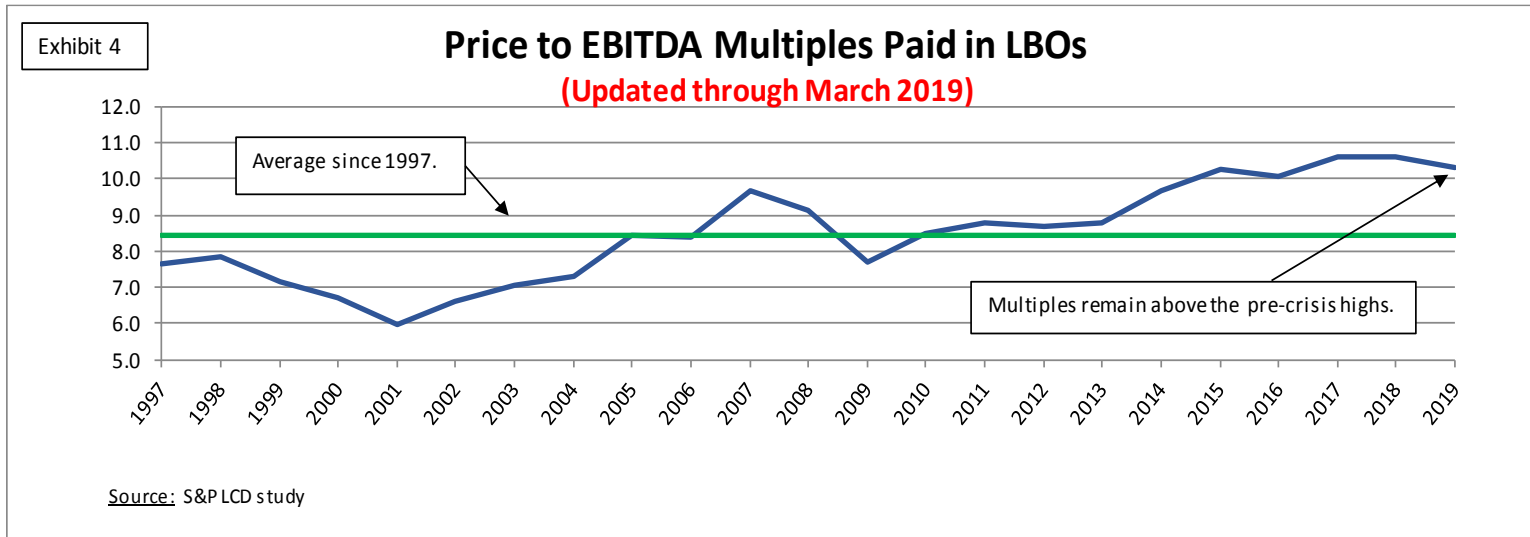
(Please note different time scales)



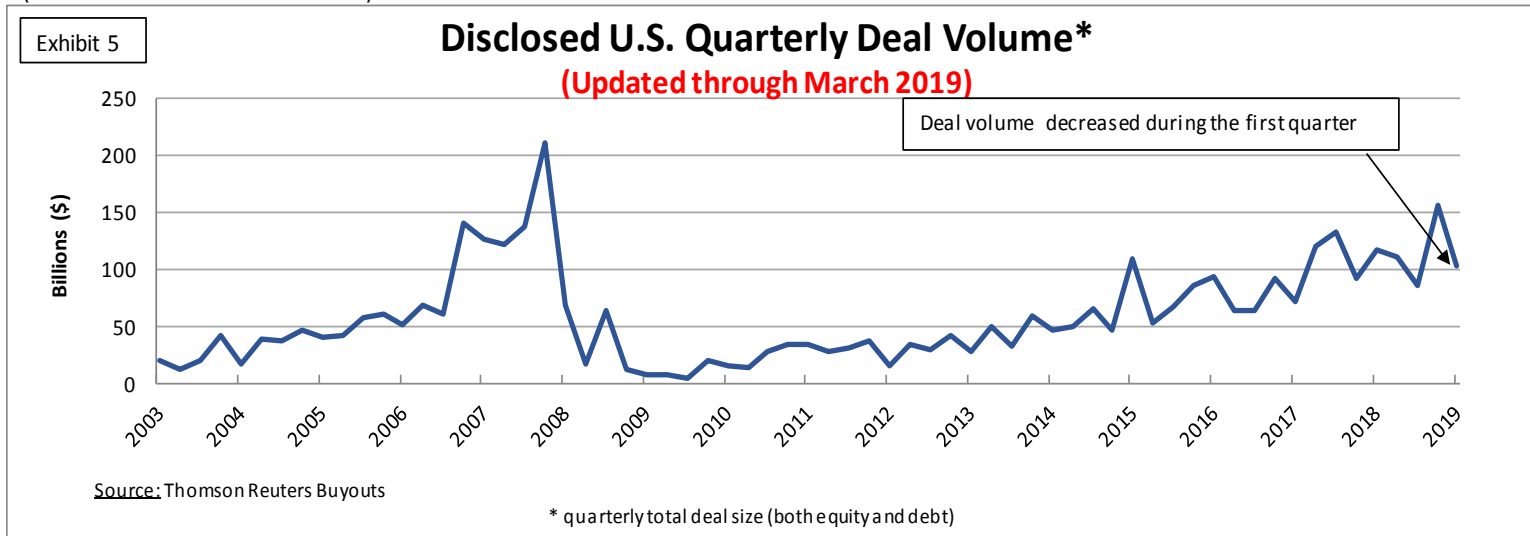
Emerging Market Public Equity Markets



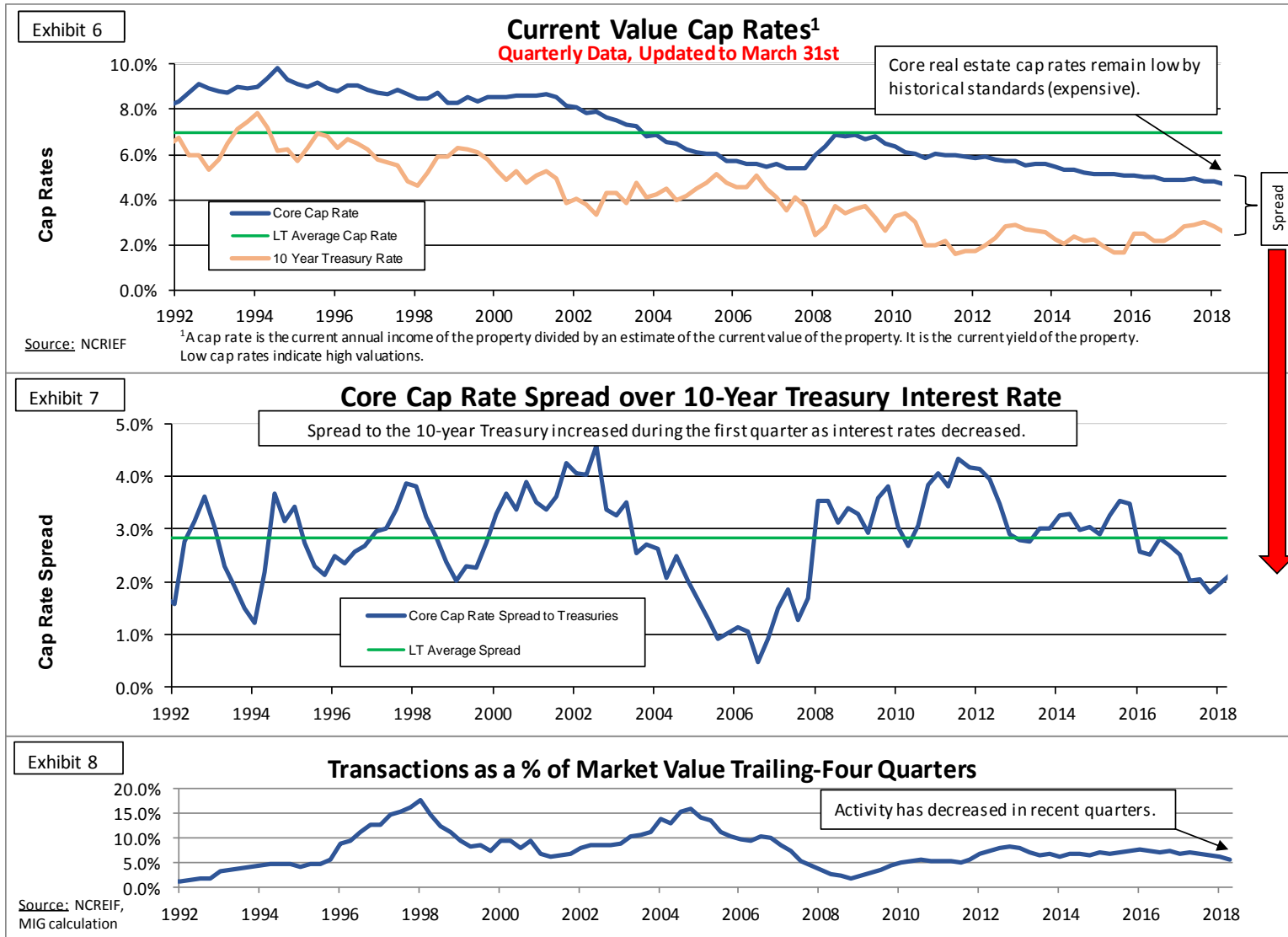
Private Equity



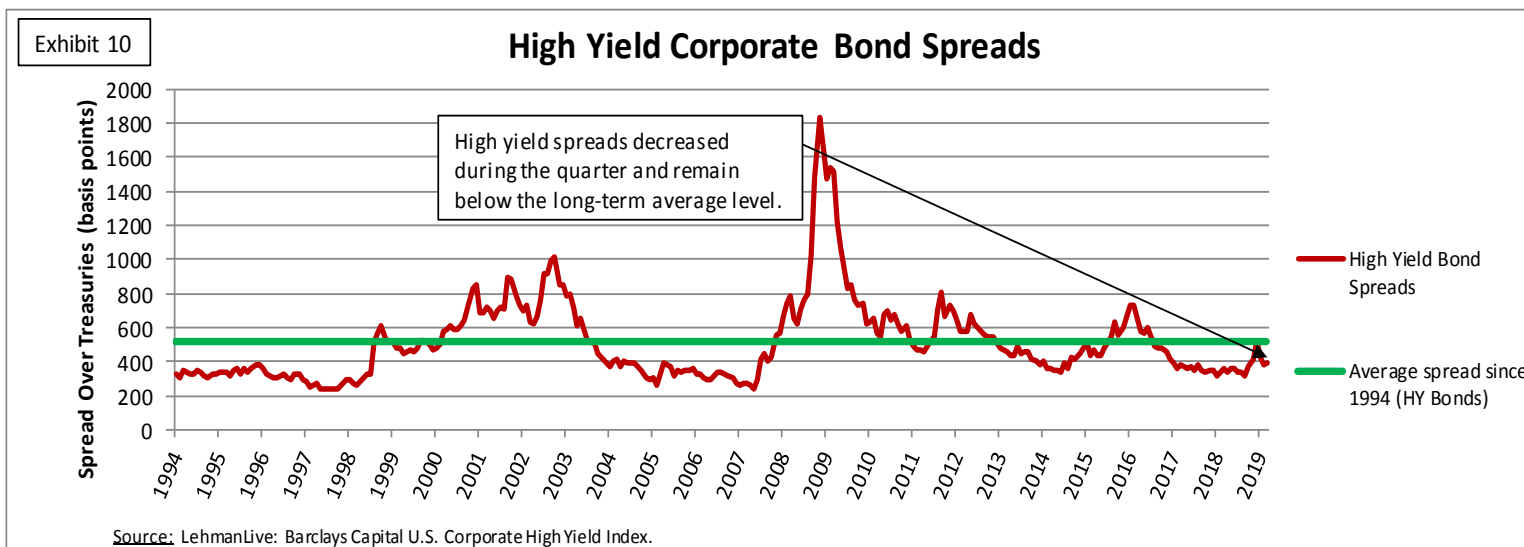
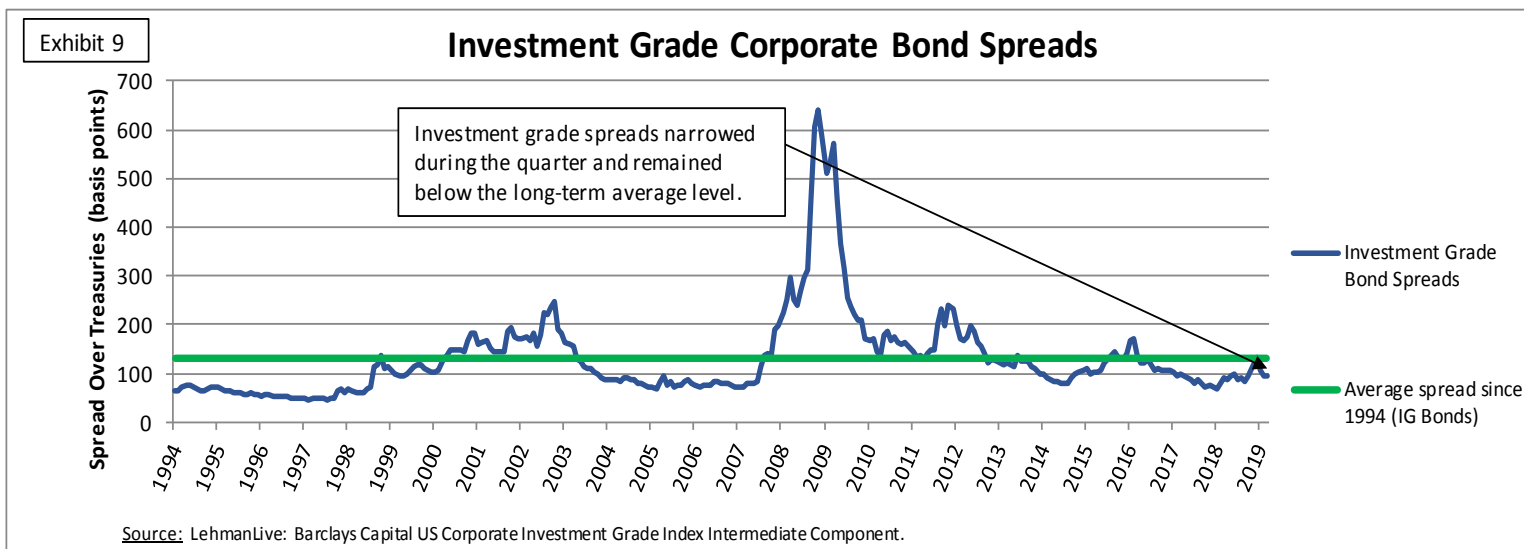
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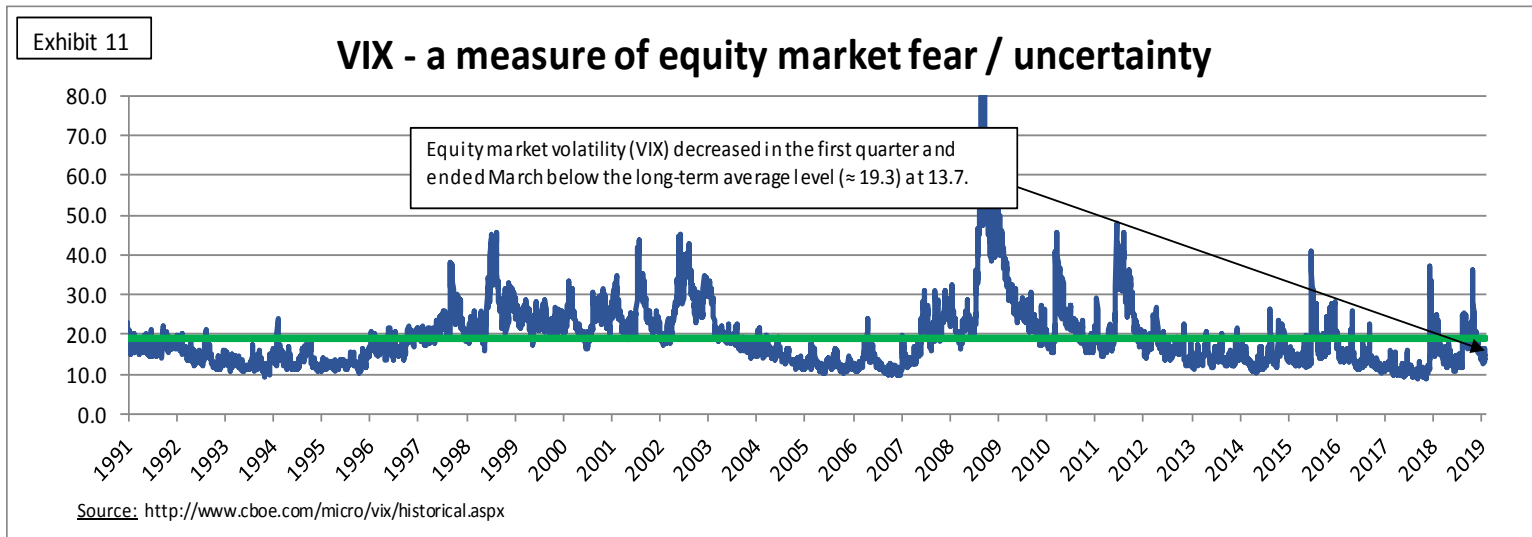
Private Real Estate



