Memorandum

To	New Mexico Interstate Stream Commission
From	RVK, Inc.
Subject	New Mexico Unit Fund Asset Allocation – Executive Summary
Date	June 22, 2016

Introduction

The purpose of this memorandum is to summarize the key inferences drawn from the Asset Allocation ("AA") our firm was contracted to conduct on behalf of the New Mexico Interstate Stream Commission ("ISC") for investment of the New Mexico Unit Fund ("Unit Fund") by the New Mexico State Investment Council ("SIC"). It is also planned to properly document the process undertaken to fulfill the Scope of Work issued by the ISC. RVK was engaged to complete the four main tasks described below from the Scope of Work:

1) Provide general investment consulting services covering assets, strategies, investment issues, data needs and educational needs of the Commission and staff.
2) Conduct cash-flow analysis of the Unit Fund in cooperation with the ISC staff.
3) Provide advice, and prepare an investment plan for submittal to the SIC, all in accordance with SIC policies.
4) Assist in the implementation of the adopted investment plan. Review performance, and recommend re-allocation of assets, as necessary.

While this memorandum refers directly to points raised within the accompanying analysis, we emphasize that a full understanding of the AA study and its implications requires a close review of the analysis in its entirety.

As fully explained in the following pages, RVK recommends allocating the Unit Fund assets utilizing one of the implementation options shown below in Figure 1.

Figure 1: Summary Recommendation

Asset Classes	Active/Passive	50% Equity	55% Equity
Large Cap US Equity	**Passive**	**23**	**25**
Small/Mid Cap US Equity	**Active**	**7**	**8**
Non-US Developed Equity	**Passive**	**15**	**17**
Non-US Emerging Markets Equity	**Active**	**5**	**5**
Core (Plus) Fixed Income	**Active**	**50**	**45**

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Background and Project Objectives

The Arizona Water Settlements Act ("AWSA" or "Act") requires that the Secretary of Interior shall deposit the amounts made available under paragraph (2)(D)(i) of section 403(f) of the Colorado River Basin Project Act (43 U.S.C. 1543(f)) (as amended by section 107(a)) into the New Mexico Unit Fund, a State of New Mexico Fund established and administered by the New Mexico Interstate Stream Commission ("ISC"). Withdrawals from the New Mexico Unit Fund shall be for the purpose of paying costs of the New Mexico Unit or other water utilization alternatives to meet water supply demands in the Southwest Water Planning Region of New Mexico, as determined by the New Mexico Interstate Stream Commission in consultation with the Southwest New Mexico Water Study Group or its successor, including costs associated with planning and environmental compliance activities and environmental mitigation and restoration. The Fund was created by statute in the New Mexico State Treasury, NMSA 1978, Section 72-14-45.

RVK was charged with the specific project objective of providing guidance to the ISC regarding prudent investment of the Unit Fund to maximize growth while minimizing exposure to risk. The Unit Fund will be invested through the available SIC client investment pools, whereby RVK is acting solely in a non-discretionary, consulting capacity without any authority to invest or otherwise exert direct influence. The primary investment goal of the ISC is to grow the Unit Fund with minimal risk in order to better achieve the requirements of the Act. The size, nature or cost of a New Mexico Unit has not yet been determined. As such, there are many unknowns. As construction of any project is dependent on the outcome of the NEPA process, ISC staff estimates that any construction could be up to 20 years in the future. In aggregate, these factors amass to a "below-average" capacity to assume excessively high volatility risk associated with a prospectively high-returning strategic asset allocation.

Inputs to Asset Allocation Analysis

Strategic asset allocation analysis is only as insightful and robust as the quality of the inputs on which the model is built. The three most critical inputs to any asset allocation modeling include 1) both arithmetic and compound returns, 2) risk as measured by standard deviation for each relevant asset class, as well as 3) the interrelationships (correlations) among those asset classes.

The actual asset allocation modeling employs a Mean-Variance Optimization (MVO) framework which incorporates both non-normal distribution assumptions and projected cash flows—resulting from contributions made by the U.S. Department of Interior as well as the projected distributions to satisfy various project costs—within the Monte Carlo stress-test scenarios to help identify the potential range of long-term outcomes and the probability of achieving the desired long-term results. The use of non-normal (downside log-stable) distribution assumptions is helpful in terms of understanding potential realistic worst-case scenarios in a world where returns are not normally distributed. The inclusion of cash flow projections assists in analyzing the dynamic between cash flows (direction and magnitude) and their impact on the ability of the Unit Fund to accept varying levels of investment risk. The individual sections detailed below will describe each critical model input and provide supporting rationale for the respective assumptions.

1. Model Inputs – Capital Market Assumptions (CMA)

The development of forward-looking, long-term capital market assumptions is an annual process which requires substantial effort and resources over the course of multiple months. Asset allocation is often cited as the most powerful driver of total fund return, thus we believe careful review of these assumptions is of critical importance. These assumptions—which incorporate estimated behaviors for reward (return), risk (volatility), and the inter-relationships (correlation coefficients)—require both relative and absolute accuracy.

Relative accuracy attempts to capture the “relative” relationships between asset classes, particularly those that are closely related. The implication of some assumptions which are precisely correct yet others that are far off is an unbalanced and poorly diversified portfolio. But absolute accuracy matters as well. Absolute accuracy reflects the absolute values which are actually experienced in future long-term capital market environments. If the capital market assumptions as a set are either too high or too low, it can lead a fund to spend more than it can afford or conversely restrict spending more than necessary. Both outcomes exert negative implications on the Unit Fund’s ability to achieve its investment objective. A well-structured and executed investment program will be best positioned to benefit from the available market returns regardless of the forecasts for total return.

For this specific asset allocation study, RVK utilized the 2016 Capital Market Assumptions—the actual values of those specific return, risk and correlation assumptions are detailed on slides 12 and 14 in Appendix 1. RVK has also provided the ISC with the 2016 RVK Capital Market Assumptions White Paper, attached as Appendix 4, which comprehensively reviews how asset class assumptions are developed along with supporting rationale however is not necessarily specific to the assumption set deemed most appropriate for ISC. The asset classes which were considered and included in this analysis are a subset of those currently available for investment within the SIC client investment pools: 1) Large Cap US Equity, 2) Small/Mid Cap US Equity, 3) Non-US Developed Equity, 4) Non-US Emerging Markets Equity and, 5) Fixed Income (Bonds). RVK made minor adjustments to the standard capital market assumption set for Large Cap US Equity and Small/Mid Cap US Equity in order to most accurately reflect and model the investment choices available to ISC.

The Role of Equity within a Fund

Equity represents an ownership interest, or directly owning a security issued by a company domiciled either within or outside the United States. Securities are purchased in “shares”, which are typically issued on the public exchanges, over the counter or in less regulated markets. Equity positions are generally the lowest position in the capital structure. The total return of an equity security is based on the combination of income and price movements. Income is the cash distributed (dividend) to the security holder. Price movements are the change in the market value of the security after purchase. Market capitalization (Large Cap vs. Small Cap), commonly known as market cap, refers to the total dollar market value of a company’s outstanding shares. Large capitalization generally refers to larger companies with market capitalizations above $10 billion whereas small capitalization tends to include companies with market capitalization below $2 billion.

Equity is intended to provide long-term growth through capital appreciation as well as providing additional return relative to other asset classes in a portfolio. The primary risk of investing in equity is the volatility of returns and the potential for loss of principal. Performance of equity securities is significantly more volatile than that of fixed income securities.

The Role of Fixed Income within a Fund

Fixed Income represents ownership of a bond that entitles the holder to a scheduled fixed payment (coupon) provided by the bond issuer over the full maturity of the bond. Issuer types include: Government Bonds (Federal, Agency, Municipal), Corporate Bonds (Senior, Subordinated, Convertibles, High Yield, etc.), or Asset Backed Bonds (CMBS, MBS, ABS, etc. – pools of debt backed by assets such as homes or cars). Ownership of fixed income is expected to provide the holder with a return consisting primarily of a fixed stream of cash payments.

Fixed Income serves as a form of capital preservation, intended to diversify other risks in a portfolio (specifically equity risk). It can provide relatively consistent, stable returns and downside

protection. In a period of declining inflation and/or deflation we would expect bonds to perform well and help protect against downside risks to the Unit Fund. There are three (3) primary risks to investing in Fixed Income:

1) **Interest Rate Risk –** Fluctuations in interest rates will cause the value of an investment to increase or decrease.
   - The relationship is inverse; as interest rates rise, the price of a bond will fall.
2) **Credit Risk –** A change in an issuer's credit risk, or ability to repay its debt obligations, will affect the price of a bond.
3) **Liquidity Risk –** Securities with a limited market can be difficult to price accurately and difficult to sell or trade at a predictable price on short notice.
   - This is especially true during periods of extreme economic stress.

2. Model Inputs – Anticipated Cash Flows

The estimated distributions, or costs, as well as the finite and known contributions made by the Federal government were provided directly by the ISC Staff for use in this project. A detailed summary of the specific cash flow assumption is provided on slide 6 of appendix 1.

Contributions

The Secretary of Interior is required by the AWSA to deposit ten (10) annual payments of $9.04 million. Five annual payments have already been made to an overnight deposit account, and five more payments are due through Fiscal Year (FY) 2021.