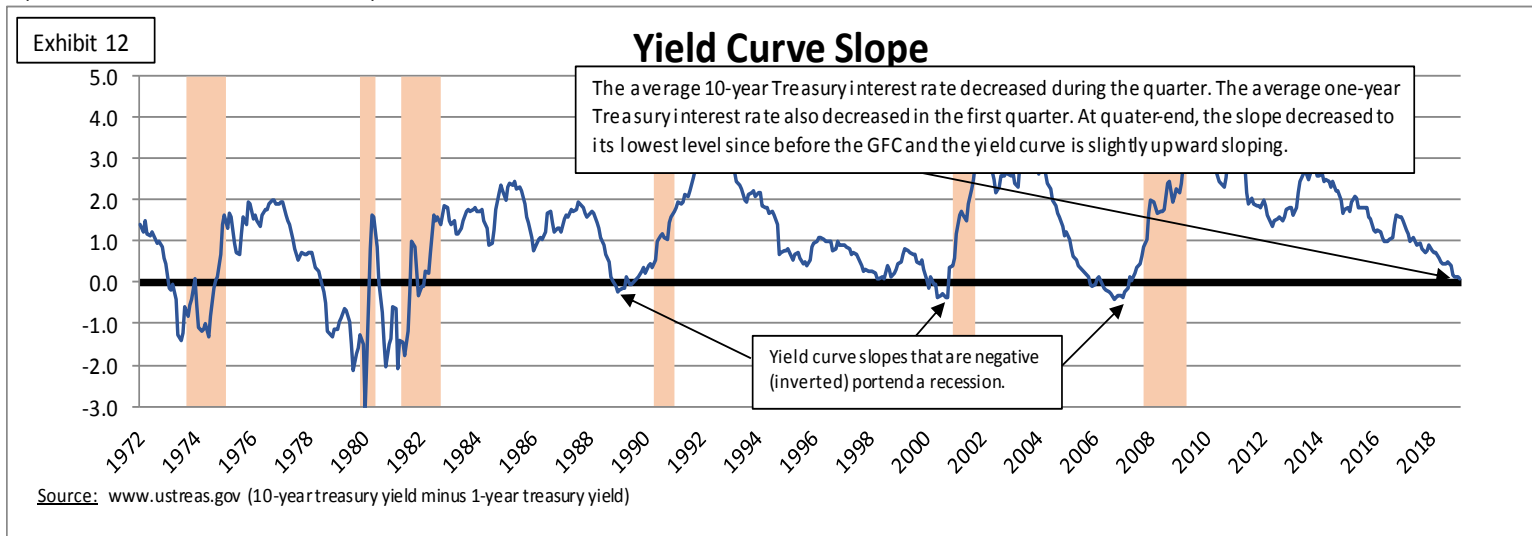
Credit Market U.S. Fixed Income



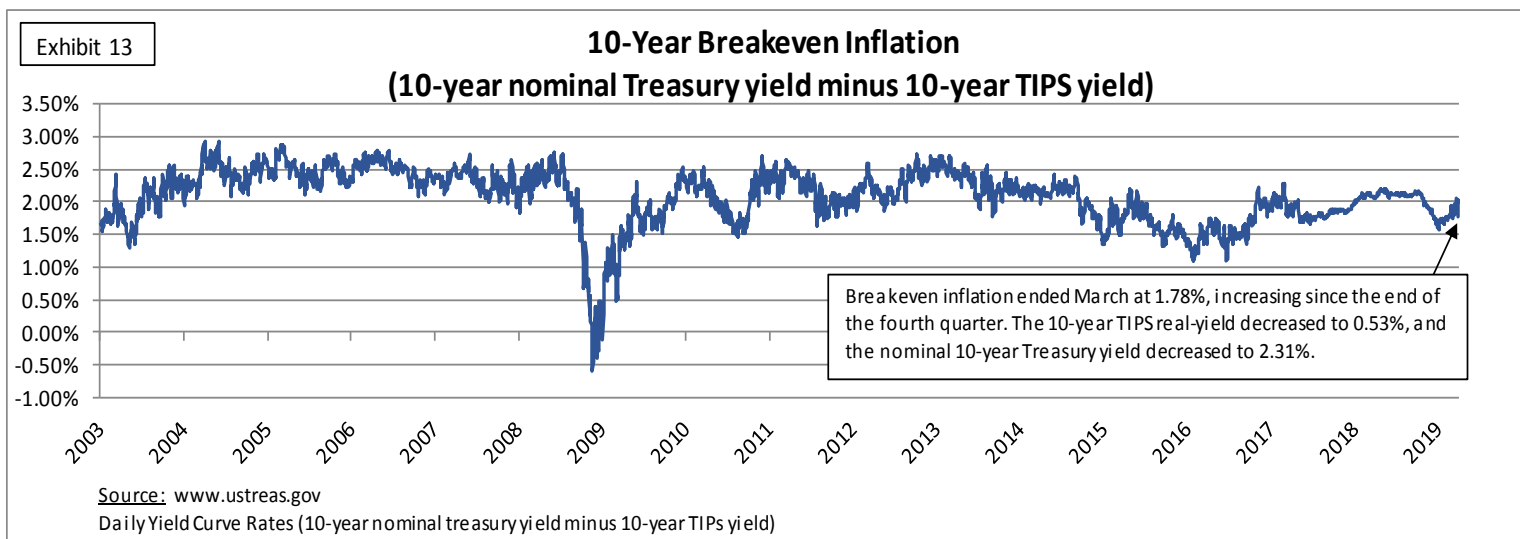
Other Market Metrics



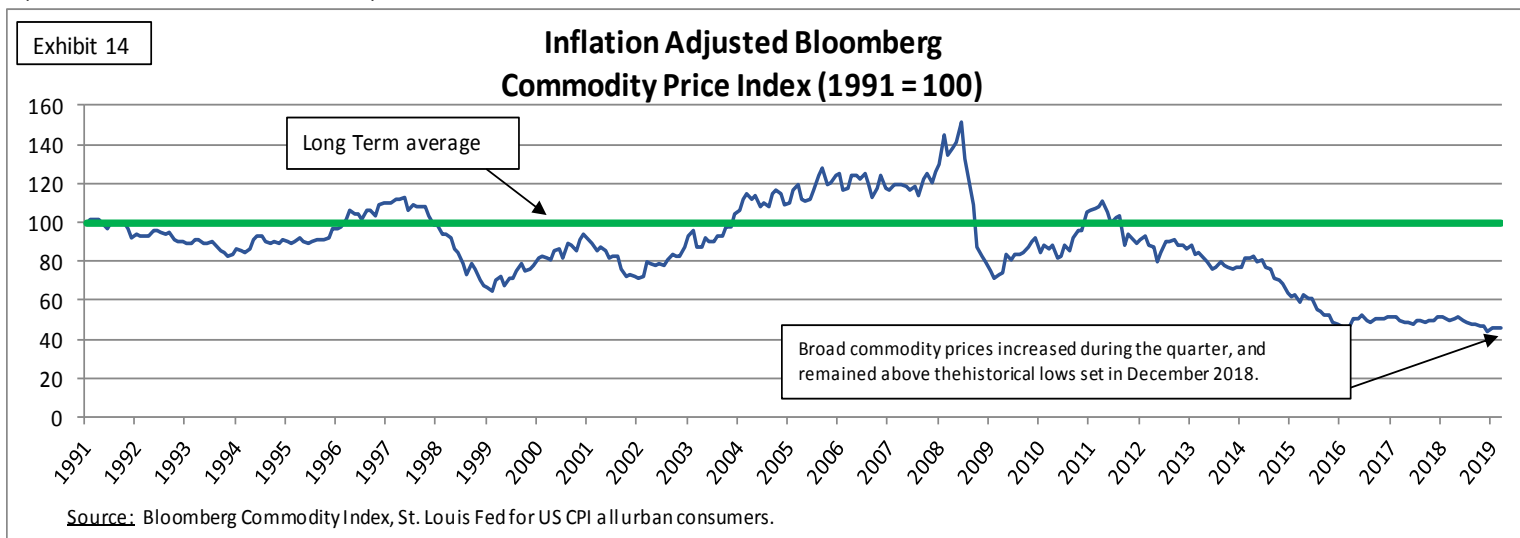
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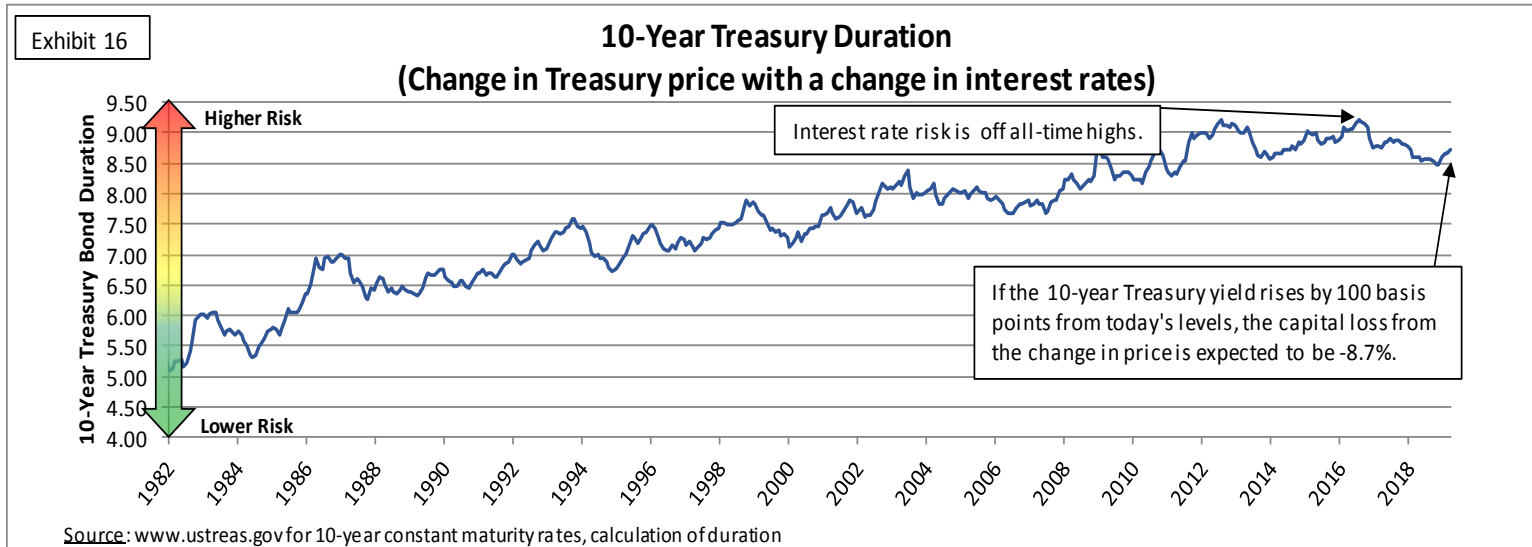
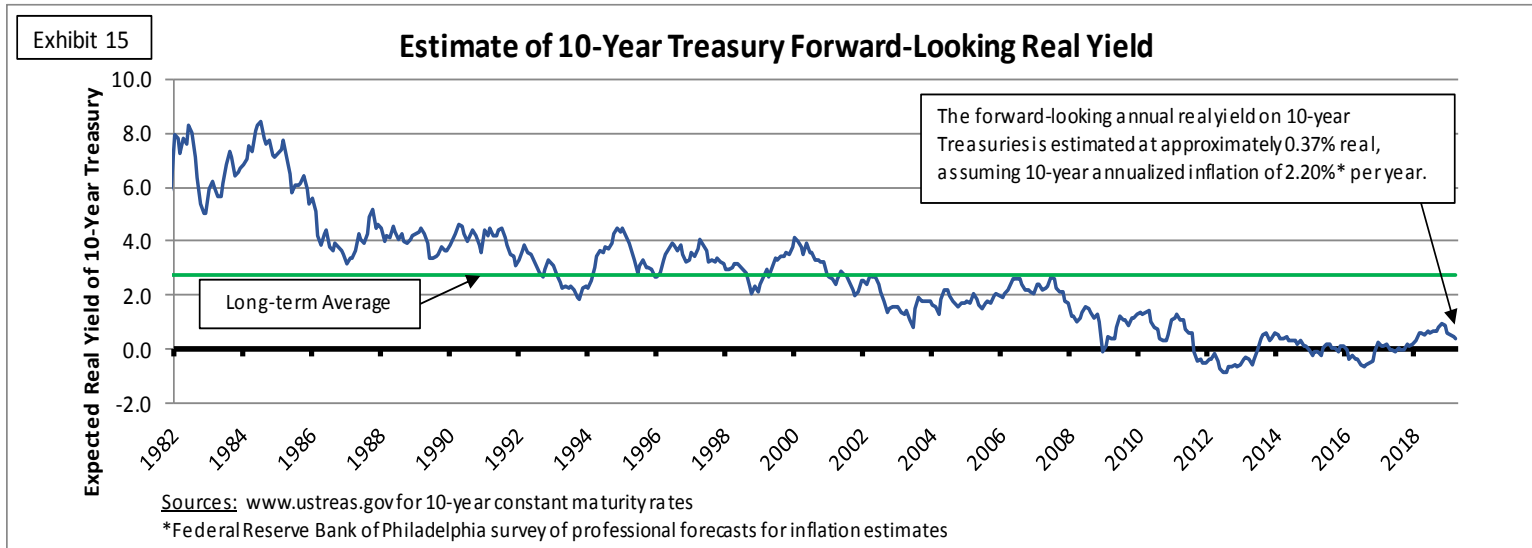
Measures of Inflation Expectations



(Please note different time scales)

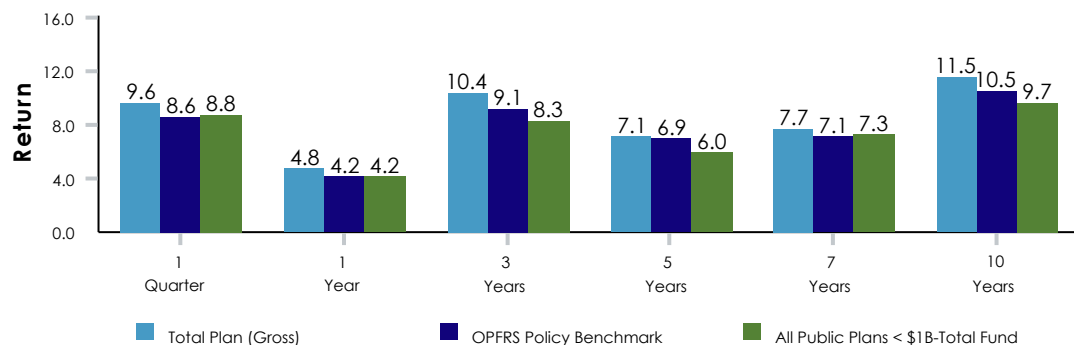


Measures of U.S. Treasury Forward-Looking Real Yield



Performance and Market Values As of March 31, 2019

Investment Performance



Portfolio Valuation (000's)

	1 Quarter	1 Year
OPFRS Total Plan		
Beginning Market Value	350,053	375,740
Net Contributions	-2,843	-12,403
Gain/Loss	33,522	17,396
Ending Market Value	380,733	380,733

Asset Class Performance (gross of fees)

	1 Quarter	1 Year	3 Years	5 Years	7 Years	10 Years
OPFRS Total Plan	9.6	4.8	10.4	7.1	7.7	11.5
OPFRS Policy Benchmark*	8.6	4.2	9.1	6.9	7.1	10.5
Excess Return	1.0	0.6	1.3	0.2	0.6	1.0
Domestic Equity	14.8	6.9	13.8	10.1	12.6	16.3
Russell 3000 (Blend)**	14.0	8.8	13.5	10.4	12.6	16.0
Excess Return	0.8	-1.9	0.3	-0.3	0.0	0.3
International Equity	11.6	-4.8	9.2	4.0	5.9	9.9
MSCI ACWI Ex US (Blend)^	10.4	-3.7	8.6	3.0	5.2	9.3
Excess Return	1.2	-1.1	0.6	1.0	0.7	0.6
Fixed Income	3.5	4.7	3.6	3.5	3.2	6.0
Bloomberg Barclays Universal (Blend)^^	3.3	4.5	2.6	3.0	2.9	4.4
Excess Return	0.2	0.2	1.0	0.5	0.3	1.6
Crisis Risk Offset	5.9	-	-	-	-	-
SG Multi Alternative Risk Premia	3.2	-	-	-	-	-
Excess Return	2.7	-	-	-	-	-
Covered Calls	9.6	7.2	9.9	7.9	-	-
CBOE BXM	6.8	3.3	7.4	5.9	-	-
Excess Return	2.8	3.9	2.5	2.0	-	-
Cash	0.5	2.0	1.3	0.8	0.6	-
FTSE 3 Month T-Bill	0.6	2.1	1.2	0.7	0.5	-
Excess Return	-0.1	-0.1	0.1	0.1	0.1	-

Evolving Policy Benchmark consists of 40% Russell 3000, 12% MSCI ACWI ex U.S., 33% Bbg BC Universal, 5% CBOE BXM, 6.7% SG Multi Asset Risk Premia, 3.3% Bbg BC Long Treasury

** Domestic Equity Benchmark consists of S&P 500 thru 3/31/98, 10% R1000, 20% R1000V, 5% RMC from 4/1/98 - 12/31/04, and Russell 3000 from 1/1/05 to present

^ International Equity Benchmark consists of MSCI EAFE thru 12/31/04, and MSCI ACWI x US thereafter.

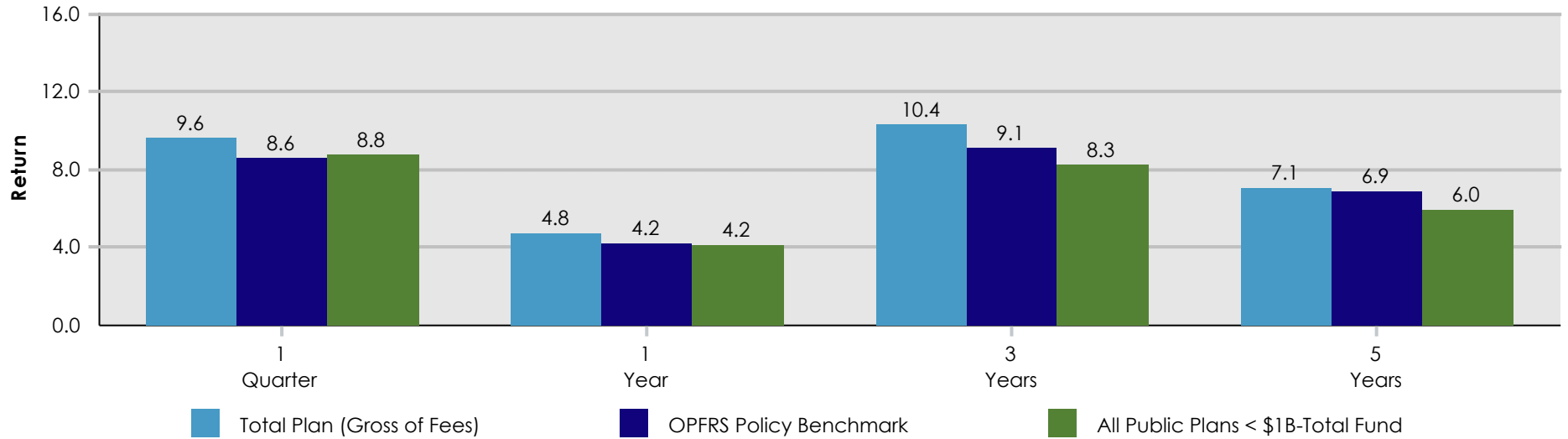
^^ Fixed Income Benchmark consists of Bbg BC Aggregate prior to 4/1/06, and Bbg BC Universal thereafter.



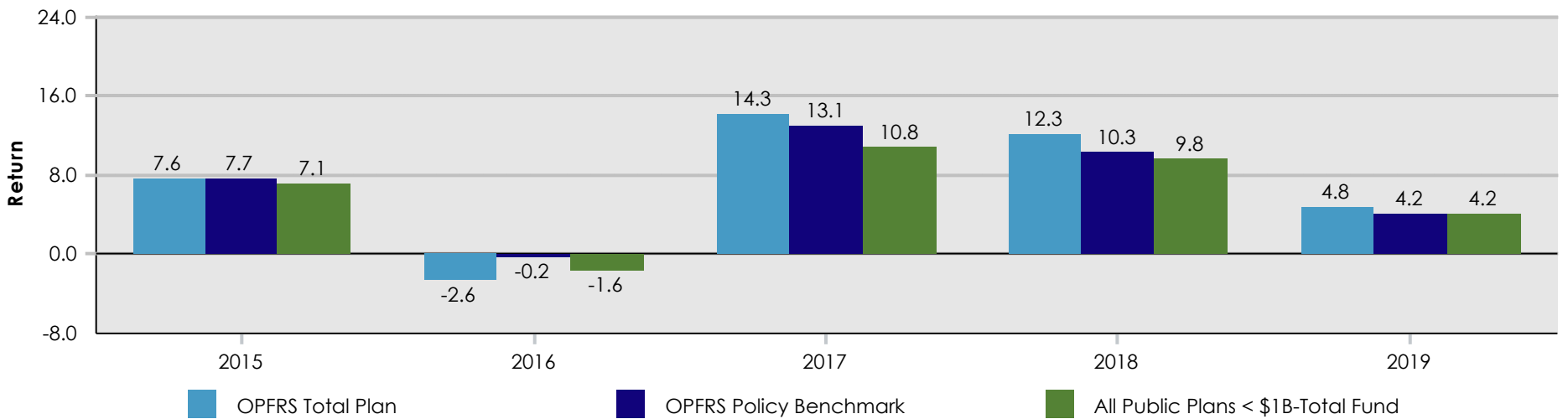
OPFRS Portfolio Relative Performance Results

As of March 31, 2019

Trailing Period Performance (annualized)



12-month Performance- As of March 31, 2019



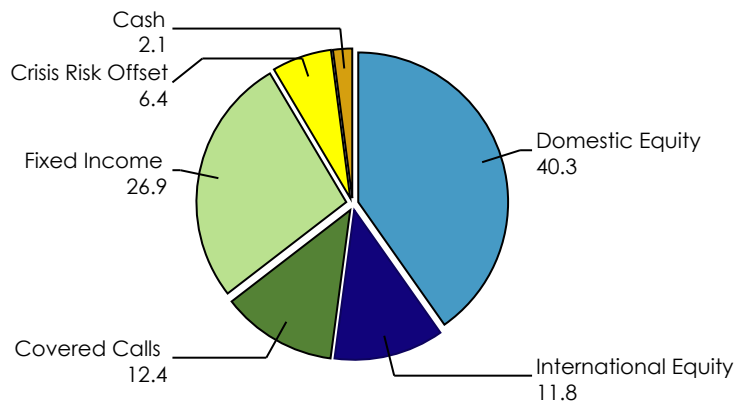
Actual vs. Target Allocation
As of March 31, 2019

	Asset Allocation (\$000)	Asset Allocation (%)	Target Allocation* (%)	Variance (%)
OPFRS Total Plan	380,733	100.0	100.0	0.0
Domestic Equity	153,270	40.3	40.0	0.3
International Equity	45,111	11.8	12.0	-0.2
Total Fixed Income	102,563	26.9	33.0	-6.1
Covered Calls	47,389	12.4	5.0	7.4
Crisis Risk Offset	24,521	6.4	10.0	-3.6
Cash	7,879	2.1	0.0	2.1

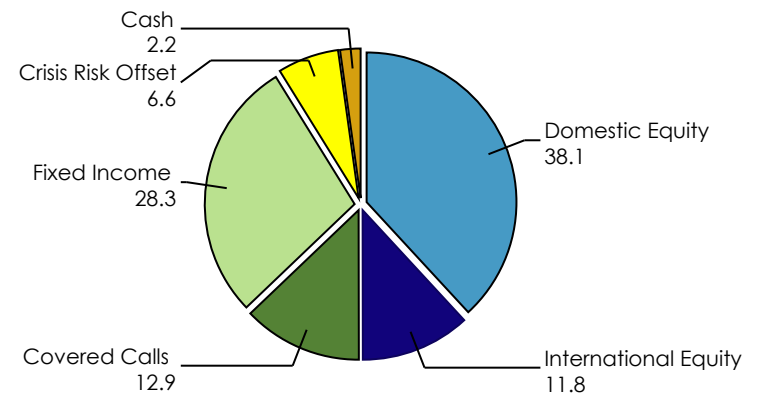
*Target weightings reflect the Plan's evolving asset allocation (effective 5/31/2017).

Actual Asset Allocation Comparison

March 31, 2019 : \$380,733,117



December 31, 2018 : \$350,053,340



Manager Performance - Gross of Fees

As of March 31, 2019

Domestic Equity

Manager - Style	Mkt Value (\$000)	1 Quarter	1 Year	3 Years	5 Years	Since Inception*	Inception Date
Large Cap Core							
Northern Trust Russell 1000 Index	83,179	14.0	9.3	13.5	10.6	13.7	06/2010
<i>Russell 1000 Index</i>		14.0	9.3	13.5	10.6	13.7	
Excess Return		0.0	0.0	0.0	0.0	0.0	
Large Cap Value							
SSgA Russell 1000 Value Index	8,159	12.0	5.7	10.5	---	7.2	11/2014
<i>Russell 1000 Value Index</i>		11.9	5.7	10.5	---	7.1	
Excess Return		0.1	0.0	0.0	---	0.1	
Large Cap Growth							
SSgA Russell 1000 Growth Index	9,679	16.1	12.7	16.5	---	13.1	11/2014
<i>Russell 1000 Growth Index</i>		16.1	12.7	16.5	---	13.1	
Excess Return		0.0	0.0	0.0	---	0.0	
Mid Cap Core							
EARNEST Partners - Active	30,831	20.1 (7)	8.3 (17)	16.4 (11)	11.4 (19)	9.6 (25)	04/2006
<i>Russell Midcap Index</i>		16.5	6.5	11.8	8.8	8.4	
Excess Return		3.6	1.8	4.6	2.6	1.2	
Small Cap Value							
NWQ - Active	9,244	12.7 (54)	-6.5 (90)	8.1 (80)	5.9 (63)	6.9 (83)	02/2006
<i>Russell 2000 Value Index</i>		11.9	0.2	10.9	5.6	6.2	
Excess Return		0.8	-6.7	-2.8	0.3	0.7	
Small Cap Growth							
Rice Hall James - Active	12,178	10.1 (98)	-3.7 (98)	---	---	9.0 (80)	07/2017
<i>Russell 2000 Growth Index</i>		17.1	3.9	---	---	9.9	
Excess Return		-7.0	-7.6	---	---	-0.9	

Over the latest three-month period ending March 31, 2019, two of OPFRS's active Domestic Equity managers outperformed their respective benchmarks.

All of OPFRS's passive Domestic Equity mandates performed in-line with their respective benchmarks.

Northern Trust, the Plan's passive large cap core transition account, continues to perform in-line with its benchmark over all time periods measured. This performance is within expectations for a passive mandate.



Manager Performance - Gross of Fees

As of March 31, 2019

Domestic Equity

SSgA Russell 1000 Value, the Plan's passive large cap value account, has continued to perform within expectations for a passive mandate.

SSgA Russell 1000 Growth, the Plan's passive large cap growth account, has continued to perform within expectations for a passive mandate.

EARNEST Partners, the Plan's mid cap core manager, outperformed its Russell Midcap benchmark by 3.6% over the quarter, placing it in the 7th percentile of its peer group. The portfolio has also outperformed its benchmark over the 1-year period by 1.8% and continues to outperform over the 3- and 5-year periods by 4.6% and 2.6% respectively. The portfolio also ranks in the top quartile of its peer group over all time periods measured.