Distributions

Going forward, the ISC anticipates that it will use the asset base of the Unit Fund to pay for:

1) Engineering and scientific investigations related to selection, design and construction of a New Mexico Unit by the New Mexico Central Arizona Project (CAP) Entity,
2) Environmental compliance costs related to a New Mexico Unit,
3) Non-diversion project costs,
4) Salary for staff in relation to the project and,
5) Expenses incurred by the New Mexico CAP Entity.

Anticipated cost estimates were provided directly by ISC Staff for the next five (5) fiscal years. Given the uncertainty of future cash flows needs, no cash flows are assumed after FY 2021 as there are too many unknown factors for ISC Staff to reasonably predict. Due to the uncertainty of the project it is difficult to predict the cost and timing. In order to help address this uncertainty, RVK included two extreme scenarios of the cash flows anticipated by the ISC Staff to evaluate the Fund implications of costs that materially exceed current expectations:

Scenario 1: **1.5x** the current predicted costs (distributions)
Scenario 2*:* **2.0x** the current predicted costs (distributions)

If costs materialize differently than expected, it could severely impact the long-term growth prospects and/or fiscal sustainability of the Unit Fund. Choosing an asset allocation that can potentially weather the demands of "up to twice" the outflows/costs should be closely considered—implications include sensitivity to losses in the portfolio and ongoing liquidity needs.

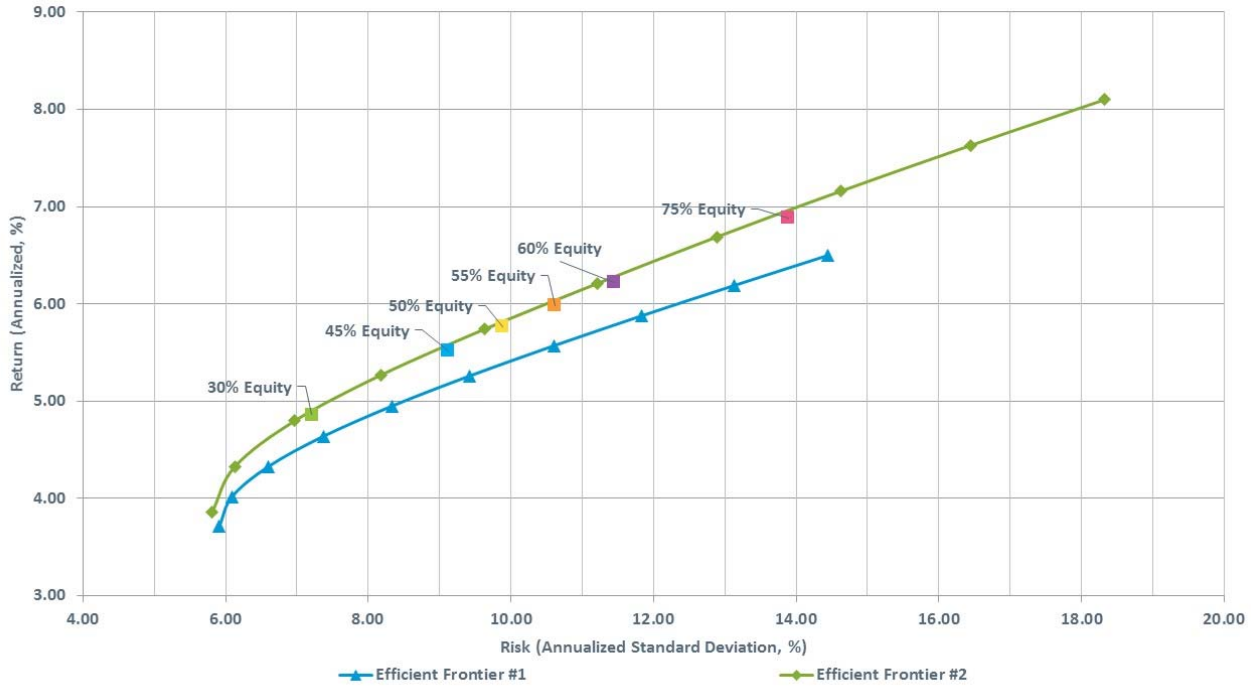
3. Modeling Results – Mean Variance Optimization

RVK set out to evaluate the Unit Fund's ability to sustain the outflows/costs associated with the planning, building, and maintenance of the physical project expected out of the Unit Fund. We assessed the impact of changes to the strategic asset allocation in improving the long-term financial health of the Unit Fund. The Mean Variance Optimization (MVO) model utilized the 2016

RVK Capital Market Assumptions as critical inputs and developed an “efficient frontier” consisting of a set of portfolios each of which provides the highest expected return for a certain level of volatility risk.

To demonstrate the accretive benefits of a diversified strategic asset allocation, RVK has provided both a simple (Frontier #1) efficient frontier that includes only Large Cap US Equity and Fixed Income to represent a simple, relatively high-quality approach to entering the capital markets. The second efficient frontier (Frontier #2) includes additional asset classes—Small/Mid Cap US Equity, Non-US Developed Equity and Non-US Emerging Markets Equity—which through their favorable correlation benefits allow for a higher level of return for a given risk exposure when compared to the more simplified Frontier #1 that consists of only two asset classes. For example, the “50% Equity” portfolio—despite having the same amount of total equity—is expected to return 5.38% per annum on average utilizing the two asset classes on Frontier #1, whereas for nearly the exact same amount of risk (9.84% vs. 9.88%), this level of equity exposure would result in an expected return of 5.76% per annum on average for Frontier #2. That’s nearly a half percent improvement per annum without an increase to the risk exposure. For these reasons, we focused our analysis on this more diversified set of portfolios shown on Frontier #2 (slides 18 and 19 of the accompanying appendix 1) below in Figure 2.

Figure 2: Frontier #2 (Green Line) including all five (5) Proposed Asset Classes



RVK considered six (6) potential portfolios across the two efficient frontiers with various levels of equity exposure. These portfolios range from 30% equity to 75% equity exposure and are named accordingly. Inherently, the more equity exposure in the portfolio mix, the higher the expected return which is however associated with incrementally higher levels of volatility risk.

Figure 3: Frontier #2 – Efficient Allocations and six (6) Potential Portfolios

	Min	Max	1	2	3	4	5	6	7	8	9	10	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
Large Cap US Equity	0	80	3	7	10	14	18	22	26	29	34	40	14	21	23	25	27	35
Small/Mid Cap US Equity	0	10	1	2	3	5	6	7	8	10	10	10	4	7	7	8	9	10
Non-US Developed Equity	0	50	4	7	10	14	18	22	26	29	34	40	9	13	15	17	18	23
Emerging Markets Equity	0	10	0	2	3	5	6	7	8	10	10	10	3	4	5	5	6	7
Fixed Income	0	100	92	82	72	62	52	42	32	22	11	0	70	55	50	45	40	25
Total			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Capital Appreciation			8	18	28	38	48	58	68	78	89	100	30	45	50	55	60	75
Capital Preservation			92	82	72	62	52	42	32	22	11	0	70	55	50	45	40	25
Alpha			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inflation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expected Return			**3.86**	**4.33**	**4.80**	**5.27**	**5.74**	**6.21**	**6.69**	**7.16**	**7.63**	**8.10**	**4.86**	**5.52**	**5.76**	**5.98**	**6.22**	**6.88**
Risk (Standard Deviation)			**5.81**	**6.13**	**6.97**	**8.18**	**9.63**	**11.21**	**12.89**	**14.63**	**16.45**	**18.33**	**7.21**	**9.12**	**9.88**	**10.62**	**11.45**	**13.89**
Return (Compound)			3.70	4.15	4.57	4.95	5.30	5.62	5.92	6.18	6.39	6.58	**4.61**	**5.13**	**5.30**	**5.45**	**5.61**	**5.99**
Return/Risk Ratio			0.66	0.71	0.69	0.64	0.60	0.55	0.52	0.49	0.46	0.44	**0.67**	**0.61**	**0.58**	**0.56**	**0.54**	**0.50**
RVK Exp Eq Beta (LCUS Eq = 1)			0.13	0.23	0.32	0.41	0.51	0.60	0.69	0.79	0.89	0.98	**0.34**	**0.48**	**0.53**	**0.57**	**0.62**	**0.76**
RVK Liquidity (T-Bills = 100)			86	86	87	87	88	88	89	89	90	91	**87**	**88**	**88**	**88**	**89**	**90**

The two portfolio mixes ("50% Equity" and "55% Equity") recommended for consideration by the ISC are expected to produce a compound return of 5.76% and 5.98%, respectively, as shown in Figure 3 above and again on slide 18 of appendix 1. As previously mentioned, comparing these portfolios on Frontier #2 to those of Frontier #1 above in Figure 2 and also on slide 19 of the appendix, the benefit of additional asset classes becomes self-evident. Figure 2 above clearly demonstrates the increase in expected return graphically of Frontier #2 (green line) versus Frontier #1 (blue line).