NWQ, the Plan's small cap value manager, outperformed the Russell 2000 Value Index by 0.8% over the latest quarter, placing the portfolio in the 54th percentile of its peer group. NWQ continues to underperform over the 1- and 3-year periods by (6.7%) and (2.8%), respectively. NWQ continues to outperform its benchmark over the 5-year period by 0.3% with an annualized return of 5.9%.

Rice Hall James, the Plan's small cap growth manager, underperformed its Russell 2000 Growth benchmark over the most recent quarter by (7.0%), placing the portfolio in the 98th percentile of its peer group. Two straight difficult quarters have caused the portfolio to trail its benchmark over the 1 -year period by (7.6%) and rank in the 98th percentile of its peer group.

Manager Performance - Gross of Fees

As of March 31, 2019

International Equity

Manager - Style	Mkt Value (\$000)	1 Quarter	1 Year	3 Years	5 Years	Since Inception	Inception Date
Active International							
Fisher Investments	16,157	12.9 (13)	-3.6 (38)	8.9 (22)	4.0 (26)	4.4 (78)	04/2011
<i>MSCI AC World ex USA</i>		10.4	-3.7	8.6	3.0	3.6	
Excess Return		2.5	0.1	0.3	1.0	0.8	
Hansberger	15,780	11.5 (66)	-7.4 (88)	10.8 (25)	5.0 (38)	4.4 (76)	02/2006
<i>MSCI AC World ex USA</i>		10.4	-3.7	8.6	3.0	4.0	
Excess Return		1.1	-3.7	2.2	2.0	0.4	
Passive International							
SSgA	13,175	10.1	-3.4	7.7	2.7	7.0	08/2002
<i>MSCI EAFE Index</i>		10.1	-3.2	7.8	2.8	7.1	
Excess Return		0.0	-0.2	-0.1	-0.1	-0.1	

Over the latest three-month period ending March 31, 2019, both of OPFRS's two active International Equity managers outperformed their respective benchmark.

The **SSgA** account has performed roughly in-line with its benchmark over all time periods measured. This performance is within expectations for a passive mandate.

Hansberger, one of OPFRS' active international equity managers, outperformed the MSCI ACWI x US Index during the quarter by 1.1%, placing the fund in the 66th percentile of its peer group. Over the 12-month period, Hansberger underperformed its benchmark by (3.7%) with an absolute return of (7.4%). Hansberger continues to outperform over the 3- and 5-year periods with excess returns of 2.2% and 2.0%, respectively.

Fisher, one of OPFRS' active international equity managers, outperformed the MSCI ACWI x US Index by 2.5% during the quarter, ranking the fund in the 13th percentile of its peer group. Over the most recent 1- and 3-year periods, Fisher has outperformed its benchmark by 0.1% and 0.3%, respectively, and continues to outperform by 1.0% over the five year period.

Manager Performance - Gross of Fees

As of March 31, 2019

Fixed Income

Manager - Style	Mkt Value (\$000)	1 Quarter	1 Year	3 Years	5 Years	Since Inception	Inception Date
Core Fixed Income							
Ramirez	70,985	3.6 (10)	4.8 (34)	---	---	3.9 (10)	01/2017
<i>Bimbg. Barc. U.S. Aggregate Index</i>		2.9	4.5	---	---	2.9	
Excess Return		0.7	0.3	---	---	1.0	
Core-Plus Fixed Income							
Reams	23,647	2.8 (95)	5.4 (6)	2.7 (80)	3.1 (74)	5.5 (52)	02/1998
<i>Bbg Barclays Universal (Hybrid)</i>		3.3	4.5	2.6	3.0	4.9	
Excess Return		-0.5	0.9	0.1	0.1	0.6	
High Yield / Bank Loans							
DDJ Capital	7,931	4.1 (88)	2.1 (98)	10.2 (6)	---	6.4 (11)	02/2015
<i>ICE BofAML High Yield Master II</i>		7.4	5.9	8.7	---	5.6	
Excess Return		-3.3	-3.8	1.5	---	0.8	

Over the latest three-month period, ending March 31, 2019, one of OPFRS's three active Fixed Income managers outperformed their respective benchmarks.

Ramirez, the Plan's core fixed income manager, returned 3.6% compared to the benchmark return of 2.9% during the quarter, ranking the portfolio in the 10th percentile of its peer group. Over the 1-year period, Ramirez has outperformed its benchmark by 0.3% and ranked in the 34th percentile of its peer group.

Reams, the Plan's core plus fixed income manager, underperformed its benchmark by (0.5%) during the quarter and ranked in the 95th percentile of its peer group. Despite the poor quarter, Reams still managed to outperform its benchmark by 0.9% over the most recent 12-month period, good enough for a 6th percentile ranking. The portfolio has slightly outperformed its benchmark by 0.1% over the 3- and 5-year periods.

DDJ, the Plan's High Yield & Bank Loan manager, returned 4.1% during the most recent quarter but was unable to keep up with the benchmark's 7.4% return. A string of underperforming quarters has left DDJ trailing its benchmark by (3.8%) over the most recent 12-month period and ranking in the 98th percentile of its peer group. DDJ's returns over the 3-year period remain strong, outperforming its benchmark by 1.5% and ranking in the 6th percentile of its peer group.

Manager Performance - Gross of Fees

As of March 31, 2019

Covered Calls

Manager - Style	Mkt Value (\$000)	1 Quarter	1 Year	3 Years	5 Years	Since Inception	Inception Date
Covered Calls Composite							
Covered Calls	47,389	9.6	7.2	9.9	7.9	7.9	04/2014
CBOE BXM		6.8	3.3	7.4	5.9	5.9	
Excess Return		2.8	3.9	2.5	2.0	2.0	
CC - Passive Allocation							
Parametric BXM	23,421	7.5	6.6	8.5	6.8	6.8	04/2014
CBOE BXM		6.8	3.3	7.4	5.9	5.9	
Excess Return		0.7	3.3	1.1	0.9	0.9	
CC - Active Allocation							
Parametric DeltaShift	23,969	11.8	7.8	11.2	9.5	9.5	04/2014
CBOE BXM		6.8	3.3	7.4	5.9	5.9	
Excess Return		5.0	4.5	3.8	3.6	3.6	

During the latest three-month period ending March 31, 2019, OPFRS' aggregate Covered Calls portfolio outperformed its benchmark by 2.8%.

Parametric BXM Portfolio, the Plan's passive covered calls allocation outperformed its CBOE BXM index by 0.7% over the most recent quarter. Over the most recent 1-year period the portfolio has outperformed by 3.3% and has outperformed over the 3- and 5-year periods by 1.1% and 0.9%, respectively.

Parametric Delta Shift Portfolio, the Plan's active covered calls allocation has outperformed the CBOE BXM benchmark by 5.0% over the most recent quarter and has outperformed by 4.5% over the 1-year period. The portfolio continues to outperform over the 3-year period by 3.8% and has earned an annualized 9.5% over the most recent 5-year period, outperforming its benchmark by 3.6%.

Manager Performance - Gross of Fees

As of March 31, 2019

Crisis Risk Offset

Manager - Style	Mkt Value (\$000)	1 Quarter	1 Year	3 Years	5 Years	Since Inception	Inception Date
Crisis Risk Offset Composite							
Crisis Risk Offset	24,521	5.9	---	---	---	-1.5	09/2018
<i>CRO Composite Benchmark</i>		3.2	---	---	---	1.8	
Excess Return		2.7	---	---	---	-3.3	
CRO - Risk Premia / Trend Following							
Parametric S.A.R.P.	24,521	5.9	---	---	---	-1.5	09/2018
<i>SG Multi Alternative Risk Premia</i>		3.2	---	---	---	1.8	
Excess Return		2.7	---	---	---	-3.3	
CRO - Long Duration							
Pending Long Duration Manager	---	0.0	---	---	---	0.0	12/2018

During the latest three-month period ending March 31, 2019, OPFRS's partially funded aggregate Crisis Risk Offset portfolio outperformed its benchmark by 2.7%.

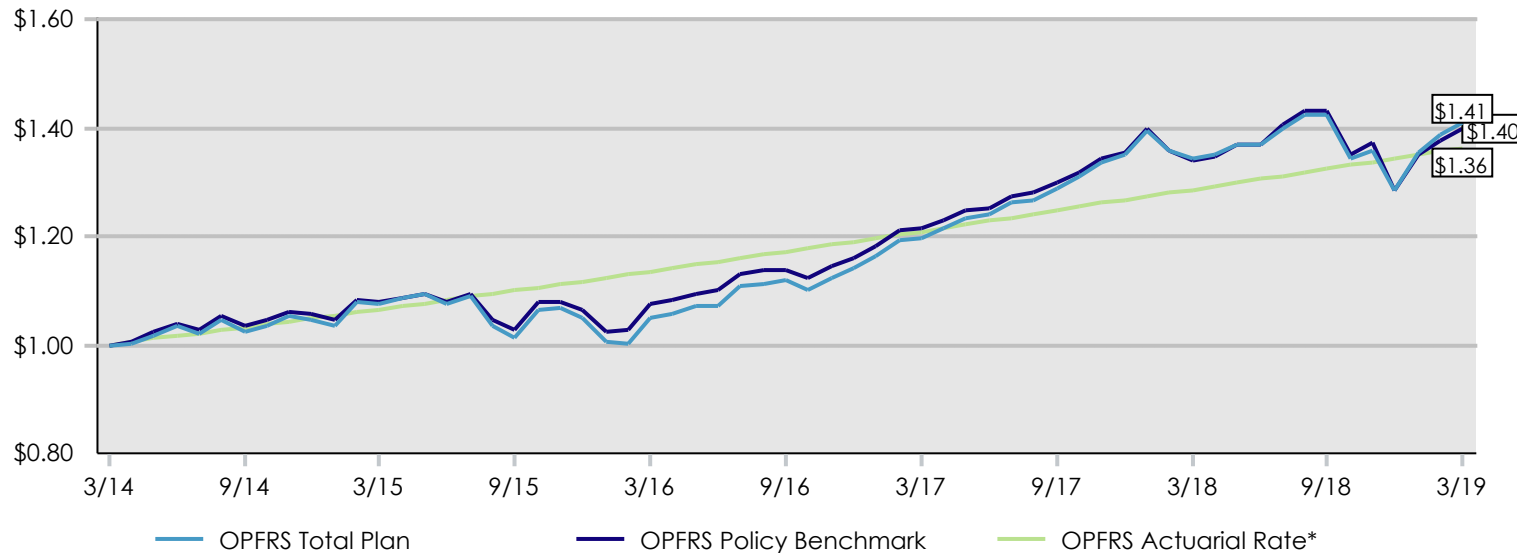
Parametric Systematic Alternative Risk Premia, the Plan's Risk Premia / Trend Following manager outperformed its benchmark by 2.7% during its first full quarter in the portfolio. Despite a much improved first quarter, the portfolio continues to trail its benchmark by (3.3%) since its funding in September 2018.

Pending Long Duration Manager, the Plan's Long Duration manager remains unfunded pending further discussion with the OPFRS Board.

OPFRS Total Portfolio 5-Year Performance

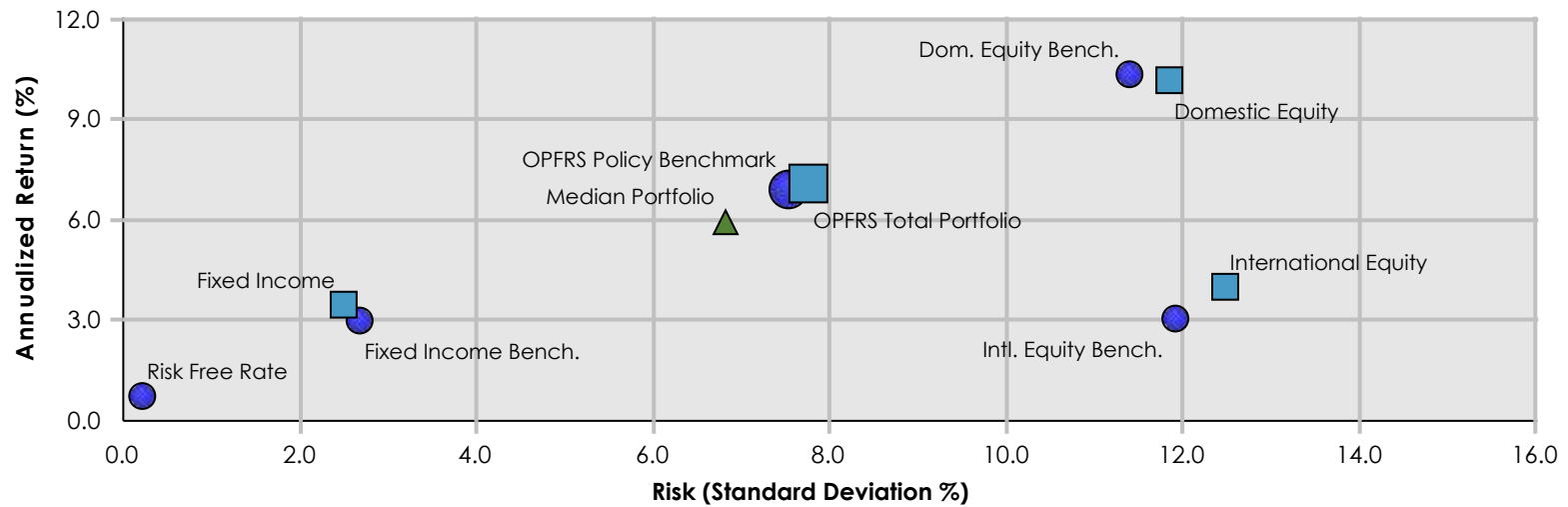
As of March 31, 2019

Growth of \$1 (5-year)

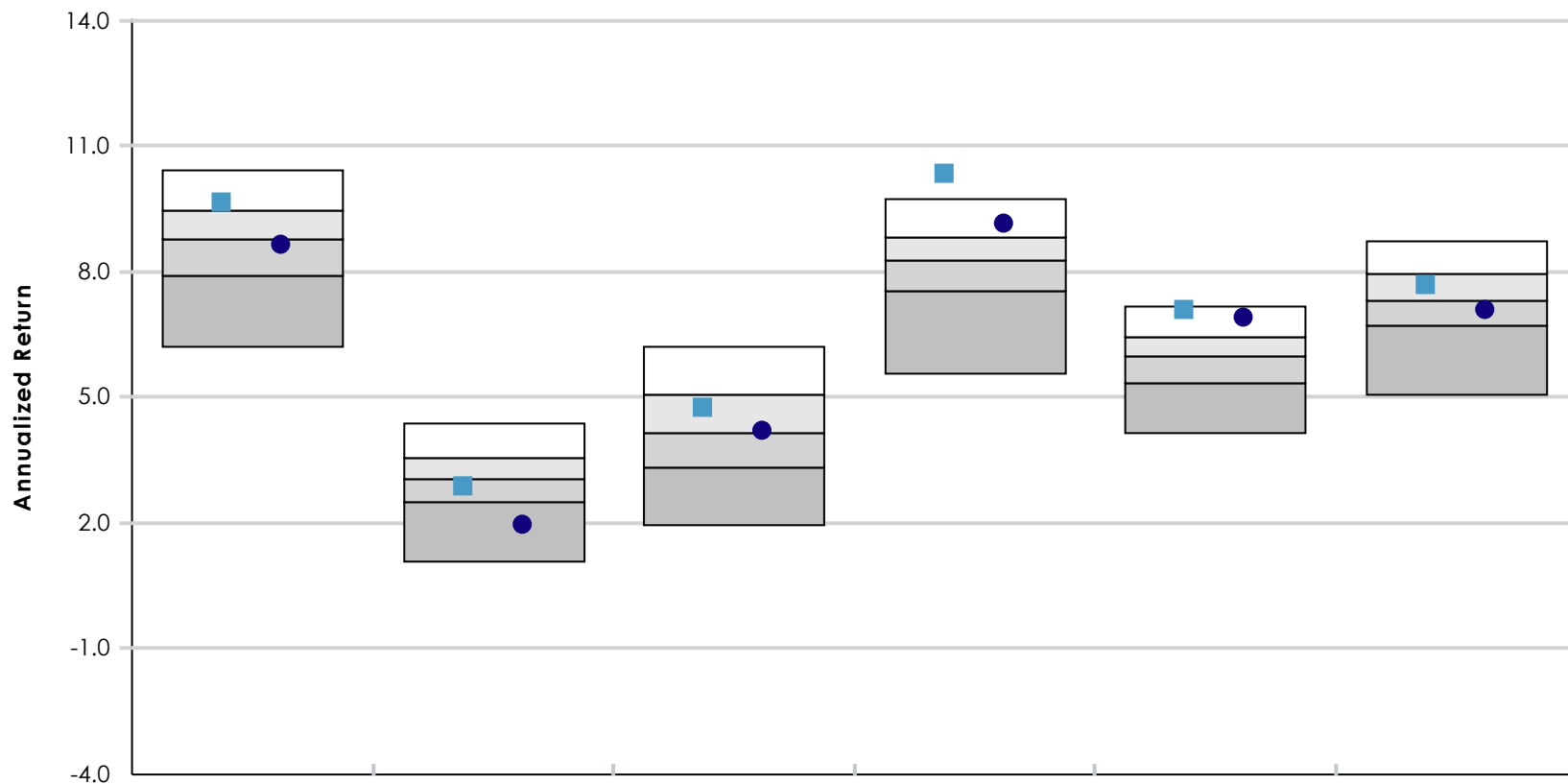


* The actuarial expected rate of return was 8% through 6/30/2009, 7.5% through 6/30/2010, 7% through 6/30/2011, 6.75% through 6/30/2014, 6.5% through 12/31/2017 and 6.0% currently

Risk/Return Performance (5-year)



Plan Sponsor Peer Group Analysis
As of March 31, 2019

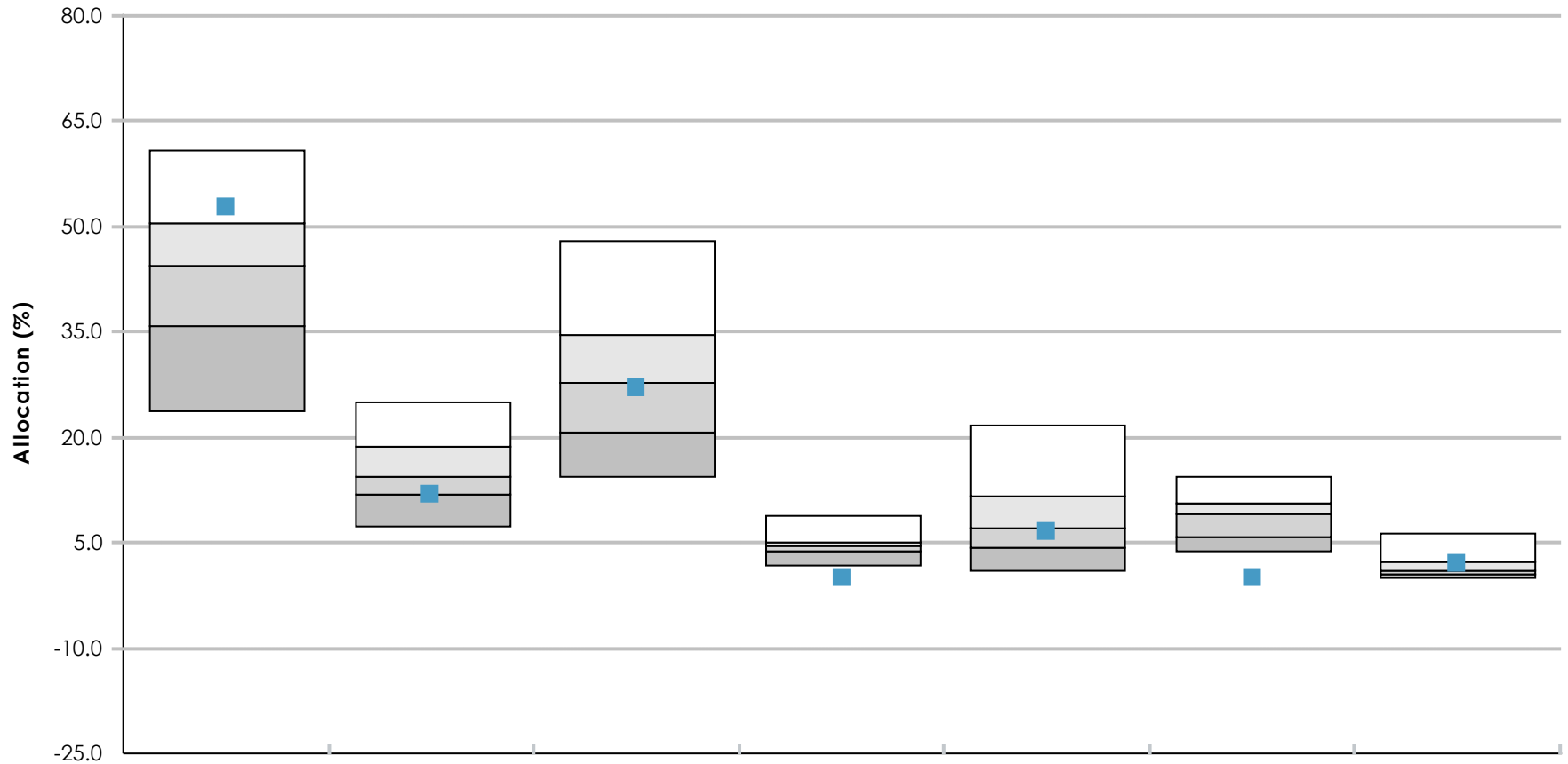


	1 Quarter	Fiscal YTD	1 Year	3 Years	5 Years	7 Years
■ OPFRS Total Plan	9.6 (21)	2.9 (60)	4.8 (33)	10.4 (3)	7.1 (6)	7.7 (39)
● OPFRS Policy Benchmark	8.6 (55)	2.0 (86)	4.2 (49)	9.1 (17)	6.9 (9)	7.1 (59)
5th Percentile	10.4	4.4	6.2	9.8	7.2	8.7
1st Quartile	9.4	3.5	5.1	8.8	6.4	8.0
Median	8.8	3.1	4.2	8.3	6.0	7.3
3rd Quartile	7.9	2.5	3.3	7.6	5.3	6.7
95th Percentile	6.2	1.1	2.0	5.6	4.1	5.1
Population	265	261	258	248	241	231

Parentheses contain percentile rankings.
 Calculation based on monthly periodicity.