Slide 32 of appendix 1 outlines the current fees charged by the underlying investment managers for the various investment pools made available to external clients by the SIC. Neither SIC nor RVK receive any portion of these fees. A summary of the fee ranges as well as the prospective total fee for the recommended portfolios is listed below in Figure 4:

Figure 4: Investment Management Fee Summary

Passive Implementation	0.07% - 0.10%
Active Implementation	0.30% - 0.44%
Recommended Portfolios	0.19% of assets

4. Modeling Results – Cash Flow and Stress Test Modeling

The cash flow modeling component is a stochastic analysis that reflects both the realistic view that investment returns are—like the investment markets themselves—volatile and always uncertain. This means that there are a range of possible outcomes for the Unit Fund; some are more likely, others less likely yet still possible.

The aforementioned deterministic approach (MVO), utilized for arriving at the expected return and risk of the various portfolio structures, is useful for gauging the general direction of change and associated consequences, however adding the element of uncertainty—more specifically year-to-year variability in the performance of the capital markets and therefore the value of the Unit Fund's assets over time—can offer additional insights, albeit with considerable complexity.

The analysis provides the reasonable range or distribution of potential outcomes for the Unit Fund for the aforementioned six (6) investment allocation options. These ranged from the more conservative (low risk, asset protective) "30% Equity" to the higher return-seeking "75% Equity" investment approach.

The distribution of potential returns over various time periods—including the 1-, 3-, 5-, and 10-year periods— are provided on slide 25 of appendix 1. The 1st percentile for the 1-year period provides a sense for the magnitude of a potential worst-case loss in any given year. For the 50% Equity portfolio, the loss is -23.92% whereas for the 55% Equity portfolio the loss is -25.77%. Despite the modestly higher loss potential for the 55% Equity portfolio, it also provides a higher upside potential as evidenced by the 95th and 99th percentiles. The 50th percentile—or median—expected return is the return than is most probably over that specific time period. As the time horizon or holding period increases, the distribution of returns becomes progressively more narrow or certain. Resultantly, the downside risk over a 10-year period is substantially lower than for any given one-year period.

The proposed portfolio mixes have a modestly better than 50% chance of achieving or exceeding a return of 5% as show on slide 26 of appendix 1 and a probability above 90% for ending the 10-year period with a positive return (denoted by a return greater than 0%). Similarly, slide 27 of appendix 1 provides the expected Unit Fund balance (wealth), inclusive of the projected cash flows, over the various time periods for the relevant percentiles. Over the 10-year period, the Unit Fund is anticipated to reach approximately $85 million with either the 50% or 55% Equity portfolio mixes. The pessimistic outcome, as identified by the 5th percentile, is approximately $50 million over the same time period for these two proposed portfolio mixes. The highly optimistic scenario, as identified by the 95th percentile, would anticipate a Unit Fund value of above $133 million. The model however clearly indicates that the $85 million outcome is most probable and realistic.

Slide 29 of appendix 1 outlines the various spreads or distributions of expected wealth for each of the aforementioned portfolio mixes with the different cash flow scenarios which include costs one and a half (1.5x) and two (2.0x) times the original estimates. The expected Unit Fund value is of course impacted by higher costs, however the recommended portfolios mixes remain prudent and sensible even under these adverse conditions. The distribution of potential Unit Fund values also becomes narrower as there is less upside growth potential with higher ongoing costs.

The information on slides 30 and 31 of appendix 1 demonstrates the economic value of the Unit Fund with the “50% Equity” and “55% Equity” portfolio mix options over a 10-year period across the median outcome (50th Percentile) and for substantially better but also worse outcomes (95th and 5th Percentiles). The slides also contain the dollar distribution as projected by ISC staff. The contributions from the Secretary of Interior to the Unit Fund stop after 5 years, which is seen by a flattening in the growth of the line. Once the contributions halt, the Unit Fund will experience increased sensitivity to market losses in the portfolio as those losses will need to entirely be recouped by market gains—rather than a combination of market gains and annual contributions to the Unit Fund. The implication is a reduced capacity to assume volatility risk.

Recommendation

RVK recommends implementing a diversified asset allocation consisting of exposure to publicly-traded US and Non-US equities, as well as core (plus) fixed income. More specifically, an asset allocation structure for the Unit Fund of either the proposed “50% Equity” or “55% Equity” portfolio mix as detailed below in Figure 5 and in additional detail on slide 18 of appendix 1. These two (2) proposed portfolio mixes would hold the balance—either 50% or 45%, respectively, in core (plus) fixed income. In addition to the strategic asset allocation decision, the ISC must make a choice regarding the implementation of that strategic asset allocation of the Unit Fund as an external client of the SIC. The two implementation choices for most asset classes are actively or passively-managed investment pools. Actively-managed strategies strive to outperform a relevant broad-market benchmark, albeit at higher fees, whereas passively-managed strategies seek to meet the return of the relevant broad-market benchmark at substantially lower fees.

The table below (Figure 5) once again details the recommended asset classes, percentage allocation to those asset classes, and our recommended implementation regarding active vs. passive management:

Figure 5: Summary Recommendation

Asset Classes	Active/Passive	50% Equity	55% Equity
Large Cap US Equity	**Passive**	**23**	**25**
Small/Mid Cap US Equity	**Active**	**7**	**8**
Non-US Developed Equity	**Passive**	**15**	**17**
Non-US Emerging Markets Equity	**Active**	**5**	**5**
Core (Plus) Fixed Income	**Active**	**50**	**45**

The SIC client investment pool titled Small/Mid Cap US Equity is currently not offered with passively-managed implementation. RVK would have recommended actively-managed implementation for that particular asset class even in the event that passive implementation would have been available. Another minor item of note relates to the available choices for fixed income exposure. The SIC currently offers passively-managed Core Fixed Income and actively-managed Core Plus Fixed Income. We recommend actively-managed Core Plus Fixed Income for the modestly higher return potential offered by the additional flexibility provided through investing a modest portion into "plus" sectors such as high yield bonds and other potentially non-investment grade securities. RVK relied on quantitative analysis and qualitative experience to help shape the recommendation for which particular asset classes should be implemented through active management. RVK is very cost-conscious and reserves the additional cost of active management for only those asset classes that have historically been able to successfully demonstrate a consistent record of outperformance. In that spirit, both the "50% Equity" and "55% Equity" portfolio mixes recommend the same active/passive mix. The active/passive mix in Figure 5, would result in an annual weighted-average investment management fee for the underlying investment managers of 0.19% of assets per annum. The quantitative analysis is provided in substantial detail within appendix 2 ("Active/Passive Investing Review") beginning on slide 33.

Conclusions

This Asset Allocation study demonstrates that the strategic asset allocation (either 50% or 55% Equity) is anticipated to prudently grow the Unit Fund under the current assumption set as demonstrated in the graphs on slides 30 and 31 of appendix 1. The Unit Fund can best meet its objectives through the thoughtful use of a well-diversified investment portfolio. However, outcomes are extremely dependent on the magnitude and timing of future cash flows.

This study is generally not supportive of a long-term, ultra-conservative approach (no equity) as the protection such a strategy provides to the current Unit Fund comes with the substantial cost of considerably lower probabilities of maintaining the long-term purchasing power of the Unit Fund and maximizing growth. Conversely, the increasing potential for large, one-year declines (drawdowns) suggests that there is likely a limit to the net benefits of adding increased risk in pursuit of additional returns—particularly once the annual contributions from the Secretary of Interior are fully satisfied.

Progress should be monitored periodically through studies such as these, particularly if the Unit Fund encounters a sustained period of lower returns in the capital markets (and thus impacting the Unit Fund's Corpus), changes to the contributions, or materially higher effective distributions from higher than anticipated realized costs.

Review of Asset Allocation and Cash Flow Analysis for Investment of the New Mexico Unit Fund

Prepared for the New Mexico Interstate Stream Commission by RVK Inc., June 2016

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RVK

Appendix 1:
Asset Allocation and Cash Flow Analysis

Overview of New Mexico Unit Fund

Objectives

Arizona Water Settlements Act of 2004, Pub. L. 108-451, Section 212(i)

- New Mexico Unit Fund. The Secretary of Interior shall deposit the amounts made available under paragraph (2)(D)(i) of section 403(f) of the Colorado River Basin Project Act (43 U.S.C. 1543(f)) (as amended by section 107(a)) into the New Mexico Unit Fund, a State of New Mexico Fund established and administered by the New Mexico Interstate Stream Commission ("ISC"). Withdrawals from the New Mexico Unit Fund shall be for the purpose of paying costs of the New Mexico Unit or other water utilization alternatives to meet water supply demands in the Southwest Water Planning Region of New Mexico, as determined by the New Mexico Interstate Stream Commission in consultation with the Southwest New Mexico Water Study Group or its successor, including costs associated with planning and environmental compliance activities and environmental mitigation and restoration.

- Fund created by statute in the New Mexico State Treasury, NMSA 1978, Section 72-14-45.

RVK

Goals of this Project

Project Objectives

- Offer guidance to the ISC regarding investment of the NM Unit Fund so as to maximize growth of the Fund while minimizing exposure to risk.
- The NM Unit Fund will be invested through the New Mexico State Investment Council ("SIC") Investment Pools.
- RVK is only providing advice on how to invest or allocate the funds to the available Investment Pools. RVK will not be investing the funds nor has any discretion.

Primary Goal

- The goal of the ISC is to grow the Unit Fund with minimal risk in order to better achieve the requirements of the Act.

Fund Horizon

- The size, nature and cost of a New Mexico Unit has not yet been determined. As such, there are many unknowns. ISC staff estimates that construction could be up to 20 years in the future.

RVK

Cash Flows of New Mexico Unit Fund

Funding Source:

- The Secretary of Interior is required by the AWSA to make 10 annual payments of $9.04 Million
  - Five annual payments have already been made to AN overnight deposit account
  - Five more payments are due through Fiscal Year (FY) 2021

Distributions:

- Going forward, the New Mexico Interstate Stream Commission anticipates that it will use the asset base (NM Unit Fund) to pay for:
  - engineering and scientific investigations related to selection, design and construction of a New Mexico Unit by the New Mexico Central Arizona Project (CAP) Entity
  - environmental compliance costs related to a New Mexico Unit
  - non-diversion project costs
  - salary for ISC staff working on the project
  - expenses incurred by the New Mexico CAP Entity

Cash flow information was provided directly to RVK by ISC Staff.

RVK

Cash Flow Assumptions

Assumptions Development and Rationale

Contributions

- Annual payments of $9.04 Million from Federal Government at the beginning of the calendar year through Fiscal Year 2021

Distributions

- Due to the uncertainty of the project, RVK included two extreme scenarios of the currently anticipated cash flows.
  - These scenarios include:
    - **1.5x** the current predicted costs/distributions
    - **2.0x** the current predicted costs/distributions
  - If costs materialize differently than expected, it could severely impact the long-term growth and/or fiscal sustainability of the assets.
  - Choosing an asset allocation that can weather the demands of up to double the anticipated outflows/costs is something that should be closely considered—implications include sensitivity to losses in the portfolio and ongoing liquidity needs.

RVK

Assumptions for Analysis

Cash Flows (provided by ISC Staff)

In Millions of Dollars ($)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Beginning Fund Balance	39.900	34.135	28.025	33.715	39.405	45.095	
Revenue by February 1 of each year		9.040	9.040	9.040	9.040	9.040	
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		
Estimated Ending Fund Balance at June 30	34.135	28.025	33.715	39.405	45.095	54.135	

- These figures were provided directly by ISC Staff through the next five (5) fiscal years.
- No cash flows are assumed after FY 2021 as there are too many unknown factors for ISC to reliably and accurately predict.

The Fiscal Year ends June 30th. Cash Flows and balances shown do not assume any investment gain/loss, only the revenues in and costs out.
The date of February 1st was picked for convenience, but is not in the AWSA and is not a date by which Reclamation is obligated to provide the funds.

RVK

New Mexico Unit Fund

Investment Options

- The New Mexico Unit Fund would be a "client" of New Mexico State Investment Council (NM SIC) and able to invest in both actively and passively managed investment options.
- The active vs. passive management decision is further described in the Appendix.
- As a client of NM SIC, the currently available investment options are shown below:

New Mexico State Investment Council ("SIC") Client Investment Pools*				
Market Cap/Style	**Management**	**Benchmark**	**Annual Investment Management Fee****	**Underlying Investment Manager(s)**
Large Cap US	Active	Russell 1000 Index	0.42%	JPM, T. Rowe Price, Brown Brothers Harriman, Wellington
Large Cap US	Passive	Russell 1000 Index	0.02%	Northern Trust
Small/Mid Cap US	Active	70% R 2000/ 30% R Mid Cap	0.66%	Donald Smith, Cortina, Seizert
Non-US Developed	Active	MSCI EAFE Index	0.55%	LSV, T. Rowe Price, Templeton, MFS
Non-US Developed	Passive	MSCI EAFE Index	0.04%	AllianceBernstein
Non-US Emerging	Active	MSCI Emerging Markets Index	0.74%	BlackRock
Non-US Emerging	Passive	MSCI Emerging Markets Index	0.14%	AllianceBernstein
Core Plus Bonds	Active	Barclays Universal Bond Index	0.20%	PIMCO, Loomis Sayles, Prudential
Core Bonds	Passive	Barclays US Agg Bond Index	0.04%	BlackRock

Passive Options

Large Cap US Equity

Non-US Developed Equity

Non-US Emerging Markets Equity

Core Bonds (Fixed Income)

Active Options

Large Cap US Equity

Small/Mid Cap US Equity

Non-US Developed Equity

Non-US Emerging Markets Equity

Core Plus Bonds (Fixed Income)

Private assets pool is also available but deemed not appropriate given the uncertainty of future cash flow needs.
*Please see the next page for more detail on the investment pools. Investments shown above are available as of July 1, 2016.
**Fees directly charged by the underlying investment managers to manage the assets. Neither SIC or RVK receive any portion of these fees.

RVK

Investment Options

NM SIC Client Investment Pools

- **Large Cap US Active**: Large capitalization stock assets actively managed by JP Morgan, T. Rowe Price, Brown Brothers Harriman, & Wellington. These investments seek to outperform the Russell 1000. (Annual fee estimate=42 bps.)
- **Large Cap US Index**: Low-cost index platform managed by Northern Trust which seeks to mirror performance of the Russell 1000 Index. (Annual fee estimate=2 bps.)
- **Small/Mid Cap US Active**: Three actively managed portfolios by Donald Smith, Cortina, and Seizert (1 small-cap value, 1 small-cap growth, 1 mid-cap core) benchmarked against custom benchmark reflecting 70% Russell 2000 and 30% Russell Mid Cap. Two strategies use fundamental, bottom-up analysis; one strategy uses quantitative and fundamental bottom-up analysis. (Annual fee estimate=66 bps.)
- **Non-US Developed Markets Active**: Actively managed international stocks in developed foreign countries managed by LSV, T. Rowe Price, Templeton, and MFS & benchmarked against the MSCI EAFE. Three Strategies use fundamental, bottom-up analysis; one strategy uses quantitative analysis. (Annual fee estimate=55 bps.)
- **Non-US Developed Markets Index**: Pool of international stocks focused on developed foreign markets & managed by Alliance Bernstein to mirror MSCI EAFE Index. (Annual fee estimate=4 bps.)
- **Non-US Emerging Markets Active**: Actively managed international stocks in emerging economies managed by BlackRock, seeking to outperform the MSCI Emerging Markets Index. (Annual fee estimate=74 bps.)
- **Non-US Emerging Markets Index**: Pool of international stocks in emerging foreign countries, managed by Alliance Bernstein to mirror the MSCI Emerging Market Index. (Annual fee estimate=14 bps.)
- **Core Plus Bonds**: Core-plus strategy actively managed by PIMCO, Loomis-Sayles and Prudential, benchmarked against the Barclays Capital Universal Bond Index. (Annual fee estimate=20 bps.)
- **Core Bonds Index**: Passively managed portfolio managed by BlackRock benchmarked against the Barclays U.S. Aggregate Bond Index. (Annual fee estimate=4 bps.)
- **Private Pools**: Four alternative investment pools are described and made available pursuant to the Private Investment Pool Policy.

RVK

New Mexico Unit Fund

RVK Recommendation (Asset Allocation)

1. **RVK recommends implementing a diversified asset allocation consisting of exposure to US and Non-US public equities, as well as core (plus) fixed income.**

2. **RVK recommends an asset allocation structure for the New Mexico Unit Fund of either the "50% Equity" or "55% Equity" portfolio mix and includes the asset classes shown on Frontier #2 of the following slides, including:**
    1. **Large Cap US Equity**
    2. **Small/Mid Cap US Equity**
    3. **Non-US Developed Equity**
    4. **Non-US Emerging Markets Equity**
    5. **Core (Plus) Fixed Income**

    These recommended portfolio mixes would hold the balance—either 50% or 45%, respectively—in Core (Plus) Fixed Income.

Bonds are referred to as Fixed Income throughout this presentation.

RVK

New Mexico Unit Fund

RVK Recommendation (Active/Passive)

1. There is a choice to be made between active and passive investments for some of the asset class options, and RVK recommends the following mix:

1.	Large Cap US Equity	Passive
2.	Small/Mid Cap US Equity	Active (only option)
3.	Non-US Developed Equity	Passive
4.	Non-US Emerging Markets Equity	Active
5.	Core (Plus) Fixed Income	Active

2. Both the "50% Equity" and "55% Equity" portfolio mixes recommended on the prior page, assuming the above Active/Passive mixes, would result in a weighted-average investment management fee for the underlying investment managers of 0.19%.

Bonds are referred to as Fixed Income throughout this presentation.

RVK

Asset Allocation Overview

Introduction

The selection of the asset allocation is one of the most important decisions that Interstate Stream Commission will make regarding the financial viability of these assets. It is the major determinant of both the long-term rates of return and the volatility of asset values. Two facets comprise the asset allocation decision: identification of the alternative asset allocations to be considered and selection of the alternative allocation that best meets the investment objectives. The identification of alternative asset allocations begins with estimating the probable future performance of the various asset classes. Using these projections, we can identify the most desirable alternative allocations (potential portfolios) and evaluate them in light of the investment objectives to select that which is most appropriate.

The structure of this report follows the process described above. First, we present our return and risk expectations for each asset class, along with a brief explanation of their relevance to asset allocation. Next, the report will address the creation of the asset allocation alternatives. A description of how the alternatives were identified accompanies a table detailing their composition.