**Plan Sponsor TF Asset Allocation
As of March 31, 2019**



	US Equity	Intl. Equity	US Fixed Income	Intl. Fixed Income	Alternative Inv.	Real Estate	Cash
■ OPFRS Total Plan	52.7 (18)	11.8 (75)	26.9 (54)	0.0	6.4 (52)	0.0	2.1 (28)
5th Percentile	60.8	25.0	48.0	8.9	21.7	14.4	6.2
1st Quartile	50.4	18.6	34.5	4.9	11.7	10.5	2.2
Median	44.3	14.4	27.8	4.4	7.0	9.2	1.0
3rd Quartile	35.9	11.8	20.7	3.8	4.2	5.8	0.5
95th Percentile	23.8	7.2	14.3	1.7	1.1	3.9	0.1
Population	447	408	407	139	91	254	330

Parentheses contain percentile rankings.
Calculation based on monthly periodicity.

Monitoring/Probation Status

As of March 31, 2019
Return vs. Benchmark since Corrective Action

Portfolio	Status	Concern	Months Since Corrective Action	Performance [^] Since Corrective Action (Gross)	Peer Group Percentile Ranking	Date of Corrective Action*
Hansberger	On Watch	Organizational	16	-3.4%	75	11/30/2017
MSCI ACWI ex-USA	---	---	16	-2.0%		
NWQ	On Watch	Organizational	14	-5.3%	80	1/31/2018
Russell 2000 Value	---	---	14	-2.7%		

[^]. Annualized performance if over one year.

* Approximate date based on when Board voted to either monitor a manager at a heightened level or place it on probation.

Investment Performance Criteria
For Manager Monitoring/Probation Status

Asset Class	Short-term (rolling 12 mth periods)	Medium-term (rolling 36 mth periods)	Long-term (60 + months)
Active Domestic Equity	Fd return < bench return – 3.5%	Fd annlzd return < bench annlzd return – 1.75% for 6 consecutive months	VRR < 0.97 for 6 consecutive months
Active International Equity	Fd return < bench return – 4.5%	Fd annlzd return < bench annlzd return – 2.0% for 6 consecutive months	VRR < 0.97 for 6 consecutive months
Passive International Equity	Tracking Error > 0.50%	Tracking Error > 0.45% for 6 consecutive months	Fd annlzd return < bench annlzd return – 0.40% for 6 consecutive months
Fixed Income	Fd return < bench return – 1.5%	Fd annlzd return < bench annlzd return – 1.0% for 6 consecutive months	VRR < 0.98 for 6 consecutive months

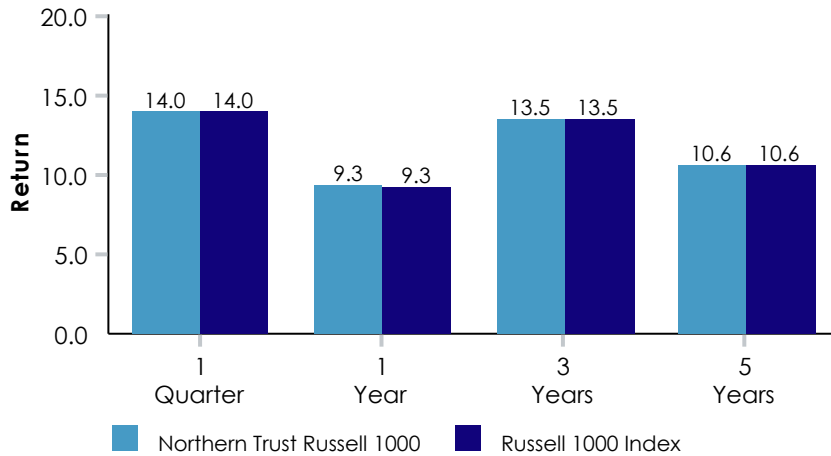
VRR – Value Relative Ratio – is calculated as: manager cumulative return / benchmark cumulative return.

Northern Trust Russell 1000 - gross of fees

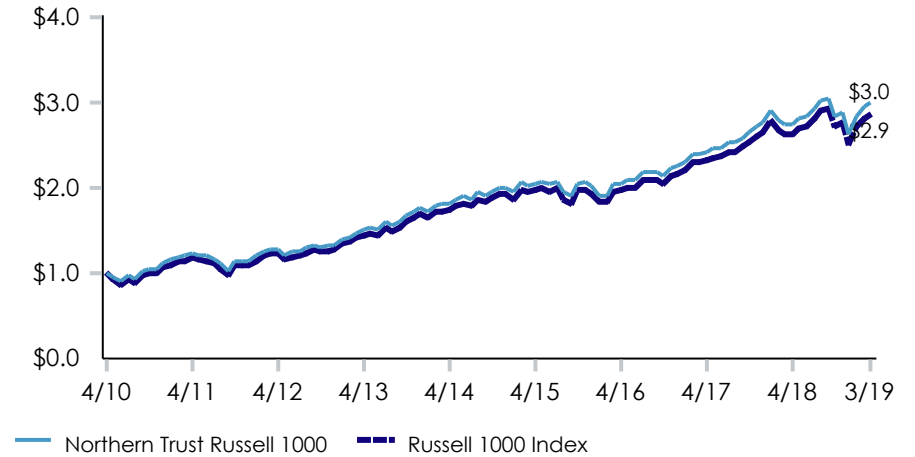
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
Northern Trust Russell 1000	0.84	0.97	0.33	1.03	1.33	0.99	99.56	95.23	05/01/2010
Russell 1000 Index	0.00	1.00	-	0.97	0.00	1.00	100.00	100.00	05/01/2010

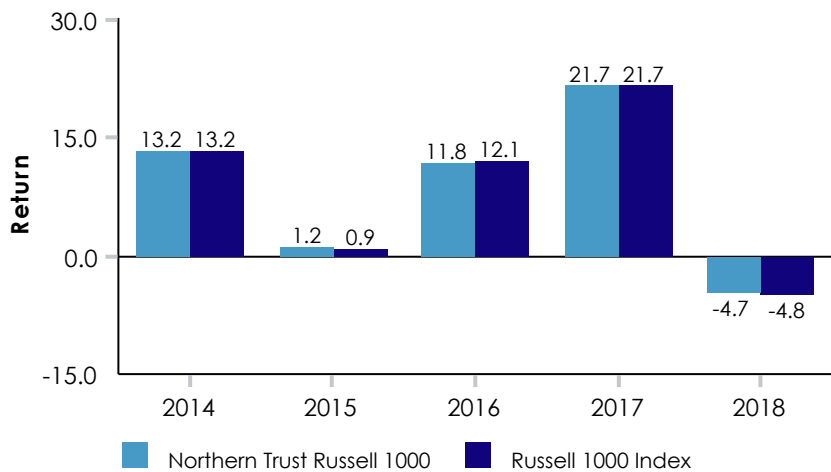
Trailing Period Performance



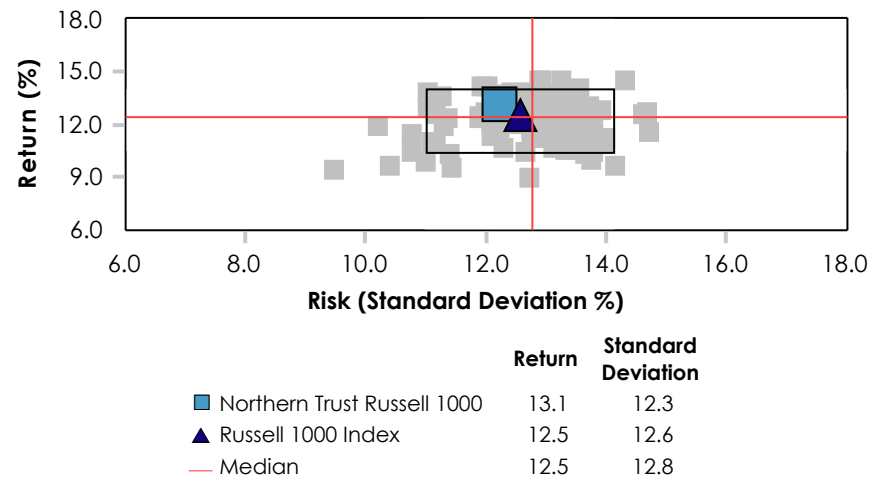
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception

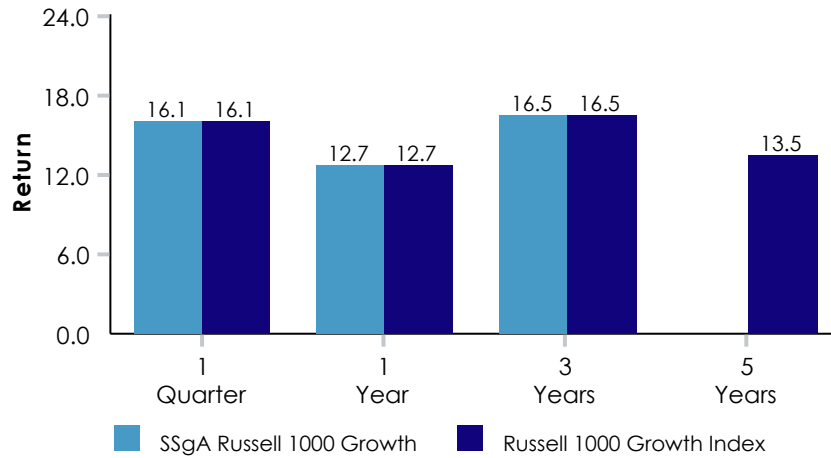


SSgA Russell 1000 Growth - gross of fees

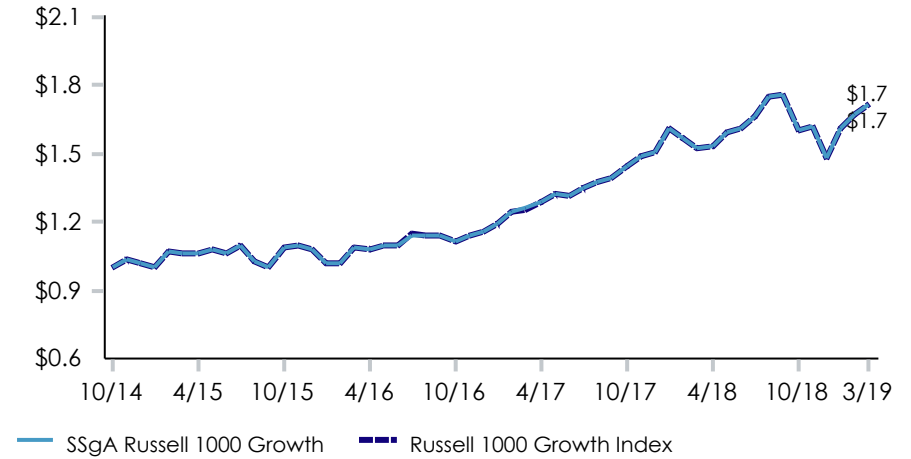
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
SSgA Russell 1000 Growth	0.01	1.00	0.06	0.98	0.03	1.00	99.99	99.96	11/01/2014
Russell 1000 Growth Index	0.00	1.00	-	0.98	0.00	1.00	100.00	100.00	11/01/2014

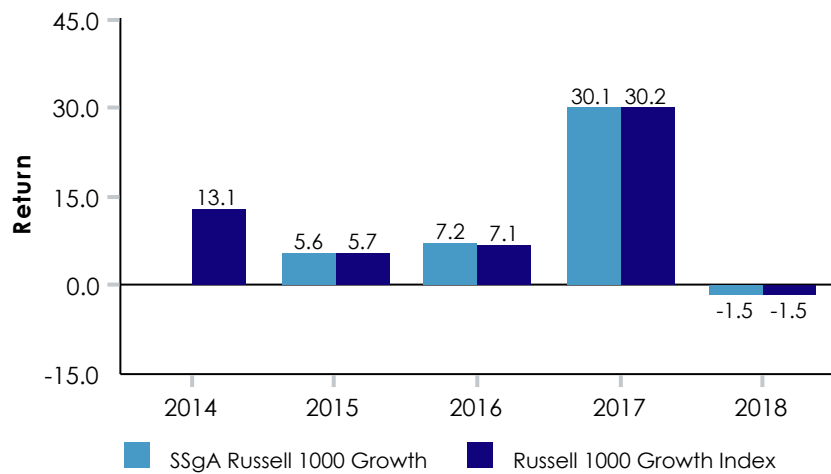
Trailing Period Performance



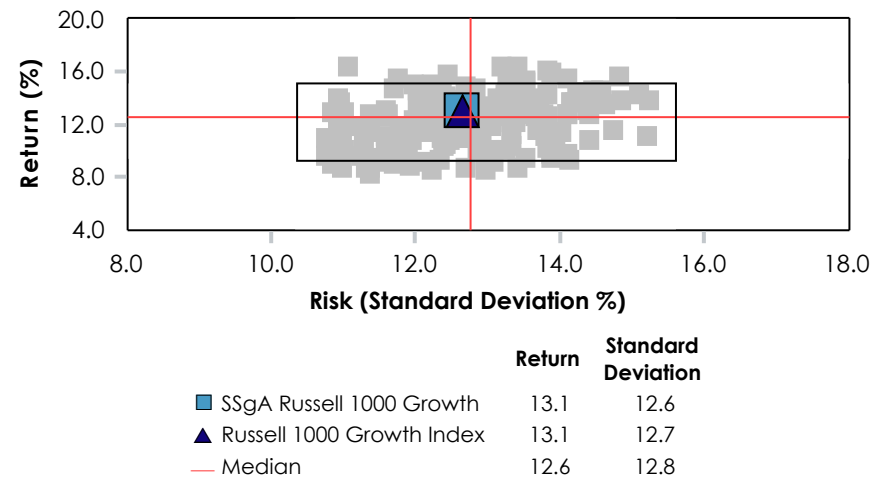
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception

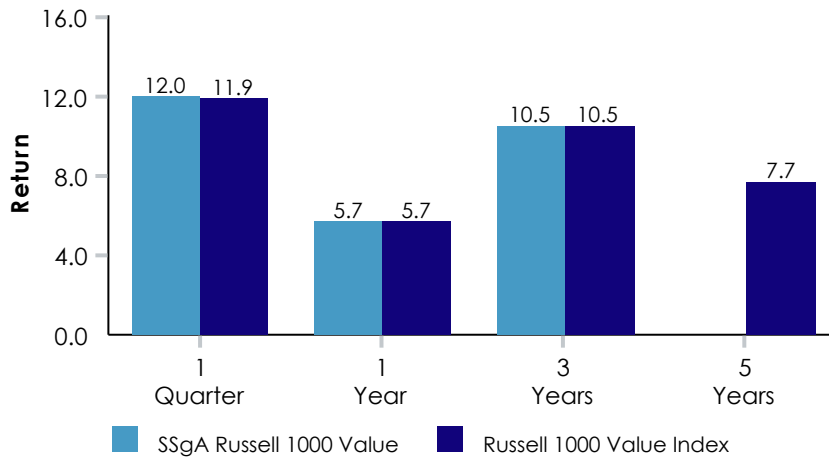


SSgA Russell 1000 Value - gross of fees

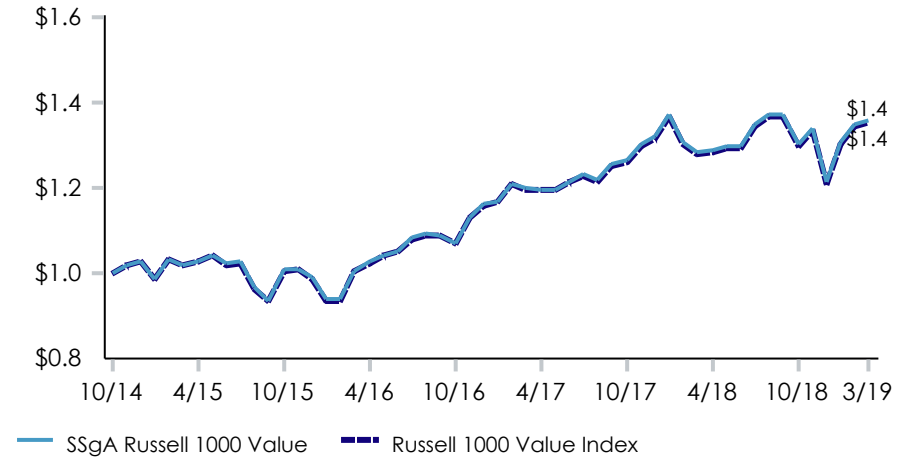
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
SSgA Russell 1000 Value	0.10	1.00	1.44	0.60	0.06	1.00	100.25	99.57	11/01/2014
Russell 1000 Value Index	0.00	1.00	-	0.59	0.00	1.00	100.00	100.00	11/01/2014

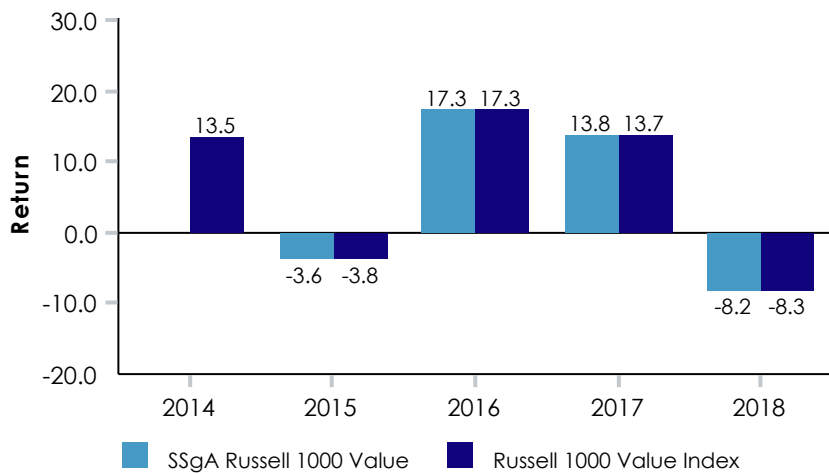
Trailing Period Performance



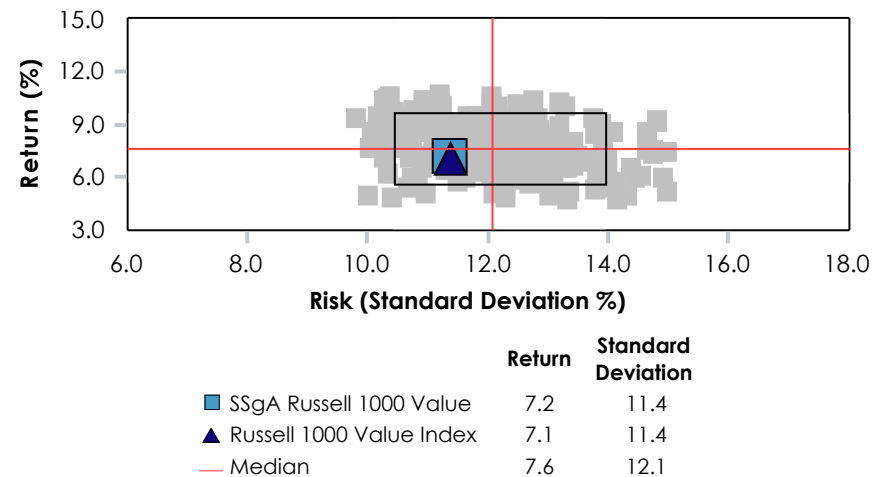
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception

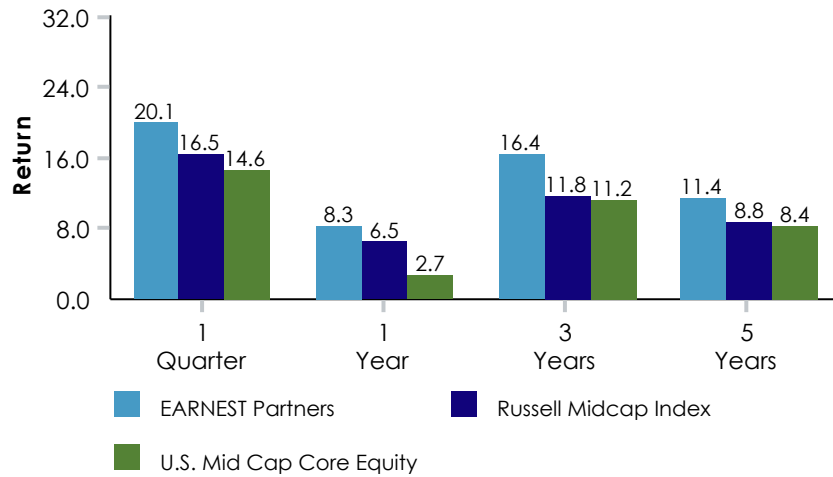


EARNEST Partners - gross of fees

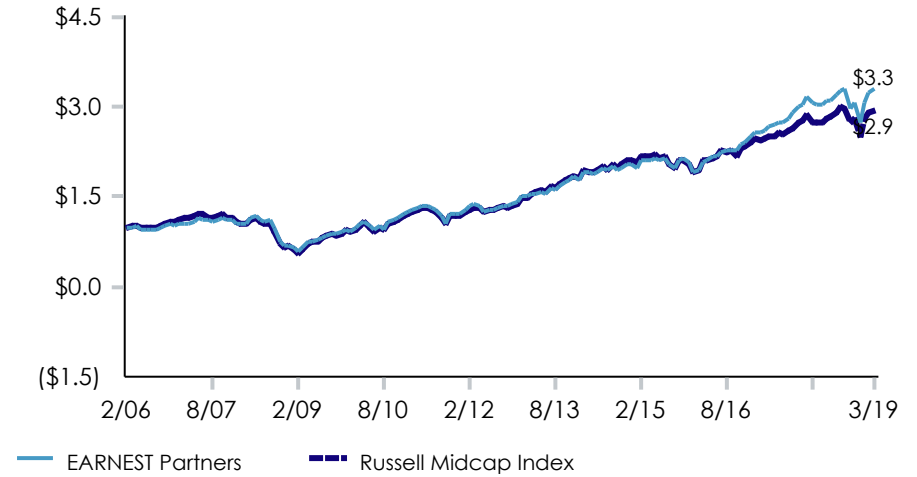
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
EARNEST Partners	0.93	1.00	0.28	0.56	3.38	0.96	100.68	95.42	03/01/2006
Russell Midcap Index	0.00	1.00	-	0.51	0.00	1.00	100.00	100.00	03/01/2006
U.S. Mid Cap Core Equity Median	-	-	-	-	-	-	-	-	-