Asset Class Expectations

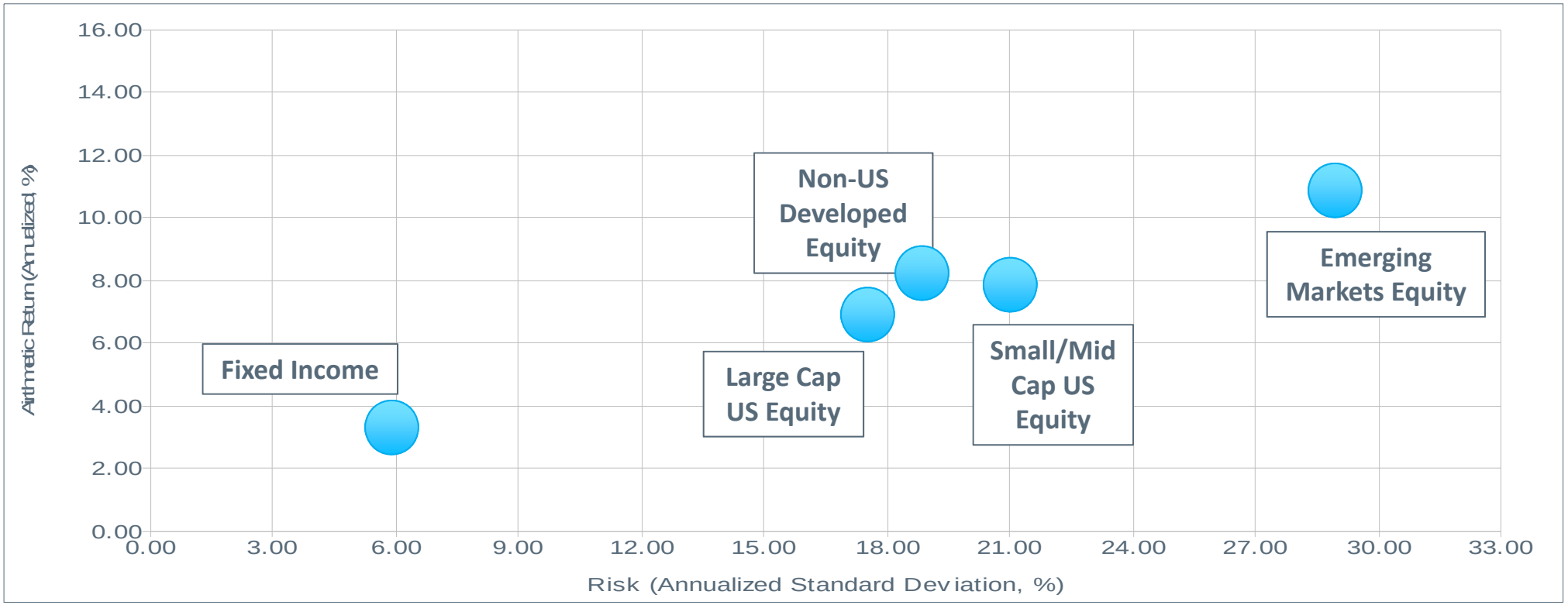
To create asset allocation alternatives, it is necessary to estimate, for each asset class to be employed, its probable return, risk, and behavior relative to other asset classes. The expected returns are our best estimates of the average annual percentage increases in the values of each asset class over a prospective long period of time. The expected returns and risks (as measured by standard deviation of returns) are listed on the left side of the next page, and the historical risks and returns of each asset class, as measured by comparable indexes, are listed on the right side of the next page.

Capital Markets Assumptions

Expected Return & Risk

Asset Class	Arithmetic Return	Standard Deviation
Large Cap US Equity	7.25	17.75
Small/Mid Cap US Equity	8.00	20.25
Non-US Developed Equity	8.25	19.00
Emerging Markets Equity	11.00	29.00
Fixed Income	3.50	6.00

Asset Class	Longest Historical Time Frame	Annualized Arithmetic Return	Annualized Standard Deviation
Russell 1000	Jan 1979 - Dec 2015	12.33	15.25
70% R 2000 / 30% R Mid	Jan 1979 - Dec 2015	13.15	18.46
MSCI EAFE	Jan 1970 - Dec 2015	10.52	17.03
MSCI Emg Mkts	Jan 1988 - Dec 2015	12.79	23.23
Barclays US Agg Bond	Jan 1976 - Dec 2015	7.56	5.42



*RVK made minor adjustment to the standard assumption set for Large Cap US Equity and Small/Mid Cap US Equity in order to most accurately reflect and model the investment choices available to ISC.
Risk is measured by standard deviation.

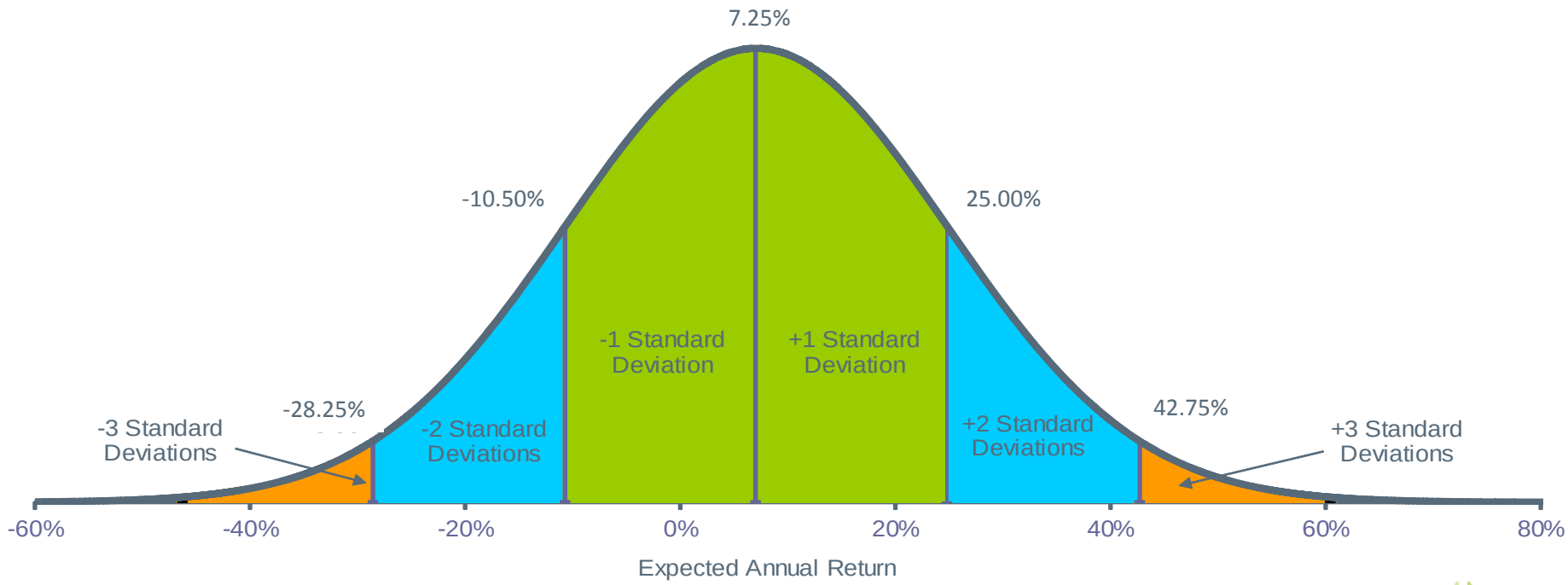
RVK

Capital Markets Assumptions

Annual Volatility of Return Assumptions

	-3 St. Dev.	-2 St. Dev.	-1 St. Dev.	Expected Return	+1 St. Dev.	+2 St. Dev.	+3 St. Dev.
Large Cap US Equity	-46.00	-28.25	-10.50	7.25	25.00	42.75	60.50
Small/Mid Cap US Equity	-52.75	-32.50	-12.25	8.00	28.25	48.50	68.75
Non-US Developed Equity	-48.75	-29.75	-10.75	8.25	27.25	46.25	65.25
Emerging Markets Equity	-76.00	-47.00	-18.00	11.00	40.00	69.00	98.00
Fixed Income	-14.50	-8.50	-2.50	3.50	9.50	15.50	21.50

Large Cap US Equity Example:



Capital Markets Assumptions

Correlation Introduction

Creating a diversified portfolio of asset classes enables the investor to achieve a high rate of return while minimizing volatility of the portfolio. Diversification exists because the returns of different asset classes do not always move in the same direction, at the same time, or with the same magnitude. Varied investment environments cause some asset classes to rise in value while others fall, and correlation is the measure that quantifies the degree to which asset classes do not move in tandem.

Correlation can take on values between 1.00 and -1.00. If returns of two asset classes rise or fall at the same time they are said to be perfectly correlated and have a correlation value of 1.00. Conversely, two asset classes that simultaneously move in opposite directions are said to be perfectly negatively correlated and have a correlation value of -1.00. A correlation of 0 indicates no relationship between the returns. It is imperfect correlations between asset classes that enable an investor to create efficient portfolios; that is, those with the highest amount of return at a given level of risk. The correlations for the asset classes used in this study are shown below.

The fact that the correlations shown in the table are nearly all positive does not imply that these asset classes do not diversify one another. Their correlations are significantly less than 1.00, meaning we expect a measurable number of instances when the underperformance of one or more of the asset classes will be offset by the outperformance of others.

Correlation Matrix

Asset Class	Large Cap US Equity	Small/Mid Cap US Equity	Non-US Developed Equity	Emerging Markets Equity	Fixed Income
Large Cap US Equity	1.00	0.90	0.84	0.74	0.17
Small/Mid Cap US Equity	0.90	1.00	0.78	0.73	0.11
Non-US Developed Equity	0.84	0.78	1.00	0.81	0.00
Emerging Markets Equity	0.74	0.73	0.81	1.00	-0.01
Fixed Income	0.17	0.11	0.00	-0.01	1.00

RVK

Efficient Portfolio Table Illustration

Thematic Classification - Represents dedicated manager allocations; as such, thematic allocations are approximations. RVK categorizes asset classes as Alpha, Capital Appreciation, Capital Preservation, and Inflation.

We constrain the model to take into account reasonable minimum or maximum allocations to each asset class or groups of asset classes.

	Min	Max	1	2	3	4	5	6	7	8	9	10	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
Large Cap US Equity	0	80	6	14	22	30	39	47	55	63	72	80	30	45	50	55	60	75
Fixed Income	0	100	94	86	78	70	61	53	45	37	28	20	70	55	50	45	40	25
Total			100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Capital Appreciation			6	14	22	30	39	47	55	63	72	80	30	45	50	55	60	75
Capital Preservation			94	86	78	70	61	53	45	37	28	20	70	55	50	45	40	25
Alpha			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inflation			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expected Return			3.71	4.02	4.33	4.64	4.95	5.26	5.57	5.88	6.19	6.50	4.63	5.19	5.38	5.56	5.75	6.31
Risk (Standard Deviation)			5.91	6.09	6.60	7.37	8.33	9.42	10.60	11.84	13.13	14.45	7.32	9.15	9.84	10.56	11.31	13.65
Return (Compound)			3.54	3.84	4.12	4.38	4.62	4.84	5.04	5.22	5.39	5.53	4.37	4.79	4.92	5.04	5.15	5.44
Return/Risk Ratio			0.63	0.66	0.66	0.63	0.59	0.56	0.53	0.50	0.47	0.45	0.63	0.57	0.55	0.53	0.51	0.46
RVK Exp Eq Beta (LCUS Eq = 1)			0.11	0.19	0.27	0.35	0.42	0.50	0.58	0.66	0.73	0.81	0.34	0.48	0.53	0.58	0.62	0.77
RVK Liquidity (T-Bills = 100)			86	86	87	88	89	90	91	91	92	93	88	90	90	91	91	93

This illustrates the tradeoff between return and risk; additional return can only be achieved by undertaking additional risk.

Range of possible optimal allocations given the selected asset classes and constraints. These ten (10) portfolios generate the blue efficient frontier line on slide 17 which provides the highest expected return for a given amount of risk.

Expected Equity Beta is a measure of the sensitivity of a portfolio to movements in the Large Cap US Equity market. It is a measure of a portfolio's non-diversifiable or systematic risk.

RVK Liquidity Metric is a qualitative method for determining the relative amount of liquidity in a portfolio. The characteristics considered when determining relative liquidity include trading volume, gates for redemption, leverage, nature of transactions, and pricing mechanisms. The RVK Liquidity Metric is calculated using investment weights applied to each corresponding asset class liquidity rating. See next page for more details.

RVK has provided six (6) potential portfolios across the efficient frontier with various levels of equity exposure (30% to 75%).

RVK

Efficient Allocations

Frontier #1

Two Major Asset Classes – Large Cap US Equity and Fixed Income

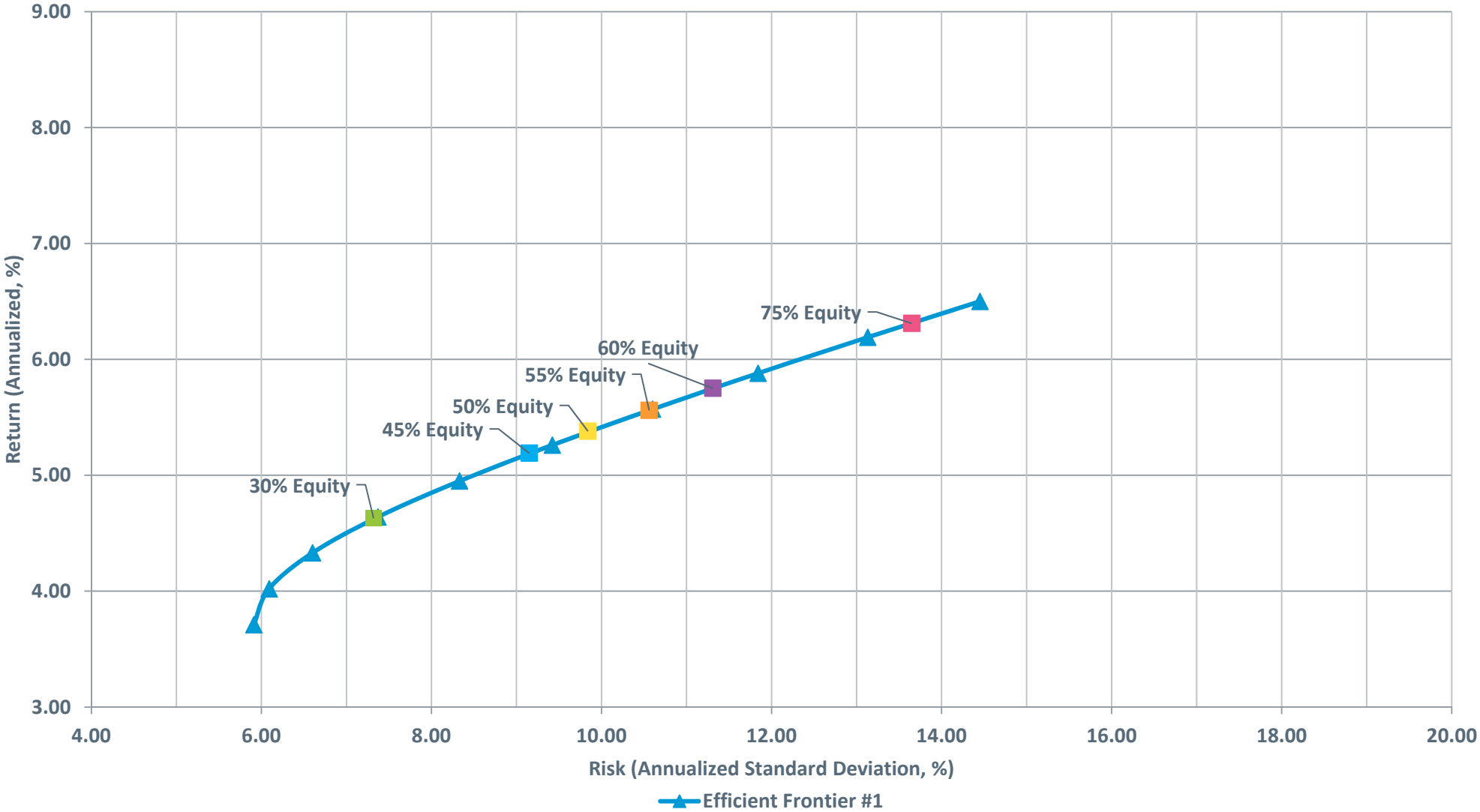
	Min	Max	1	2	3	4	5	6	7	8	9	10	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
Large Cap US Equity	**0**	**80**	6	14	22	30	39	47	55	63	72	80	**30**	**45**	**50**	**55**	**60**	**75**
Fixed Income	**0**	**100**	94	86	78	70	61	53	45	37	28	20	**70**	**55**	**50**	**45**	**40**	**25**
Total			100	100	100	100	100	100	100	100	100	100	**100**	**100**	**100**	**100**	**100**	**100**
Capital Appreciation			6	14	22	30	39	47	55	63	72	80	**30**	**45**	**50**	**55**	**60**	**75**
Capital Preservation			94	86	78	70	61	53	45	37	28	20	**70**	**55**	**50**	**45**	**40**	**25**
Alpha			0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**
Inflation			0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**
Expected Return			**3.71**	**4.02**	**4.33**	**4.64**	**4.95**	**5.26**	**5.57**	**5.88**	**6.19**	**6.50**	**4.63**	**5.19**	**5.38**	**5.56**	**5.75**	**6.31**
Risk (Standard Deviation)			**5.91**	**6.09**	**6.60**	**7.37**	**8.33**	**9.42**	**10.60**	**11.84**	**13.13**	**14.45**	**7.32**	**9.15**	**9.84**	**10.56**	**11.31**	**13.65**
Return (Compound)			3.54	3.84	4.12	4.38	4.62	4.84	5.04	5.22	5.39	5.53	**4.37**	**4.79**	**4.92**	**5.04**	**5.15**	**5.44**
Return/Risk Ratio			0.63	0.66	0.66	0.63	0.59	0.56	0.53	0.50	0.47	0.45	**0.63**	**0.57**	**0.55**	**0.53**	**0.51**	**0.46**
RVK Exp Eq Beta (LCUS Eq = 1)			0.11	0.19	0.27	0.35	0.42	0.50	0.58	0.66	0.73	0.81	**0.34**	**0.48**	**0.53**	**0.58**	**0.62**	**0.77**
RVK Liquidity (T-Bills = 100)			86	86	87	88	89	90	91	91	92	93	**88**	**90**	**90**	**91**	**91**	**93**

- Frontier #1 includes only Large Cap US Equity and Fixed Income represents a very simple, relatively high quality approach to entering the capital markets.
- RVK has provided six (6) potential portfolios across the efficient frontier with various levels of equity exposure (30% to 75%).
- More equity will produce higher levels of return, but also higher levels of risk.