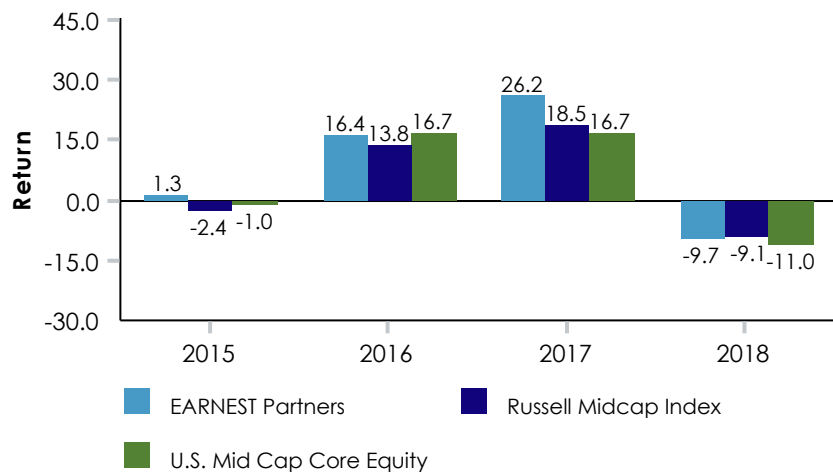
Trailing Period Performance



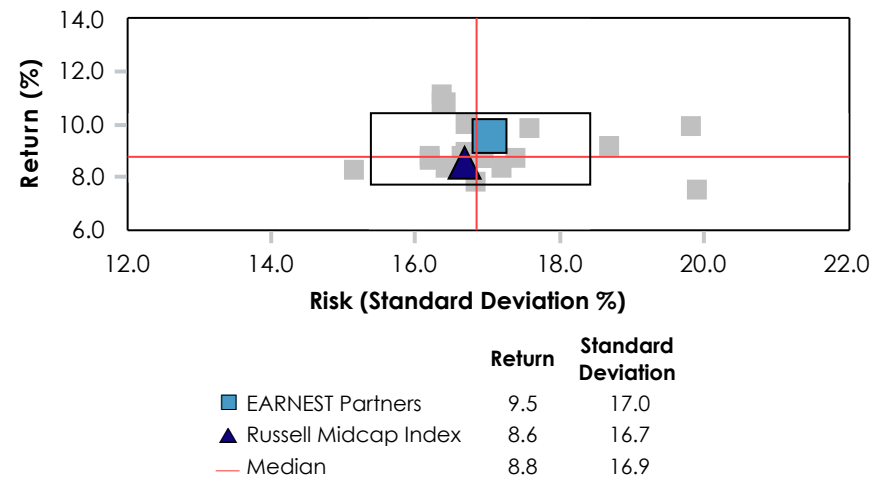
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception

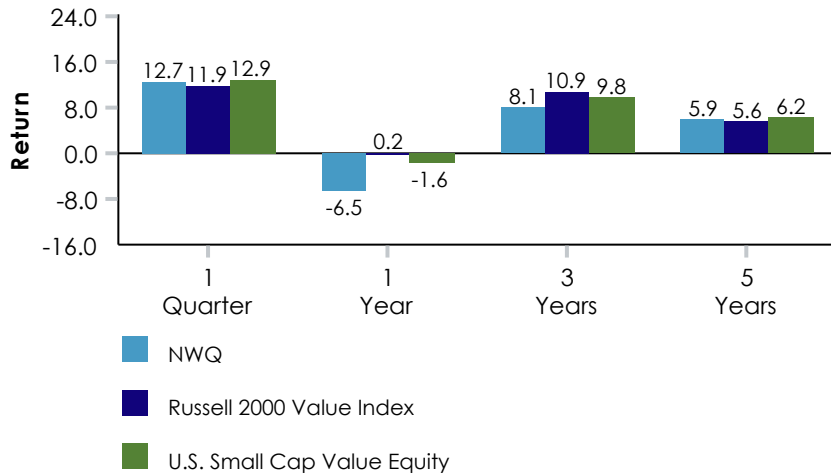


NWQ - gross of fees

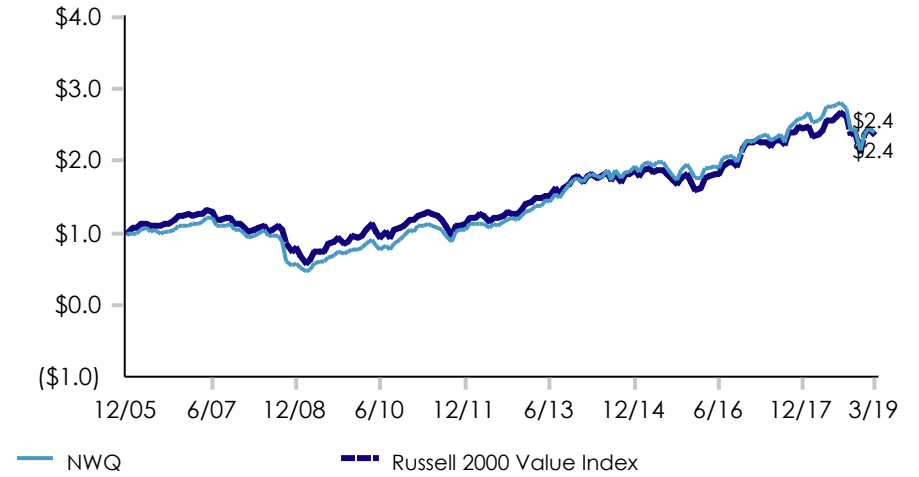
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
NWQ	0.31	1.01	0.06	0.38	6.78	0.89	101.48	100.16	01/01/2006
Russell 2000 Value Index	0.00	1.00	-	0.38	0.00	1.00	100.00	100.00	01/01/2006
U.S. Small Cap Value Equity Median	-	-	-	-	-	-	-	-	-

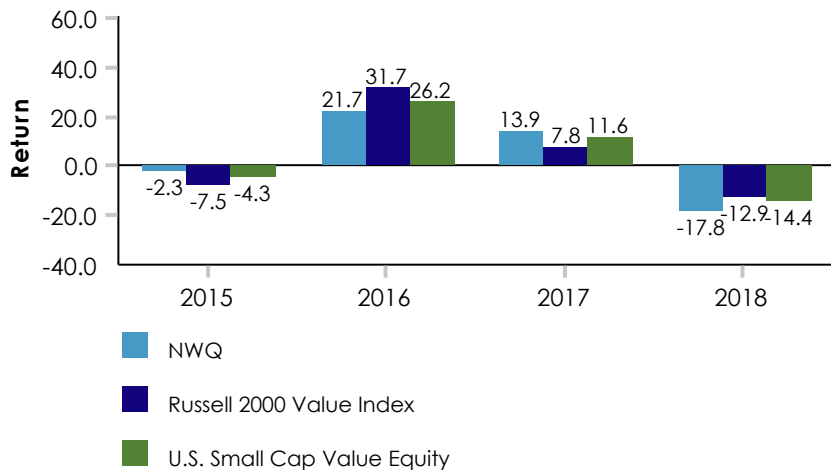
Trailing Period Performance



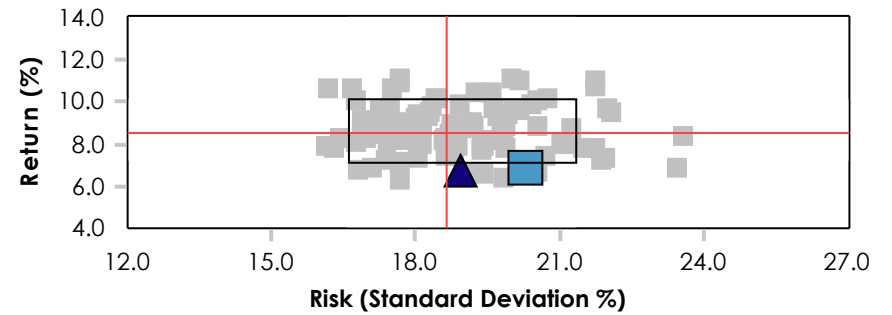
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception



	Return	Standard Deviation
NWQ	6.9	20.3
Russell 2000 Value Index	6.8	18.9
Median	8.5	18.6

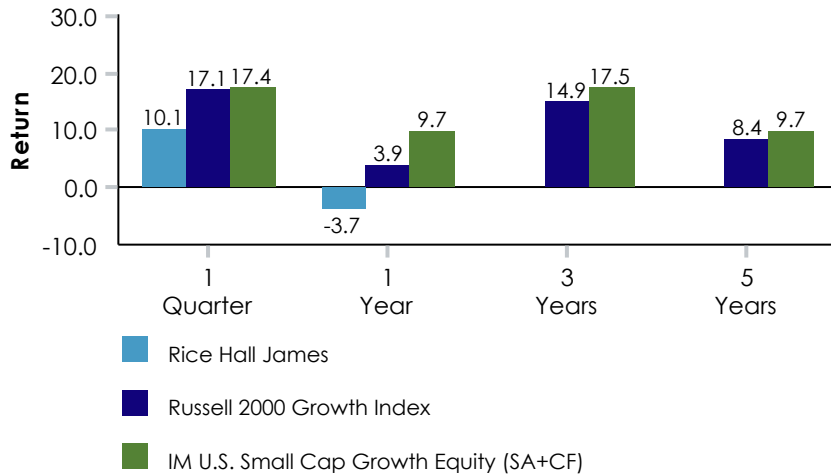


Rice Hall James - gross of fees

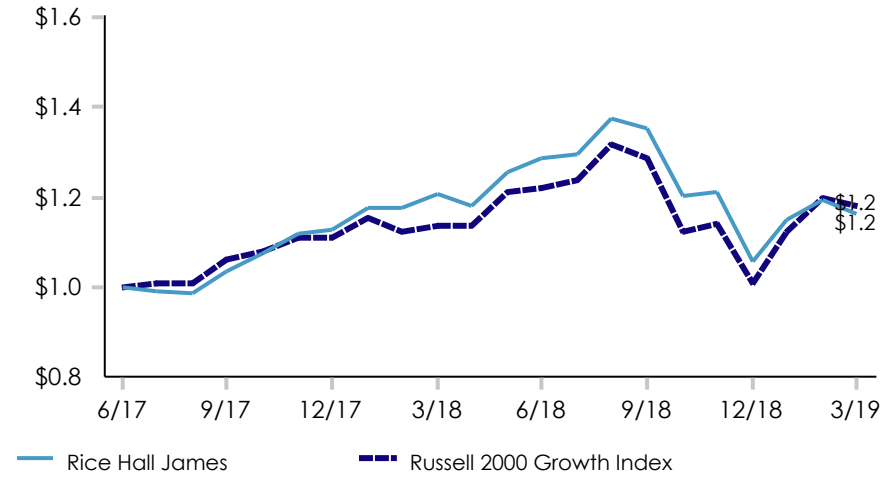
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
Rice Hall James	-0.02	0.91	-0.20	0.48	5.33	0.92	91.25	91.69	07/01/2017
Russell 2000 Growth Index	0.00	1.00	-	0.51	0.00	1.00	100.00	100.00	07/01/2017
IM U.S. Small Cap Growth Equity (SA+CF) Median	-	-	-	-	-	-	-	-	-

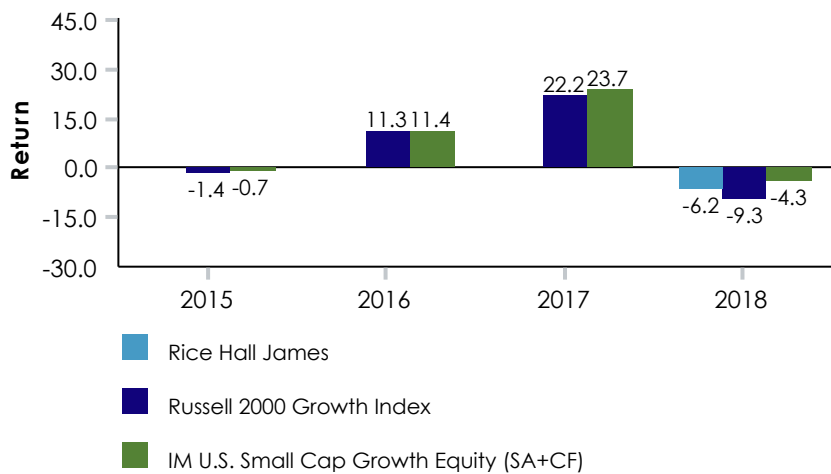
Trailing Period Performance



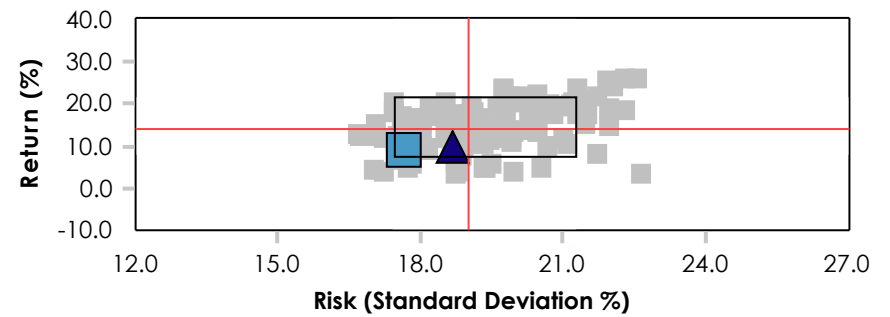
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception



	Return	Standard Deviation
Rice Hall James	9.0	17.7
Russell 2000 Growth Index	9.9	18.7
Median	14.1	19.0

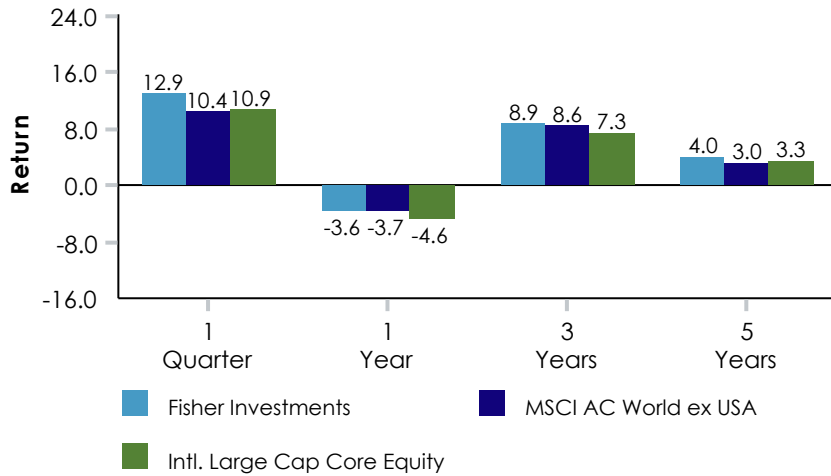


Fisher Investments - gross of fees

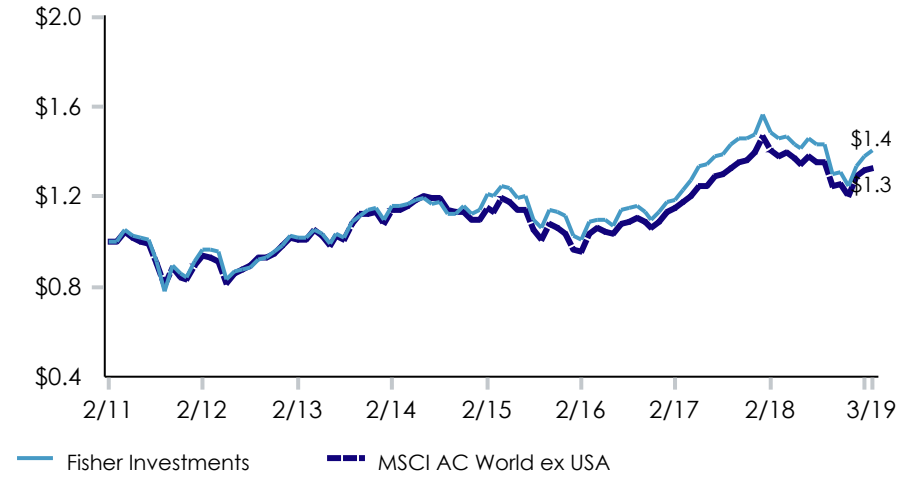
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
Fisher Investments	0.56	1.09	0.27	0.32	3.48	0.95	106.84	102.88	03/01/2011
MSCI AC World ex USA	0.00	1.00	-	0.29	0.00	1.00	100.00	100.00	03/01/2011
Intl. Large Cap Core Equity Median	-	-	-	-	-	-	-	-	-

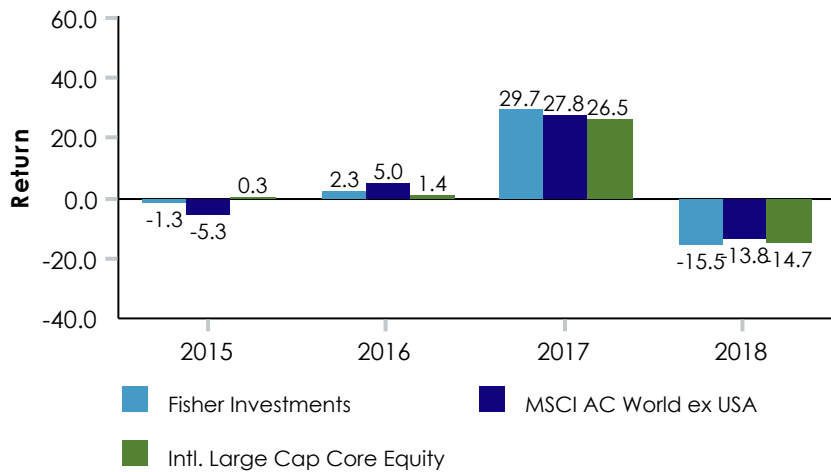
Trailing Period Performance



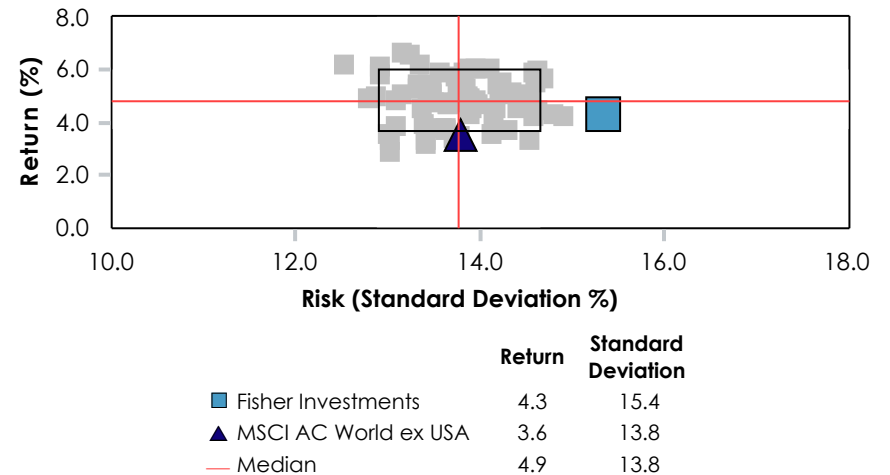
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception

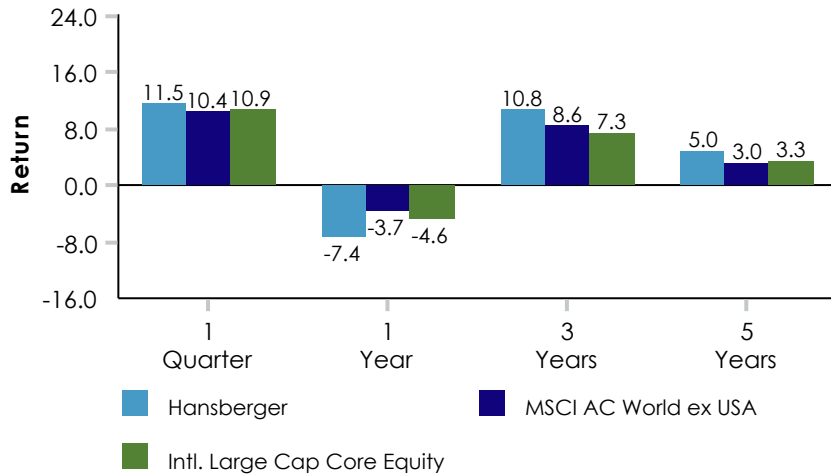


Hansberger - gross of fees

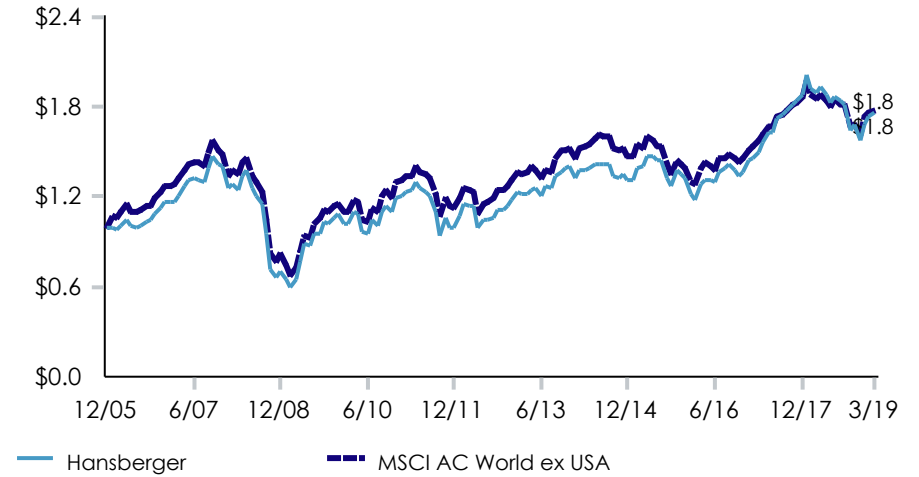
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
Hansberger	-0.21	1.08	0.06	0.26	4.41	0.95	105.46	105.81	01/01/2006
MSCI AC World ex USA	0.00	1.00	-	0.27	0.00	1.00	100.00	100.00	01/01/2006
Intl. Large Cap Core Equity Median	-	-	-	-	-	-	-	-	-