RVK

Efficient Frontiers

Frontier #1



1) *Non-US Equity not to exceed US Equity.*
2) *Small/Mid Cap US Equity must be less than 1/3 Large Cap US Equity.*
3) *Emerging Markets Equity must be less than 1/3 Non-US Developed Equity.*

The efficient frontier is created based on the risk/return profiles of portfolio mixes 1-10 on slides 15 and 16.

Efficient Allocations

Frontier #2

Five Major Asset Classes – Addition of Small/Mid Cap, Non-US Developed and Emerging Markets

	Min	Max	1	2	3	4	5	6	7	8	9	10	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
Large Cap US Equity	**0**	**80**	3	7	10	14	18	22	26	29	34	40	**14**	**21**	**23**	**25**	**27**	**35**
Small/Mid Cap US Equity	**0**	**10**	1	2	3	5	6	7	8	10	10	10	**4**	**7**	**7**	**8**	**9**	**10**
Non-US Developed Equity	**0**	**50**	4	7	10	14	18	22	26	29	34	40	**9**	**13**	**15**	**17**	**18**	**23**
Emerging Markets Equity	**0**	**10**	0	2	3	5	6	7	8	10	10	10	**3**	**4**	**5**	**5**	**6**	**7**
Fixed Income	**0**	**100**	92	82	72	62	52	42	32	22	11	0	**70**	**55**	**50**	**45**	**40**	**25**
Total			100	100	100	100	100	100	100	100	100	100	**100**	**100**	**100**	**100**	**100**	**100**
Capital Appreciation			8	18	28	38	48	58	68	78	89	100	**30**	**45**	**50**	**55**	**60**	**75**
Capital Preservation			92	82	72	62	52	42	32	22	11	0	**70**	**55**	**50**	**45**	**40**	**25**
Alpha			0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**
Inflation			0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**
Expected Return			**3.86**	**4.33**	**4.80**	**5.27**	**5.74**	**6.21**	**6.69**	**7.16**	**7.63**	**8.10**	**4.86**	**5.52**	**5.76**	**5.98**	**6.22**	**6.88**
Risk (Standard Deviation)			**5.81**	**6.13**	**6.97**	**8.18**	**9.63**	**11.21**	**12.89**	**14.63**	**16.45**	**18.33**	**7.21**	**9.12**	**9.88**	**10.62**	**11.45**	**13.89**
Return (Compound)			3.70	4.15	4.57	4.95	5.30	5.62	5.92	6.18	6.39	6.58	**4.61**	**5.13**	**5.30**	**5.45**	**5.61**	**5.99**
Return/Risk Ratio			0.66	0.71	0.69	0.64	0.60	0.55	0.52	0.49	0.46	0.44	**0.67**	**0.61**	**0.58**	**0.56**	**0.54**	**0.50**
RVK Exp Eq Beta (LCUS Eq = 1)			0.13	0.23	0.32	0.41	0.51	0.60	0.69	0.79	0.89	0.98	**0.34**	**0.48**	**0.53**	**0.57**	**0.62**	**0.76**
RVK Liquidity (T-Bills = 100)			86	86	87	87	88	88	89	89	90	91	**87**	**88**	**88**	**88**	**89**	**90**

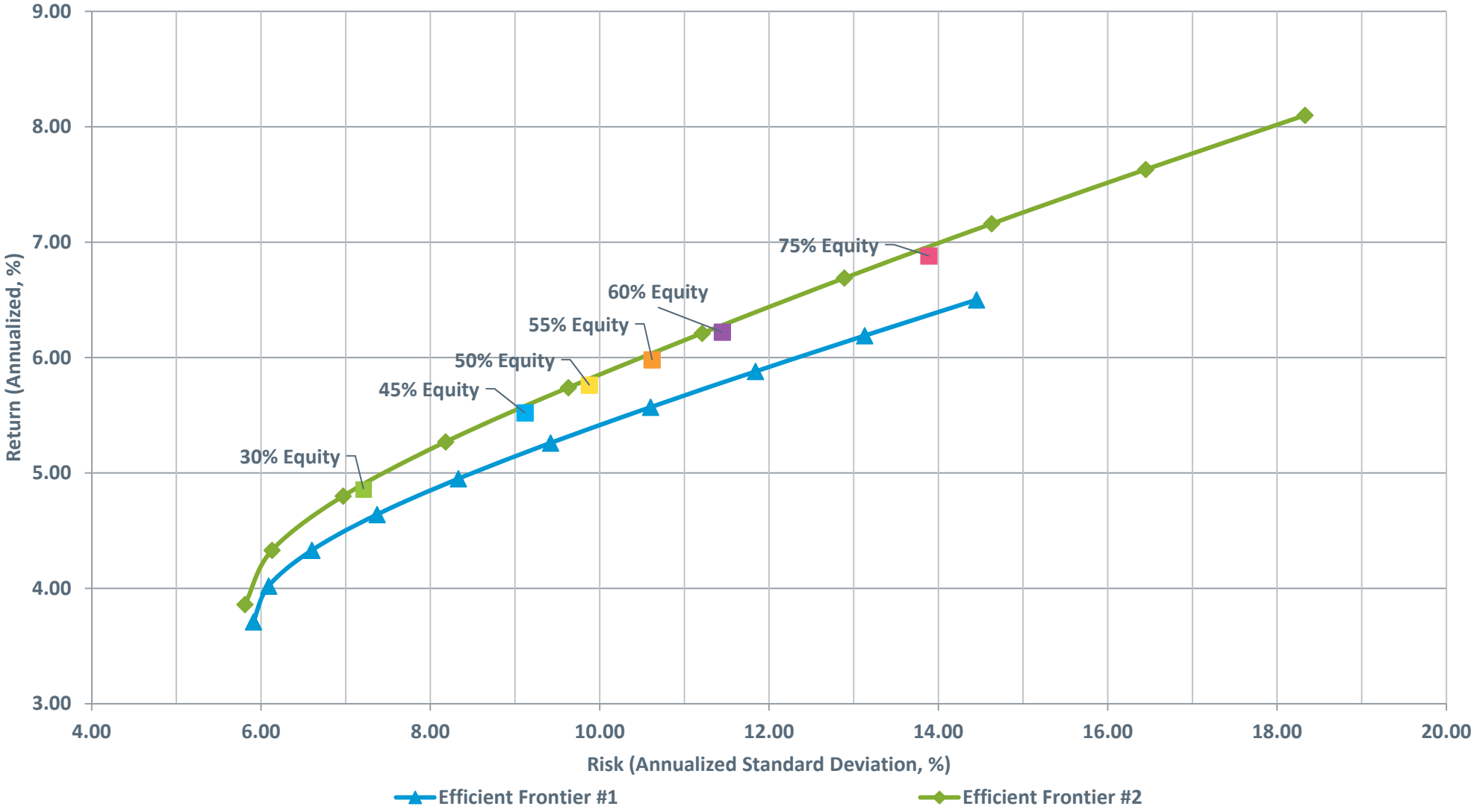
- Frontier #2 includes additional asset classes which through their correlation benefits allow for higher level of return with the same amount of risk, or conversely the same amount of return with lower levels of risk vis-à-vis the options shown on Frontier #1 using a simpler asset allocation.

1) *Non-US Equity not to exceed US Equity.*
2) *Small/Mid Cap US Equity must be less than 1/3 Large Cap US Equity.*
3) *Emerging Markets Equity must be less than 1/3 Non-US Developed Equity.*

RVK

Efficient Frontiers

Frontier #2



1) *Non-US Equity not to exceed US Equity.*
2) *Small/Mid Cap US Equity must be less than 1/3 Large Cap US Equity.*
3) *Emerging Market Equity must be less than 1/3 Non-US Developed Equity.*

RVK

Monte Carlo Simulations

Monte Carlo Simulation

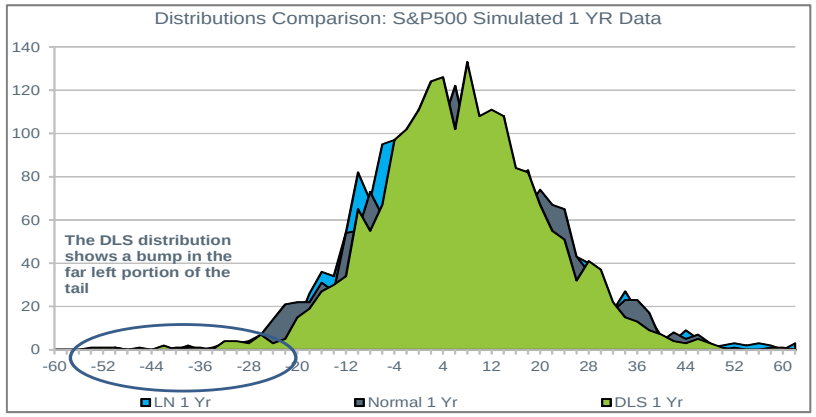
Introduction

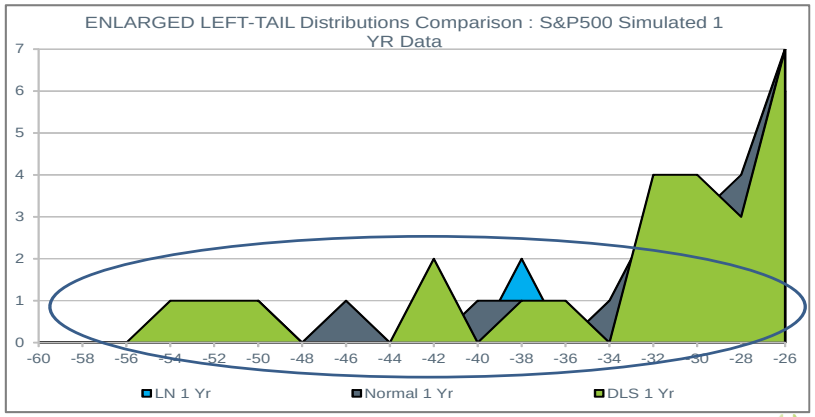
Monte Carlo simulation uses a random sampling of asset class returns, based on the probability distribution implied by the empirical returns, to create several thousand estimates of portfolio performance. Undergoing a Monte Carlo simulation provides insight into the performance of the asset allocation by examining many randomly sampled return outcomes.