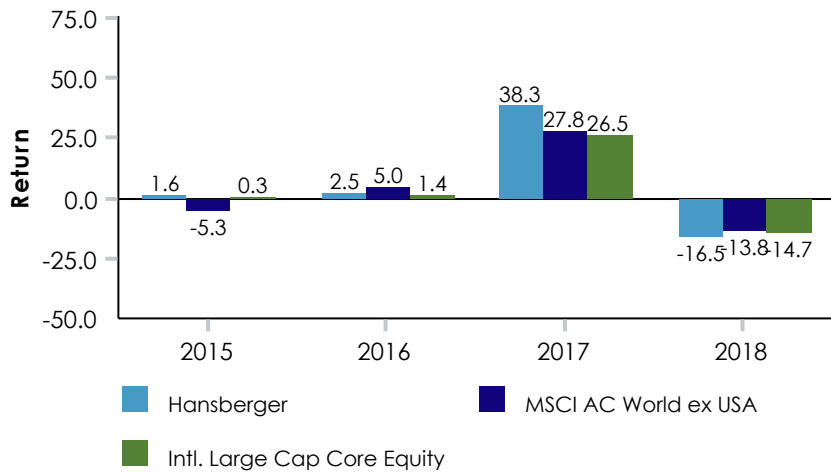
Trailing Period Performance



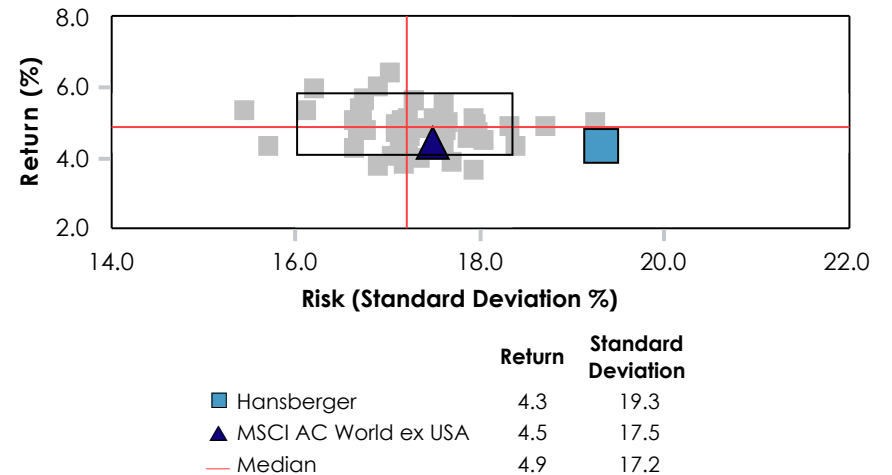
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception

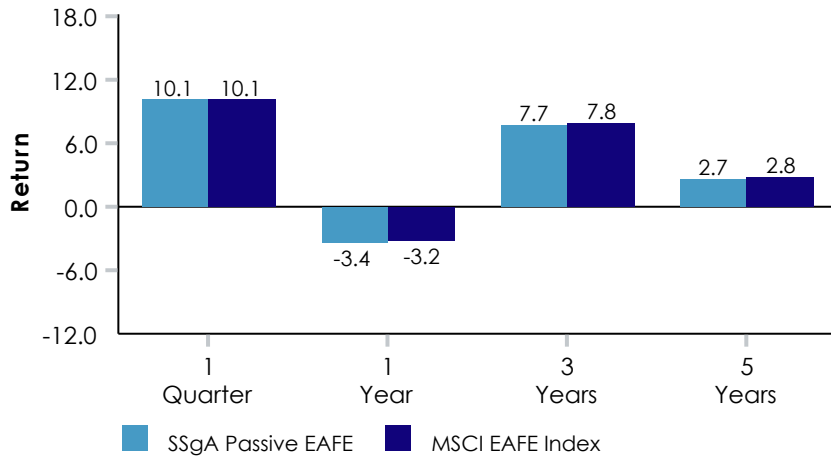


SSgA Passive EAFE - gross of fees

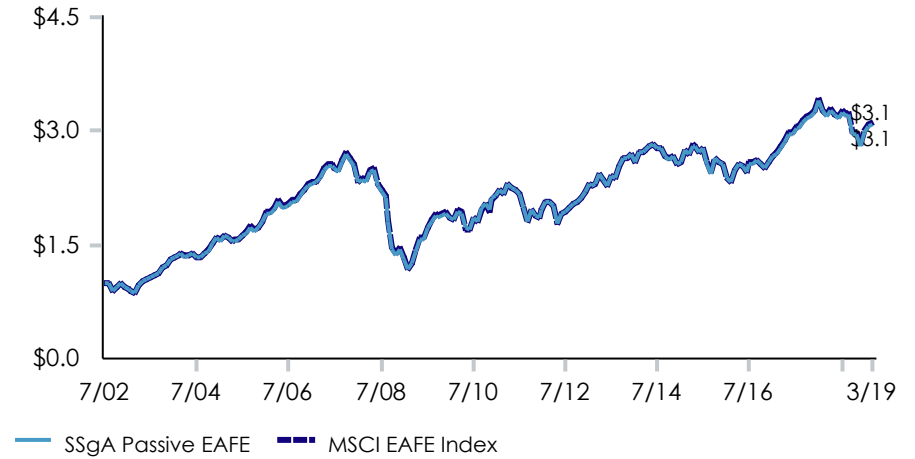
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
SSgA Passive EAFE	-0.01	0.99	-0.15	0.42	0.43	1.00	99.29	99.34	08/01/2002
MSCI EAFE Index	0.00	1.00	-	0.42	0.00	1.00	100.00	100.00	08/01/2002

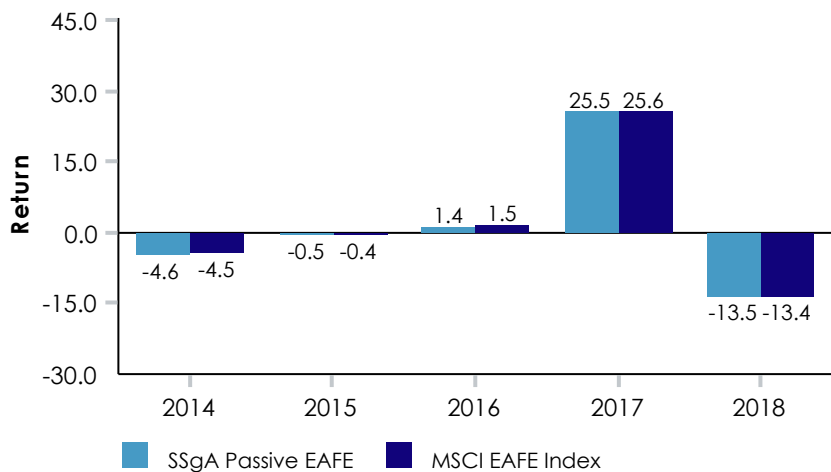
Trailing Period Performance



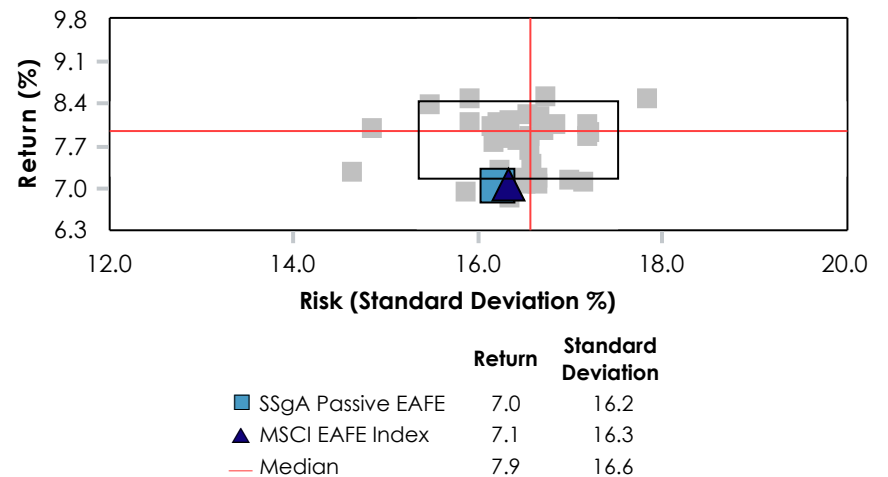
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception

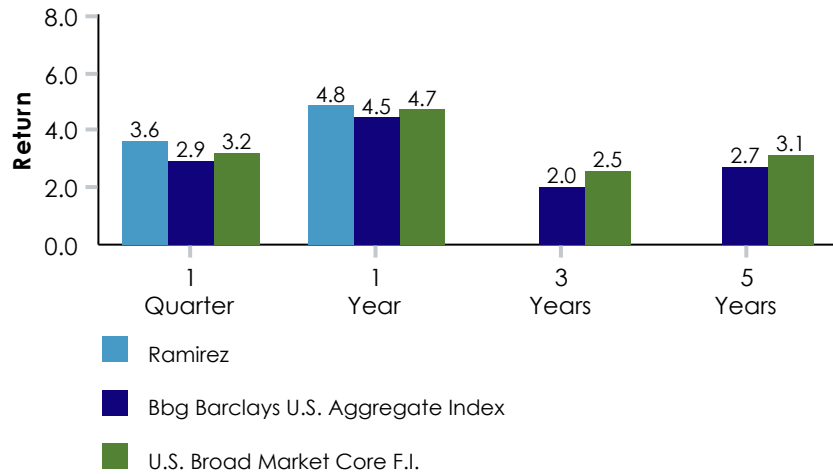


Ramirez - gross of fees

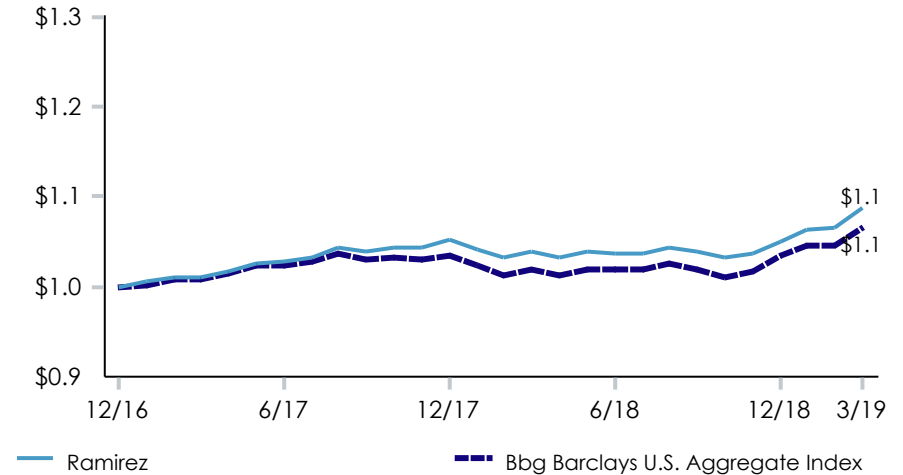
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
Ramirez	1.23	0.90	1.49	0.98	0.63	0.94	105.70	72.28	01/01/2017
Bbg Barclays U.S. Aggregate Index	0.00	1.00	-	0.55	0.00	1.00	100.00	100.00	01/01/2017
U.S. Broad Market Core F.I. Median	-	-	-	-	-	-	-	-	-

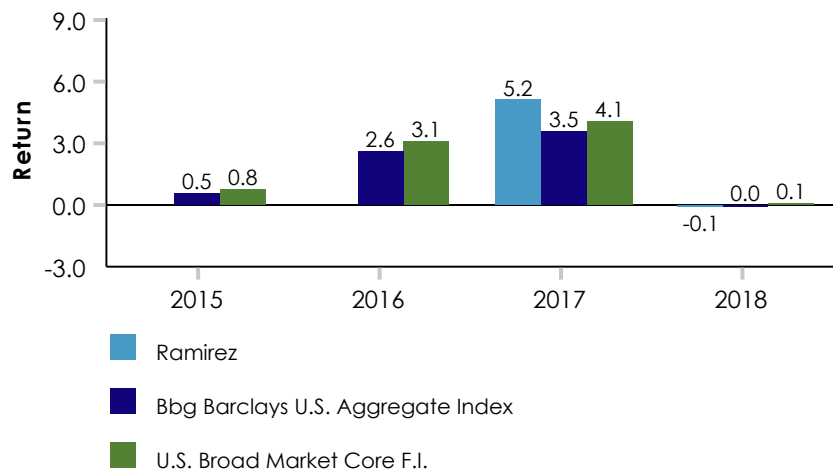
Trailing Period Performance



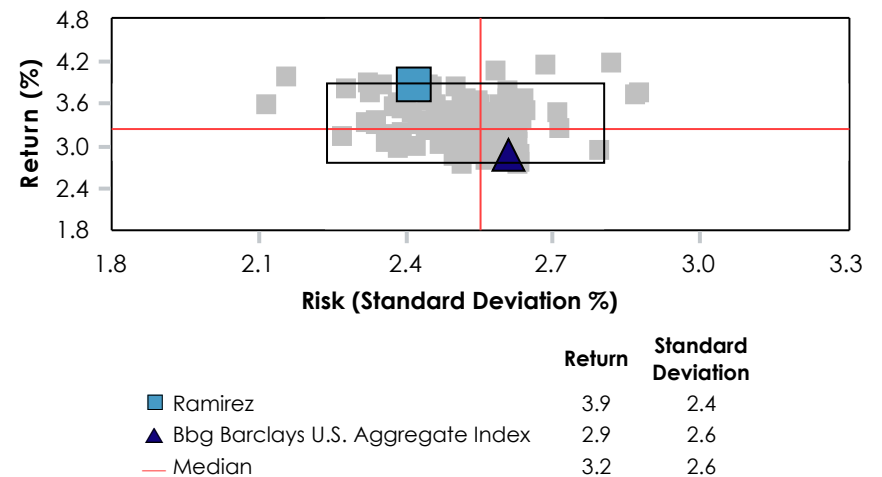
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception

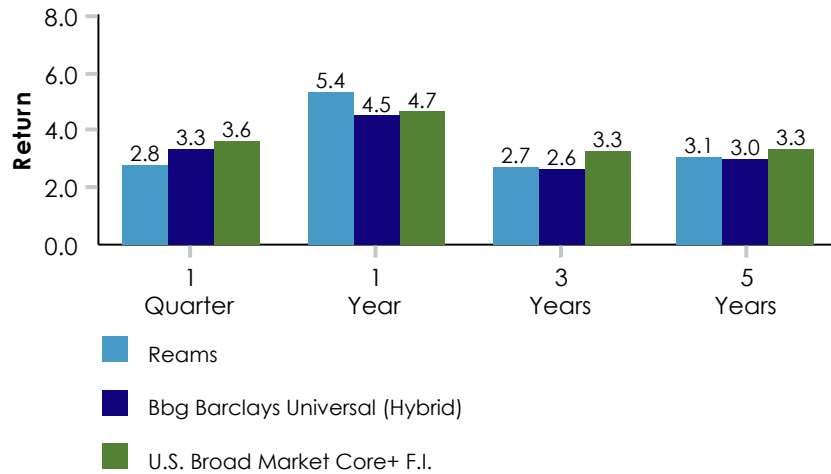


Reams - gross of fees

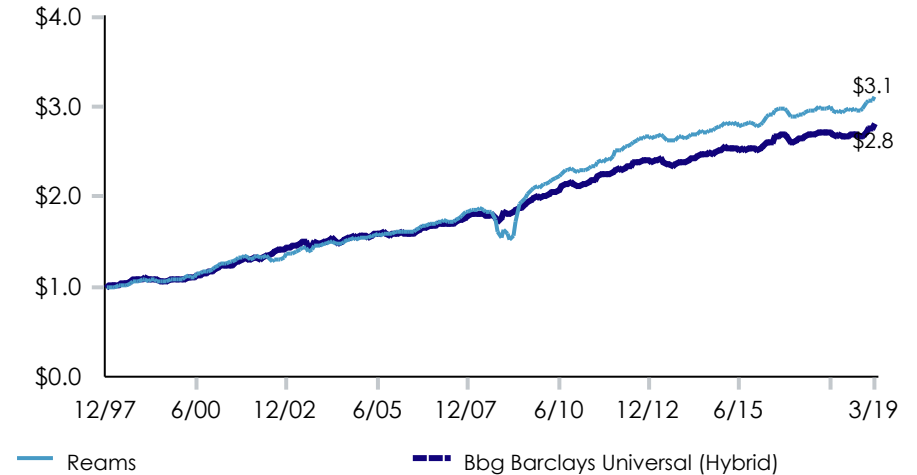
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
Reams	0.31	1.06	0.15	0.67	3.98	0.44	109.06	103.42	01/01/1998
Bbg Barclays Universal (Hybrid)	0.00	1.00	-	0.89	0.00	1.00	100.00	100.00	01/01/1998
U.S. Broad Market Core+ F.I. Median	-	-	-	-	-	-	-	-	-

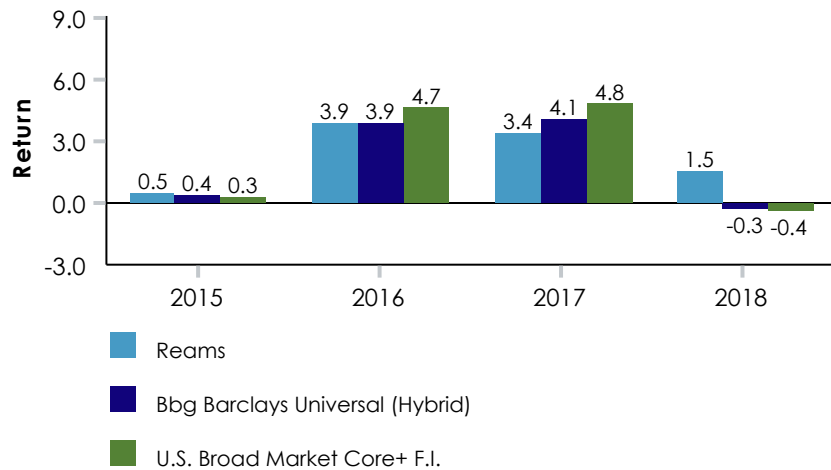
Trailing Period Performance



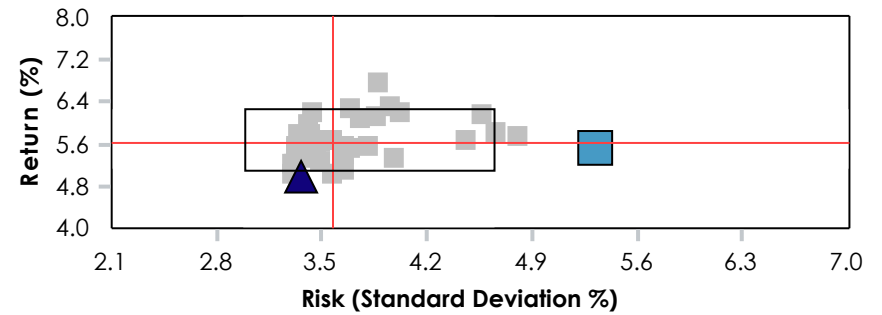
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception



	Return	Standard Deviation
Reams	5.5	5.3
Bbg Barclays Universal (Hybrid)	5.0	3.4
Median	5.6	3.6

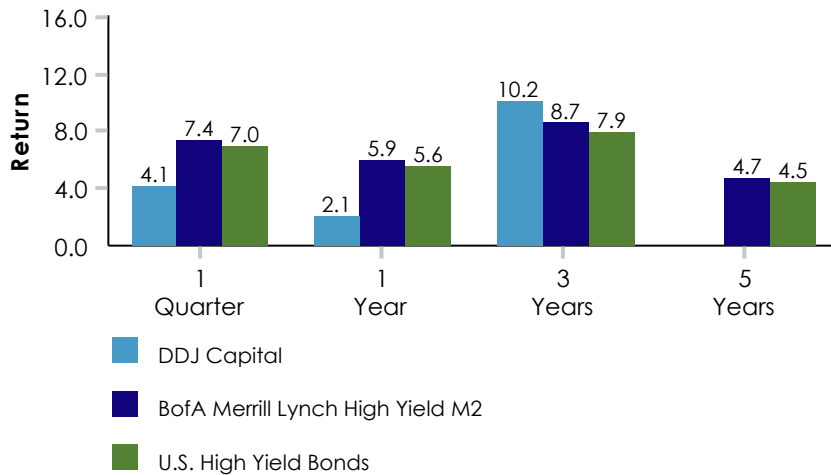


DDJ Capital - gross of fees

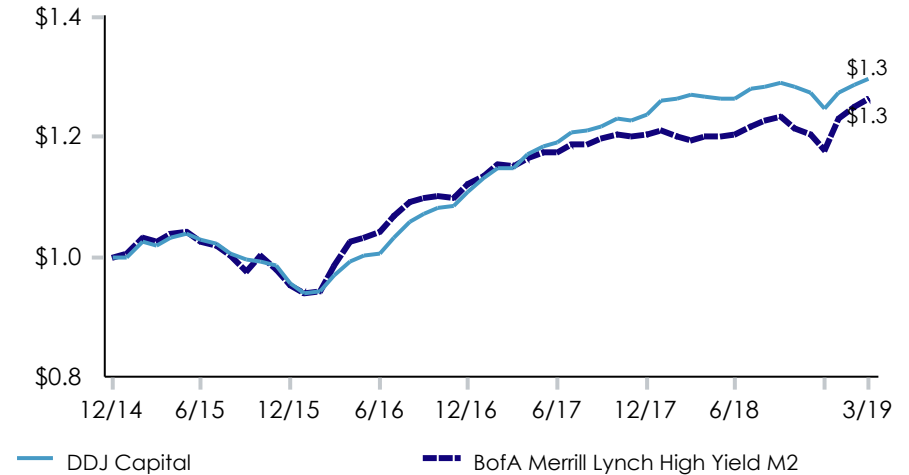
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
DDJ Capital	2.42	0.68	0.19	1.21	3.00	0.71	88.97	64.46	01/01/2015
BofA Merrill Lynch High Yield M2	0.00	1.00	-	0.87	0.00	1.00	100.00	100.00	01/01/2015
U.S. High Yield Bonds Median	-	-	-	-	-	-	-	-	-

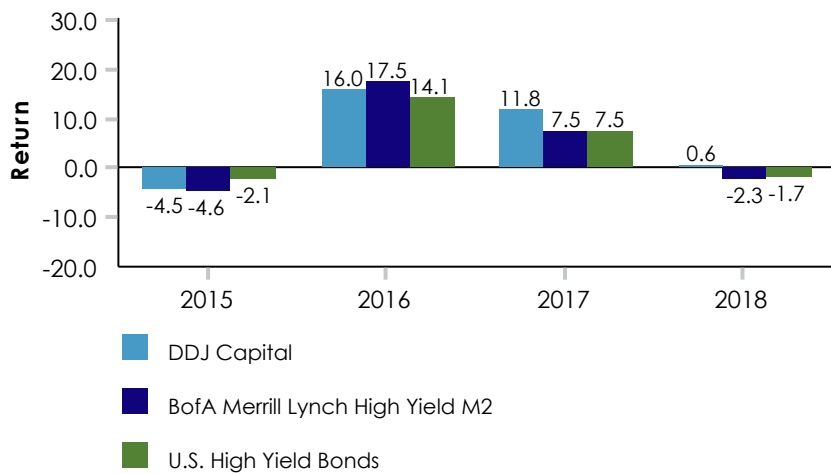
Trailing Period Performance



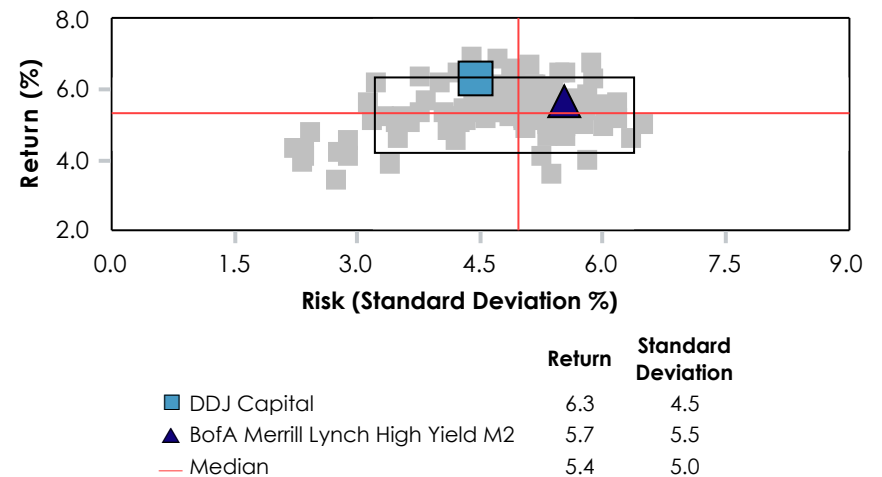
Growth of \$1 - Since Inception



Calendar Year Performance



Risk/Return - Since Inception

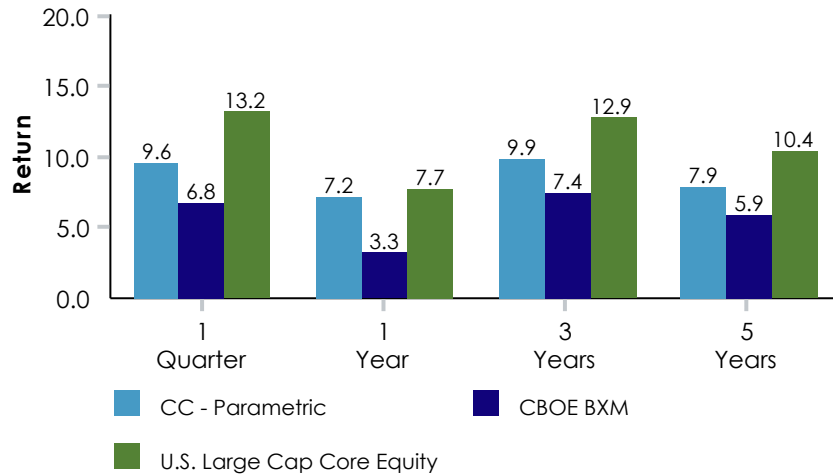


CC - Parametric - gross of fees

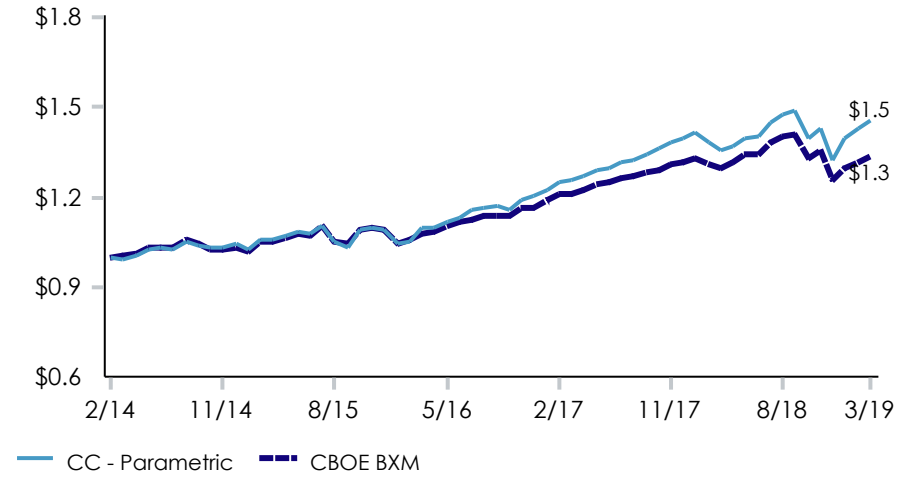
As of March 31, 2019

	Alpha	Beta	Information Ratio	Sharpe Ratio	Tracking Error	R-Squared	Up Market Capture	Down Market Capture	Inception Date
CC - Parametric	1.26	1.07	0.73	0.88	2.28	0.92	117.03	106.51	03/01/2014
CBOE BXM	0.00	1.00	-	0.75	0.00	1.00	100.00	100.00	03/01/2014
U.S. Large Cap Core Equity Median	-	-	-	-	-	-	-	-	-

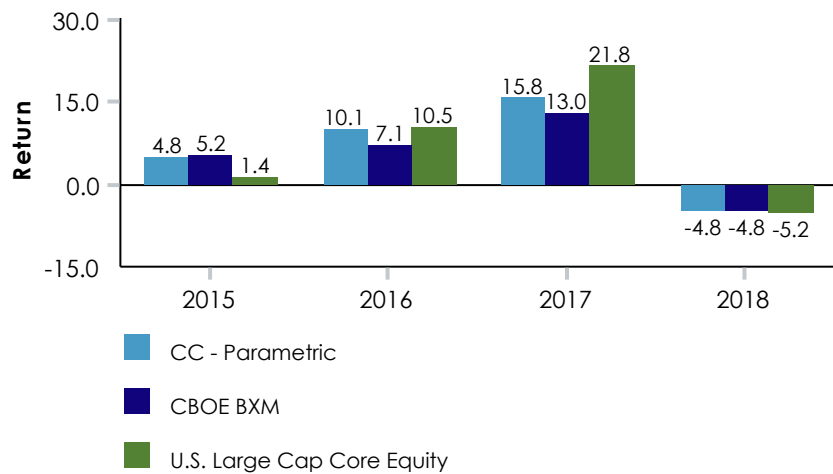
Trailing Period Performance



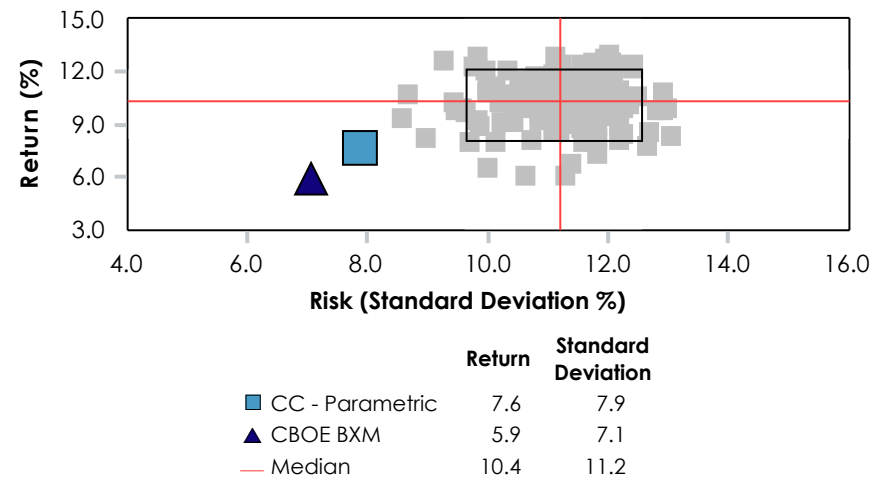
Growth of \$1 - Since Inception



Calendar Year Performance

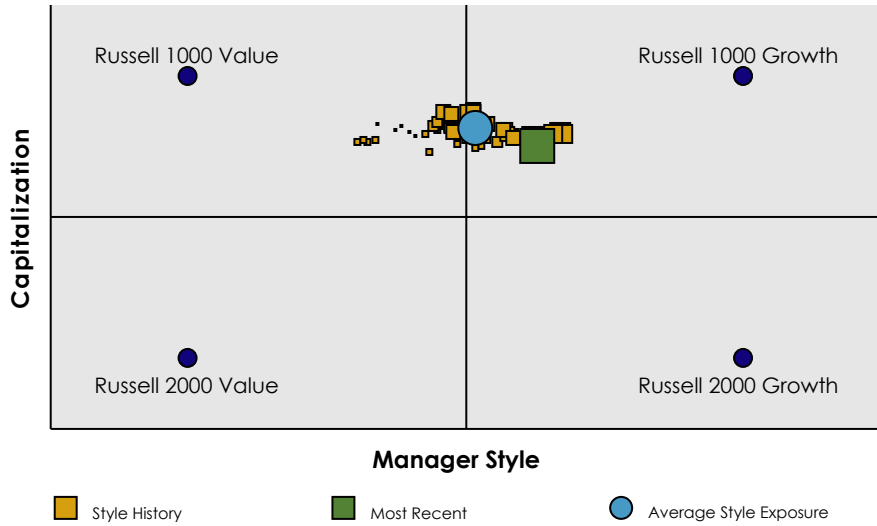


Risk/Return - Since Inception

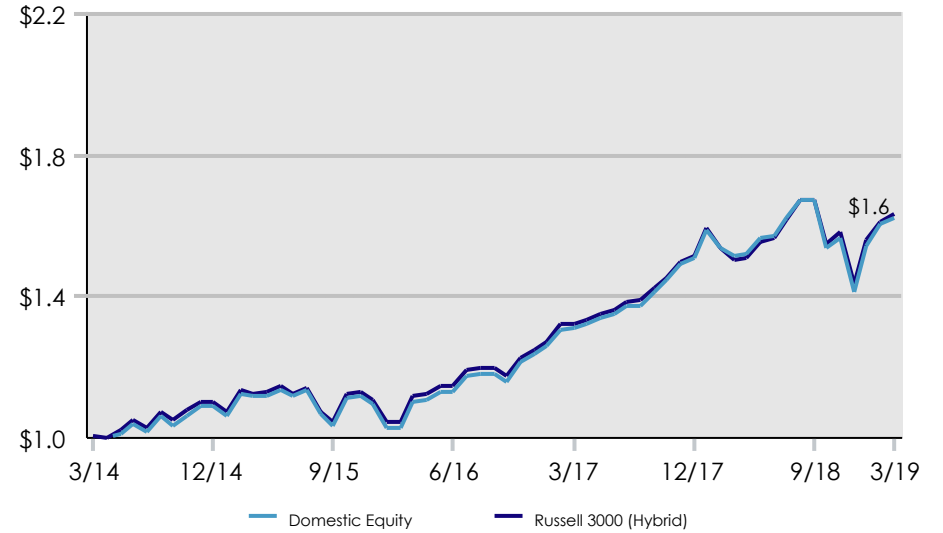


Domestic Equity Analysis As of March 31, 2019

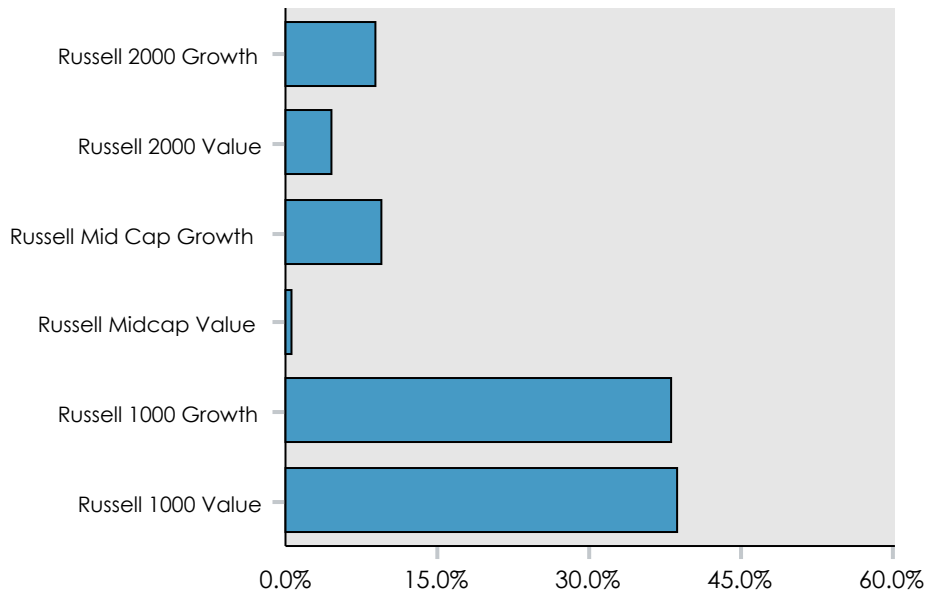
Style Map (5-Year)



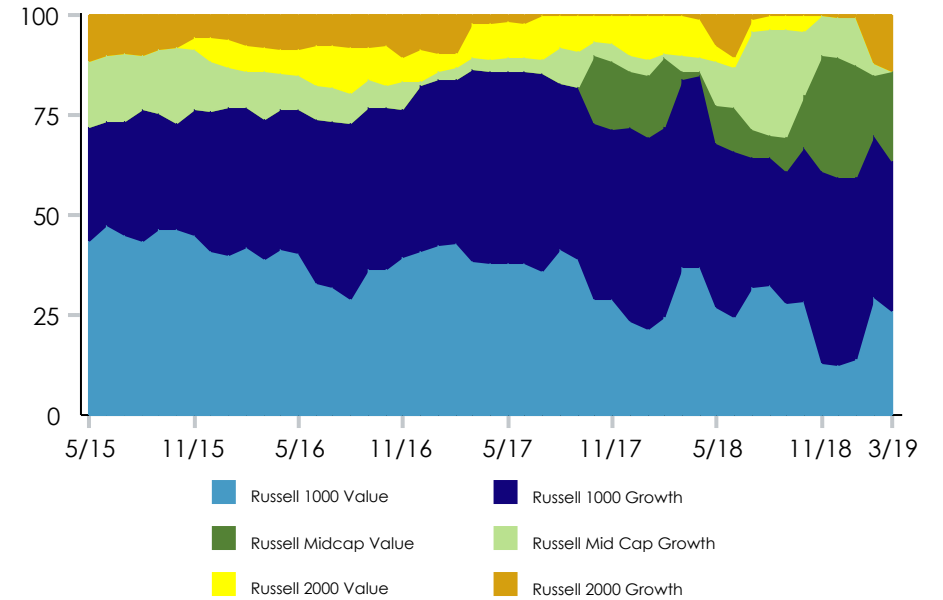
Growth of \$1 (5-Year)



Style Exposure



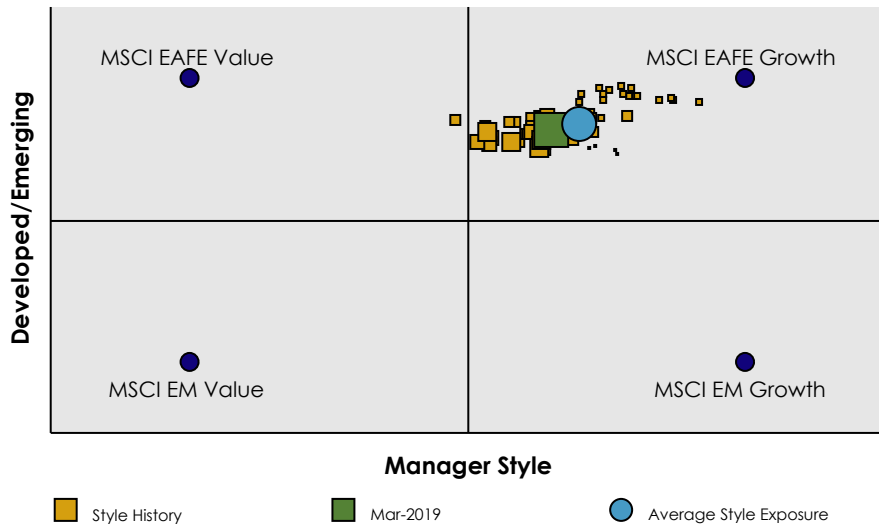
Style History (5-Year)



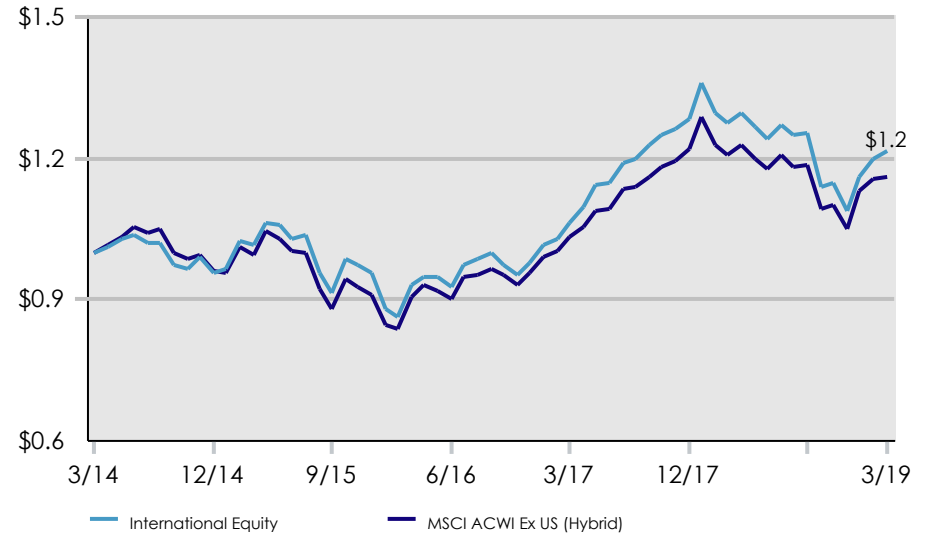
International Equity Analysis

As of March 31, 2019

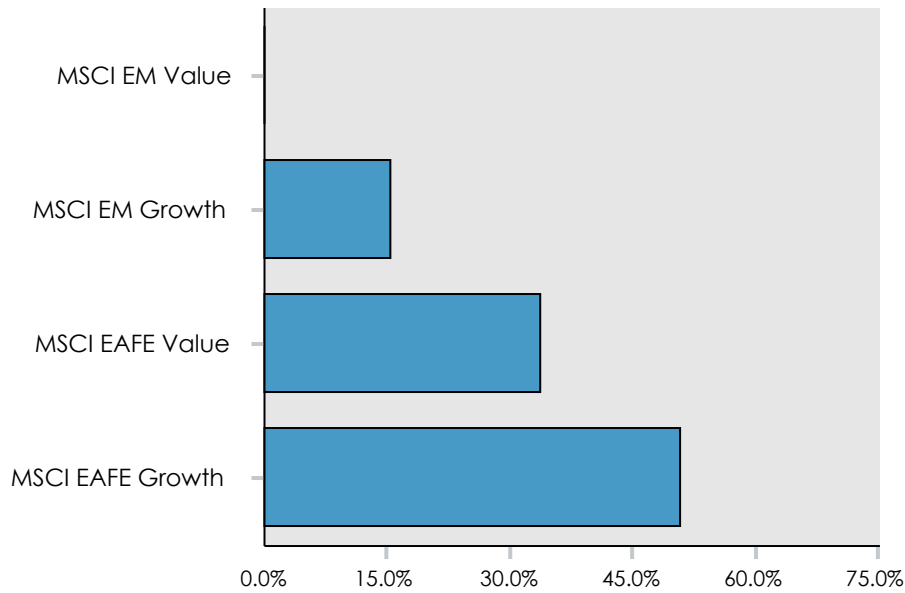
Style Map (5-Year)



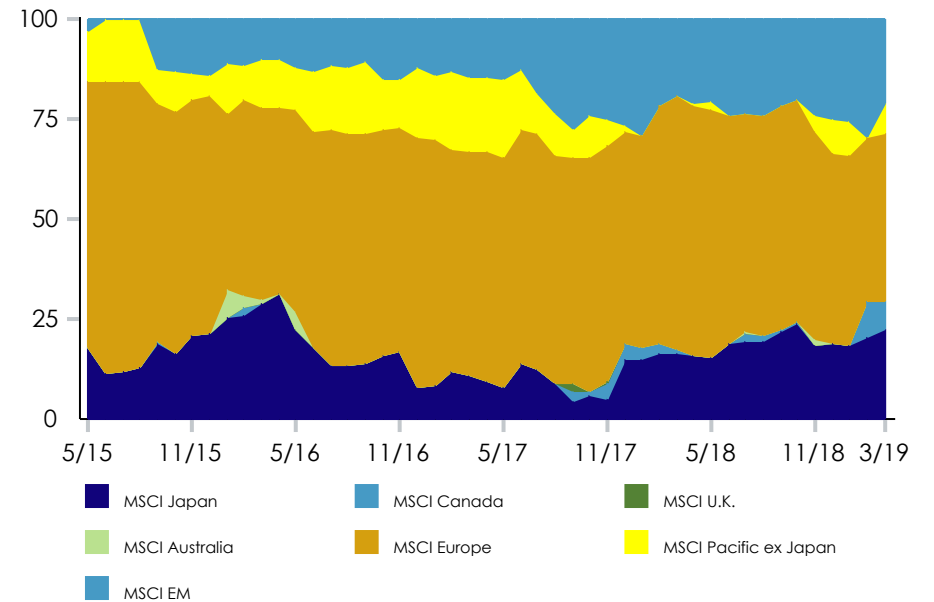
Growth of \$1 (5-Year)



Style Exposure

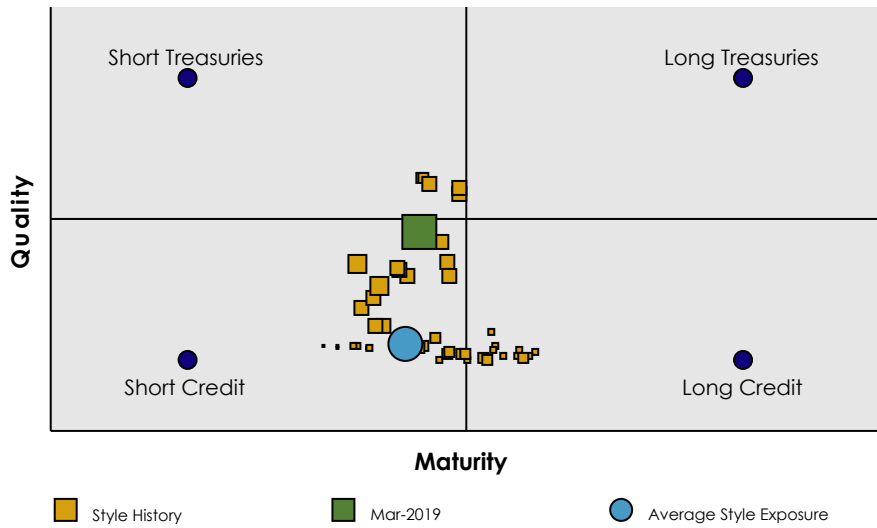


Style History (5-Year)

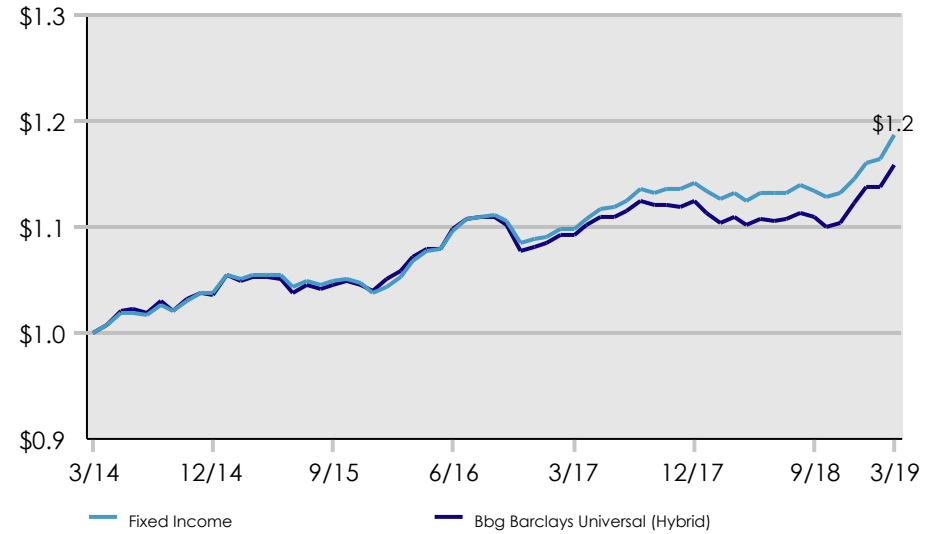


Fixed Income Analysis As of March 31, 2019

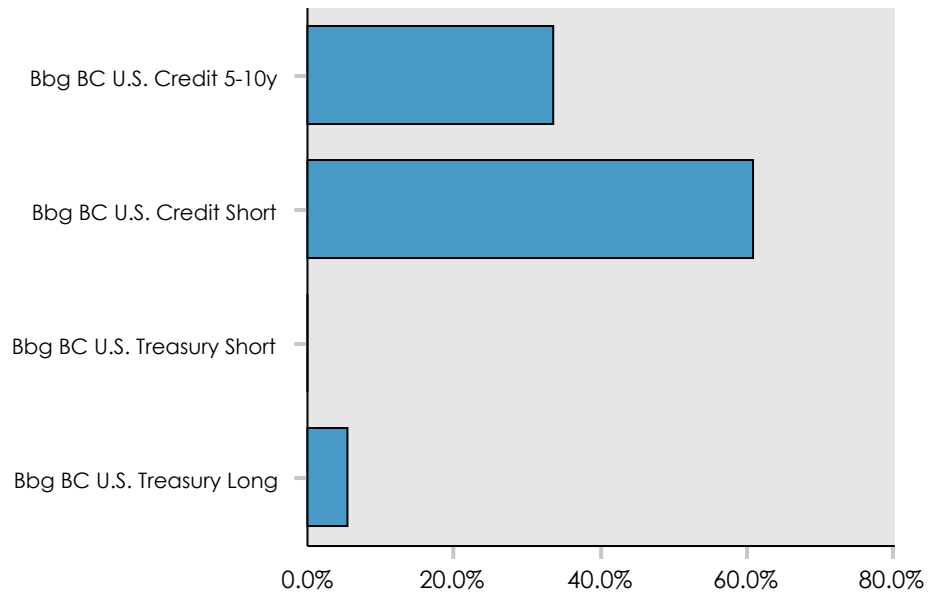
Style Map (5-Year)



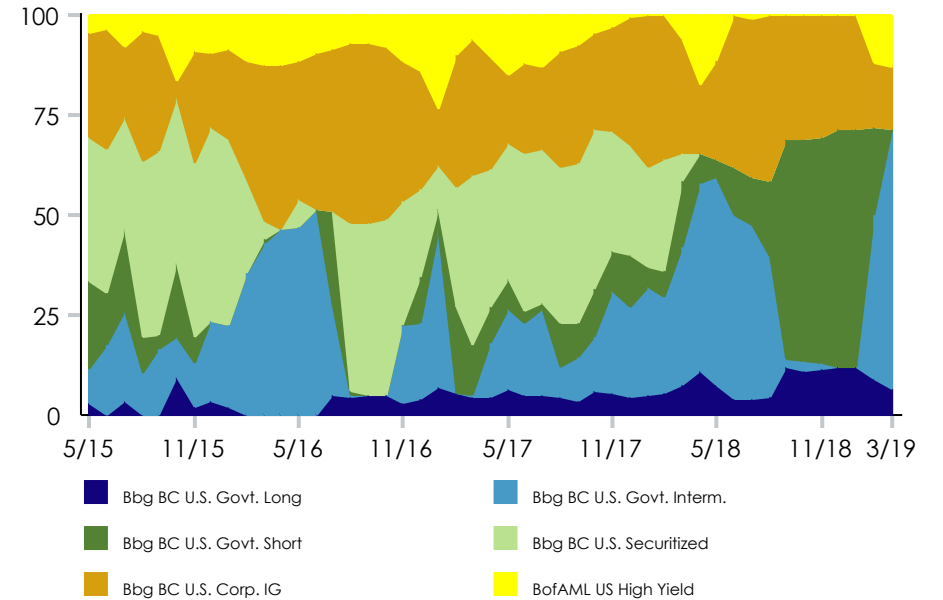
Growth of \$1 (5-Year)



Style Exposure



Style History (5-Year)



Glossary

Alpha

The premium an investment earns above a set standard. This is usually measured in terms of a common index (i.e., how the stock performs independent of the market). An Alpha is usually generated by regressing excess return on the S&P 500 excess return.

Annualized Performance

The annual rate of return that when compounded (t) times generates the same (t) period holding return as actually occurred from periods (1) to period (t).

Batting Average

Percentage of periods a portfolio outperforms a given index.

Beta

The measure of an asset's risk in relation to the Market (for example, the S&P 500) or to an alternative benchmark or factors. Roughly speaking, a security with a Beta of 1.5 will have moved, on average, 1.5 times the market return.

Bottom-up

A management style that de-emphasizes the significance of economic and market cycles, focusing instead on the analysis of individual stocks.

Dividend Discount Model

A method to value the common stock of a company that is based on the present value of the expected future dividends.

Growth Stock

Common stock of a company that has an opportunity to invest money and earn more than its opportunity cost of capital.

Information Ratio

The ratio of annualized expected residual return to residual risk. A central measurement for active management, value added is proportional to the square of the information ratio.

R - Squared

Square of the correlation coefficient. The proportion of the variability in one series that can be explained by the variability of one or more other series in a regression model. A measure of the quality of fit. 100% R-square means a perfect predictability.

Standard Deviation

The square root of the variance. A measure of dispersion of a set of data from its mean

Sharpe Ratio

A measure of a portfolio's excess return relative to the total variability of the portfolio.

Style Analysis

A returns-based analysis using a multi-factor attribution model. The model calculates a product's average exposure to particular investment styles over time (i.e., the products normal style benchmark).

Top-Down

Investment style that begins with an assessment of the overall economic environment and makes a general asset allocation decision regarding various sectors of the financial markets and various industries.

Tracking Error

The standard deviation of the difference between the returns of a portfolio and an appropriate benchmark.

Turnover

For mutual funds, a measure of trading activity during the previous year, expressed as a percentage of the average total assets of the fund. A turnover rate of 25% means that the value of trades represented (1/4) of the assets of the fund.

Value Stock

Stocks with low price/book ratios or price/earnings ratios. Historically, value stocks have enjoyed higher average returns than growth stocks (stocks with high price/book or price/earnings ratios) in a variety of countries.

Benchmark Definitions

Bloomberg Barclays Capital Universal: includes market coverage by the Aggregate Bond Index fixed rate debt issues, which are rated investment grade or higher by Moody's, S&P, or Fitch, in that order with all issues having at least one year to maturity and an outstanding par value of at least \$100 million and includes exposures to high yield CMBS securities. All returns are market value weighted inclusive of accrued interest.

MSCI ACWI x US: MSCI ACWI (All Country World Index) Free excluding US (gross dividends): is a free-floating adjusted market capitalization index designed to measure equity performance in the global developed and emerging markets. As of April 2002, the index consisted of 49 developed and emerging market country indices.

MSCI EAFE (Europe, Australasia, Far East): is a free float-adjusted market capitalization index that is designed to measure developed market equity performance, excluding the US & Canada.

Russell 1000: measures the performance of the 1,000 largest securities in the Russell 3000 Index. Russell 1000 is highly correlated with the S&P 500 Index and capitalization-weighted.

Russell 1000 Growth: measures the performance of those Russell 1000 securities with a greater-than-average growth orientation. Securities in this index tend to exhibit higher price-to-book and price-earnings ratios, lower dividend yields and higher forecasted growth values than the Value universe.

Russell 1000 Value: measures the performance of those Russell 1000 securities with a less-than-average growth orientation. Securities in this index tend to exhibit lower price-to-book and price-earnings ratios, higher dividend yields and lower forecasted growth values than the Growth universe.

Russell Mid-Cap: measures the performance of the smallest 800 companies in the Russell 1000 Index, as ranked by total market capitalization.

Russell 2000: measures the performance of the 2,000 smallest securities in the Russell 3000 Index. Russell 2000 is market capitalization-weighted.

Russell 2000 Growth: measures the performance of those Russell 2000 securities with a greater-than-average growth orientation. Securities in this index tend to exhibit higher price-to-book and price-to-earnings ratios.

Russell 2000 Value: measures the performance of those Russell 2000 securities with a less-than-average growth orientation. Securities in this index tend to exhibit lower price-to-book and price-to-earnings ratios.

CBOE BXM: measures the performance of a hypothetical buy-write strategy on the S&P 500 Index.

ICE BofA ML U.S. High Yield Master II: Tracks the performance of US dollar denominated below investment grade rated corporate debt publicly issued in the US domestic market. All securities in index must have a below investment grade rating and an investment grade rated country of risk (based on foreign currency long term sovereign debt ratings). Each securities have > 1 year remaining maturity, fixed coupon schedule, and a minimum amount outstanding of \$100 million.

Societe Generale (SG) Multi-Alternative Risk Premia: Represents risk premia managers with programs diversified across multiple asset classes utilizing multiple risk premia factors. These managers trade multiple asset classes such as equities, fixed income, currencies, and in many cases commodities, and aim to capture a diversity of discrete risk premia, including most prevalently value, carry, and momentum. These multi-asset, multi-risk premia strategies are typically systematic. Single asset class and risk premia programs are excluded. The SG Multi Alternative Risk Premia Index is an equally weighed, non-investable index of funds

RISK METRIC DESCRIPTION – Rationale for selection and calculation methodology

US Equity Markets:

Metric: P/E ratio = Price / “Normalized” earnings for the S&P 500 Index

To represent the price of US equity markets, we have chosen the S&P 500 index. This index has the longest published history of price, is well known, and also has reliable, long-term, published quarterly earnings. The price=P of the P/E ratio is the current price of the market index (the average daily price of the most recent full month for the S&P 500 index). Equity markets are very volatile. Prices fluctuate significantly during normal times and extremely during periods of market stress or euphoria. Therefore, developing a measure of earnings power (E) which is stable is vitally important, if the measure is to provide insight. While equity prices can and do double, or get cut in half, real earnings power does not change nearly as much. Therefore, we have selected a well known measure of real, stable earnings power developed by Yale Professor Robert Shiller known as the Shiller E-10. The calculation of E-10 is simply the average real annual earnings over the past 10 years. Over 10 years, the earnings shenanigans and boom and bust levels of earnings tend to even out (and often times get restated). Therefore, this earnings statistic gives a reasonably stable, slow-to-change estimate of average real earnings power for the index. Professor Shiller’s data and calculation of the E-10 are available on his website at <http://www.econ.yale.edu/~shiller/data.htm>. We have used his data as the base for our calculations. Details of the theoretical justification behind the measure can be found in his book *Irrational Exuberance* [Princeton University Press 2000, Broadway Books 2001, 2nd ed., 2005].

Developed Equity Markets Excluding the US:

Metric: P/E ratio = Price / “Normalized” earnings for the MSCI EAFE Index

To represent the price of non-US developed equity markets, we have chosen the MSCI EAFE index. This index has the longest published history of price for non-US developed equities. The price=P of the P/E ratio is the current price of the market index (the average daily price of the most recent full month for the MSCI EAFE index). The price level of this index is available starting in December 1969. Again, for the reasons described above, we elected to use the Shiller E-10 as our measure of earnings (E). Since 12/1972, a monthly price earnings ratio is available from MSCI. Using this quoted ratio, we have backed out the implied trailing-twelve month earnings of the EAFE index for each month from 12/1972 to the present. These annualized earnings are then inflation adjusted using CPI-U to represent real earnings in US dollar terms for each time period. The Shiller E-10 for the EAFE index (10 year average real earnings) is calculated in the same manner as detailed above.

However, we do not believe that the pricing and earnings history of the EAFE markets are long enough to be a reliable representation of pricing history for developed market equities outside of the US. Therefore, in constructing the Long-Term Average Historical P/E for developed ex-US equities for comparison purposes, we have elected to use the US equity market as a developed market proxy, from 1881 to 1982. This lowers the Long-Term Average Historical P/E considerably. We believe this methodology provides a more realistic historical comparison for a market with a relatively short history.

Emerging Market Equity Markets

Metric: Ratio of Emerging Market P/E Ratio to Developed Market P/E Ratio

To represent the Emerging Markets P/E Ratio, we have chosen the MSCI Emerging Market Free Index, which has P/E data back to January 1995 on Bloomberg. To represent the Developed Markets PE Ratio, we have chosen the MSCI World Index, which also has data back to January 1995 on Bloomberg. Although there are issues with published, single time period P/E ratios, in which the denominator effect can cause large movements, we feel that the information contained in such movements will alert investors to market activity that they will want to interpret.

RISK METRIC DESCRIPTION – Rationale for selection and calculation methodology

US Private Equity Markets:

Metrics: S&P LCD Average EBITDA Multiples Paid in LBOs and US Quarterly Deal Volume

The Average Purchase Price to EBITDA multiples paid in LBOs is published quarterly by S&P in their LCD study. This is the total price paid (both equity and debt) over the trailing-twelve month EBITDA (earnings before interest, taxes, depreciation and amortization) as calculated by S&P LCD. This is the relevant, high-level pricing metric that private equity managers use in assessing deals. Data is published monthly.

US quarterly deal volume for private equity is the total deal volume in \$ billions (both equity and debt) reported in the quarter by Thomson Reuters Buyouts. This metric gives a measure of the level of activity in the market. Data is published quarterly.

U.S Private Real Estate Markets:

Metrics: US Cap rates and Annual US Real Estate Deal Volume

Real estate cap rates are a measure of the price paid in the market to acquire properties versus their annualized income generation before financing costs (NOI=net operating income). The date is published by NCREIF. We chose to use current value cap rate. These are capitalization rates from properties that were revalued during the quarter. While this data does rely on estimates of value and therefore tends to be lagging, (estimated prices are slower to rise and slow to fall than transaction prices), the data series goes back to 1979, providing a long data series for valuation comparison. Data is published quarterly.

Annual US real estate deal volume is the total deal transaction volume in \$ billions (both equity and debt) reported by Real Capital Analytics during the trailing-twelve months. This metric gives the level of activity in the market. Data is published monthly.

Measure of Equity Market Fear / Uncertainty

Metric: VIX – Measure of implied option volatility for U.S. equity markets

The VIX is a key measure of near-term volatility conveyed by implied volatility of S&P 500 index option prices. VIX increases with uncertainty and fear. Stocks and the VIX are negatively correlated. Volatility tends to spike when equity markets fall.

Measure of Monetary Policy

Metric: Yield Curve Slope

We calculate the yield curve slope as the 10 year treasury yield minus the 1 year treasury yield. When the yield curve slope is zero or negative, this is a signal to pay attention. A negative yield curve slope signals lower rates in the future, caused by a contraction in economic activity. Recessions are typically preceded by an inverted (negatively sloped) yield curve. A very steep yield curve (2 or greater) indicates a large difference between shorter-term interest rates (the 1 year rate) and longer-term rates (the 10 year rate). This can signal expansion in economic activity in the future, or merely higher future interest rates.

RISK METRIC DESCRIPTION – Rationale for selection and calculation methodology

Definition of “extreme” metric readings

A metric reading is defined as “extreme” if the metric reading is in the top or bottom decile of its historical readings. These “extreme” reading should cause the reader to pay attention. These metrics have reverted toward their mean values in the past.

Credit Markets US Fixed Income:

Metric: Spreads

The absolute level of spreads over treasuries and spread trends (widening / narrowing) are good indicators of credit risk in the fixed income markets. Spreads incorporate estimates of future default, but can also be driven by technical dislocations in the fixed income markets. Abnormally narrow spreads (relative to historical levels) indicate higher levels of valuation risk, wide spreads indicate lower levels of valuation risk and / or elevated default fears. Investment grade bond spreads are represented by the Barclays Capital US Corporate Investment Grade Index Intermediate Component. The high yield corporate bond spreads are represented by the Barclays Capital US Corporate High Yield Index.

Measures of US Inflation Expectations

Metrics: Breakeven Inflation and Inflation Adjusted Commodity Prices

Inflation is a very important indicator impacting all assets and financial instruments. Breakeven inflation is calculated as the 10 year nominal treasury yield minus the 10 year real yield on US TIPS (treasury inflation protected securities). Abnormally low long-term inflation expectations are indicative of deflationary fears. A rapid rise in breakeven inflation indicates acceleration in inflationary expectations as market participants sell nominal treasuries and buy TIPS. If breakeven inflation continues to rise quarter over quarter, this is a signal of inflationary worries rising, which may cause Fed action and / or dollar decline.

Commodity price movement (above the rate of inflation) is an indication of anticipated inflation caused by real global economic activity putting pressure on resource prices. We calculate this metric by adjusted in the Dow Jones UBS Commodity Index (formerly Dow Jones AIG Commodity Index) by US CPI-U. While rising commodity prices will not necessarily translate to higher US inflation, higher US inflation will likely show up in higher commodity prices, particularly if world economic activity is robust.

These two measures of anticipated inflation can, and often are, conflicting.

Measures of US Treasury Bond Interest Rate Risk

Metrics: 10-Year Treasury Forward-Looking Real Yield and 10-Year Treasury Duration

The expected annualized real yield of the 10 year US Treasury Bond is a measure of valuation risk for US Treasuries. A low real yield means investors will accept a low rate of expected return for the certainty of receiving their nominal cash flows. MIG estimates the expected annualized real yield by subtracting an estimate of expected 10 year inflation (produced by the Survey of Professional Forecasters as collected by the Federal Reserve Bank of Philadelphia), from the 10 year Treasury constant maturity interest rate.

Duration for the 10-Year Treasury Bond is calculated based on the current yield and a price of 100. This is a measure of expected percentage movements in the price of the bond based on small movements in percentage yield. We make no attempt to account for convexity.

RISK METRIC DESCRIPTION – Rationale for selection and calculation methodology

What is the MIG Market Sentiment Indicator (PMSI)?

The PMSI is a measure meant to gauge the market's sentiment regarding economic growth risk. Growth risk cuts across most financial assets, and is the largest risk exposure that most portfolios bear. The PMSI takes into account the momentum (trend over time, positive or negative) of the economic growth risk exposure of publicly traded stocks and bonds, as a signal of the future direction of growth risk returns; either positive (risk seeking market sentiment), or negative (risk averse market sentiment).

How do I read the MIG Market Sentiment Indicator (PMSI) graph?

Simply put, the PMSI is a color coded indicator that signals the market's sentiment regarding economic growth risk. It is read left to right chronologically. A green indicator on the PMSI indicates that the market's sentiment towards growth risk is positive. A gray indicator indicates that the market's sentiment towards growth risk is neutral or inconclusive. A red indicator indicates that the market's sentiment towards growth risk is negative. The black line on the graph is the level of the PMSI. The degree of the signal above or below the neutral reading is an indication the signal's current strength.

How is the MIG Market Sentiment Indicator (PMSI) Constructed?

The PMSI is constructed from two sub-elements representing investor sentiment in stocks and bonds:

1. Stock return momentum: Return momentum for the S&P 500 Equity Index (trailing 12-months)
2. Bond yield spread momentum: Momentum of bond yield spreads (excess of the measured bond yield over the identical duration U.S. Treasury bond yield) for corporate bonds (trailing 12-months) for both investment grade bonds (75% weight) and high yield bonds (25% weight). The scale of this measure is adjusted to match that of the stock return momentum measure.

The black line reading on the graph is calculated as the average of the stock return momentum measure and the bonds spread momentum measure. The color reading on the graph is determined as follows:

1. If both stock return momentum and bond spread momentum are positive = GREEN (positive)
2. If one of the momentum indicators is positive, and the other negative = GRAY (inconclusive)
3. If both stock return momentum and bond spread momentum are negative = RED (negative)

What does the MIG Market Sentiment Indicator (PMSI) mean? Why might it be useful?

There is strong evidence that time series momentum is significant and persistent. In particular, across an extensive array of asset classes, the sign of the trailing 12-month return (positive or negative) is indicative of future returns (positive or negative) over the next 12 month period. The PMSI is constructed to measure this momentum in stocks and corporate bond spreads. A reading of green or red is agreement of both the equity and bond measures, indicating that it is likely that this trend (positive or negative) will continue over the next 12 months. When the measures disagree, the indicator turns gray. A gray reading does not necessarily mean a new trend is occurring, as the indicator may move back to green, or into the red from there. The level of the reading (black line) and the number of months at the red or green reading, gives the user additional information on which to form an opinion, and potentially take action.

Momentum is defined as the persistence of relative performance. There is a significant amount of academic evidence indicating that positive momentum (e.g., strong performing stocks over the recent past continue to post strong performance into the near future) exists over near-to-intermediate holding periods. See, for example, "Understanding Momentum," *Financial Analysts Journal*, Scowcroft, Sefton, March, 2005.

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