An asset allocation study allows for the construction of an "efficient," or return-maximizing, portfolio of asset class investments at each given level of portfolio volatility. These calculations are based on expected return, risk, and correlations for each asset class. The asset allocation process provides a snapshot of portfolio performance that is highly dependent on the mean return expectations. A Monte Carlo simulation process "stress tests" these assumptions and asset allocation recommendations that stem from them through thousands of independent samplings of portfolio returns, based on the assumptions and indicated asset allocations. Through the Monte Carlo simulation process, we are better able to ascertain the real-world probability of achieving various return targets over time.

Our Monte Carlo simulation model assumes a non-normal (downside log-stable (DLS), or "fat-tailed") distribution of returns, which we believe provides a more realistic representation of historical market experience than the typically used normal or log-normal (LN) distribution. Given this non-normal distribution of random returns derived from our assumption inputs and empirical return dispersion, we can estimate the potential return for a given portfolio over the indicated time period. The charts below illustrate the differences between the above mentioned distributions.

It is important to note that the output that follows refers to geometric (compound) return, rather than the arithmetic return assumptions used in the asset allocation analysis. The geometric return of a portfolio will be less than (or equal to) its arithmetic return over time, because geometric return accounts for the dampening effect of volatility on the portfolio's compound returns.





Monte Carlo Analysis

Expected Return (Nominal) by Percentile – Frontier #1

1 Year	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
1st Percentile	-18.61	-24.36	-26.25	-28.35	-30.65	-36.42
5th Percentile	-7.28	-10.25	-11.29	-12.33	-13.28	-16.80
25th Percentile	0.63	-0.28	-0.61	-0.94	-1.28	-2.37
50th Percentile	**4.95**	**5.45**	**5.65**	**5.84**	**6.01**	**6.46**
75th Percentile	9.36	11.35	12.05	12.75	13.44	15.53
95th Percentile	15.81	20.19	21.73	23.27	24.84	29.48
99th Percentile	20.90	27.24	29.54	31.67	33.88	41.42
3 Years						
5th Percentile	-3.15	-4.99	-5.62	-6.35	-7.05	-9.20
25th Percentile	1.96	1.47	1.29	1.12	0.94	0.33
50th Percentile	**4.73**	**5.11**	**5.23**	**5.37**	**5.51**	**5.88**
75th Percentile	7.35	8.64	9.10	9.50	9.95	11.28
95th Percentile	11.03	13.74	14.62	15.57	16.52	19.40
5 Years						
5th Percentile	-1.38	-2.71	-3.28	-3.85	-4.44	-6.26
25th Percentile	2.46	2.22	2.11	2.00	1.86	1.41
50th Percentile	**4.63**	**5.07**	**5.18**	**5.28**	**5.41**	**5.76**
75th Percentile	6.64	7.70	8.07	8.43	8.80	9.84
95th Percentile	9.60	11.66	12.40	13.16	13.85	16.04
10 Years						
5th Percentile	-0.04	-0.94	-1.27	-1.66	-2.05	-3.54
25th Percentile	2.95	2.87	2.80	2.73	2.65	2.35
50th Percentile	**4.54**	**4.92**	**5.05**	**5.15**	**5.26**	**5.55**
75th Percentile	5.96	6.83	7.12	7.41	7.70	8.52
95th Percentile	8.08	9.67	10.20	10.71	11.24	12.87

RVK

Monte Carlo Analysis

Percentage Chance of Achieving or Exceeding Return Target – Frontier #1

1 Year	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
Target 0%	78	74	73	72	71	69
Target 3%	62	62	61	61	61	60
Target 4%	56	57	57	57	57	58
Target 4.5%	53	55	55	55	55	56
Target 5%	**50**	**52**	**53**	**53**	**54**	**55**
Target 6%	44	47	48	49	50	52
3 Years						
Target 0%	86	82	81	80	79	76
Target 3%	66	66	65	65	65	64
Target 4%	57	58	59	59	59	59
Target 4.5%	52	55	55	56	56	57
Target 5%	**47**	**51**	**51**	**52**	**53**	**54**
Target 6%	37	44	45	46	47	49
5 Years						
Target 0%	91	87	86	85	84	81
Target 3%	70	69	69	68	68	67
Target 4%	58	60	60	61	61	61
Target 4.5%	52	55	56	57	57	58
Target 5%	**45**	**51**	**52**	**53**	**53**	**55**
Target 6%	32	40	43	44	45	48
10 Years						
Target 0%	95	92	91	90	90	86
Target 3%	74	74	73	73	72	70
Target 4%	59	62	62	63	63	63
Target 4.5%	51	55	57	57	58	59
Target 5%	**42**	**49**	**51**	**52**	**53**	**55**
Target 6%	25	36	38	41	42	46

RVK

Monte Carlo Analysis

Expected Wealth including Cash Flows (in $ Millions) – Frontier #1

1 Year	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
1st Percentile	$22.5	$20.8	$20.3	$19.6	$19.0	$17.3
5th Percentile	$25.9	$25.0	$24.7	$24.4	$24.1	$23.1
25th Percentile	$28.2	$27.9	$27.8	$27.7	$27.6	$27.3
50th Percentile	**$29.5**	**$29.6**	**$29.7**	**$29.8**	**$29.8**	**$29.9**
75th Percentile	$30.8	$31.4	$31.6	$31.8	$32.0	$32.6
95th Percentile	$32.7	$34.0	$34.5	$34.9	$35.4	$36.8
99th Percentile	$34.2	$36.1	$36.8	$37.4	$38.1	$40.3
3 Years						
5th Percentile	$36.6	$35.0	$34.4	$33.8	$33.2	$31.3
25th Percentile	$41.3	$40.8	$40.7	$40.5	$40.3	$39.7
50th Percentile	**$44.1**	**$44.5**	**$44.6**	**$44.8**	**$44.9**	**$45.3**
75th Percentile	$46.9	$48.3	$48.8	$49.3	$49.8	$51.3
95th Percentile	$51.0	$54.2	$55.3	$56.5	$57.6	$61.2
5 Years						
5th Percentile	$51.6	$49.2	$48.4	$47.4	$46.5	$43.7
25th Percentile	$58.9	$58.4	$58.2	$58.0	$57.8	$56.9
50th Percentile	**$63.5**	**$64.4**	**$64.7**	**$65.0**	**$65.3**	**$66.0**
75th Percentile	$68.0	$70.6	$71.5	$72.3	$73.3	$76.2
95th Percentile	$75.2	$81.0	$83.0	$85.0	$87.0	$93.8
10 Years						
5th Percentile	$53.9	$49.8	$48.3	$46.6	$44.9	$40.1
25th Percentile	$69.0	$68.6	$68.3	$68.0	$67.6	$65.9
50th Percentile	**$79.1**	**$81.8**	**$82.6**	**$83.4**	**$84.2**	**$86.2**
75th Percentile	$89.2	$95.7	$98.0	$100.3	$102.6	$110.1
95th Percentile	$106.1	$120.4	$125.8	$131.3	$137.2	$156.3

Starting market value as of 7/1/2016 is assumed to be $34.1 million per ISC Staff.

RVK

Monte Carlo Analysis

Expected Return (Nominal) by Percentile – Frontier #2

1 Year	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
1st Percentile	-17.26	-22.34	-23.92	-25.77	-27.90	-33.92
5th Percentile	-7.12	-10.15	-11.32	-12.46	-13.73	-17.11
25th Percentile	0.69	-0.30	-0.63	-1.03	-1.37	-2.34
50th Percentile	**5.23**	**5.76**	**6.00**	**6.17**	**6.33**	**6.86**
75th Percentile	9.59	11.75	12.54	13.34	14.19	16.64
95th Percentile	16.39	21.47	23.08	24.78	26.66	31.84
99th Percentile	21.03	27.98	30.61	33.03	35.50	42.87
3 Years						
5th Percentile	-2.74	-4.57	-5.21	-5.85	-6.61	-8.86
25th Percentile	2.16	1.69	1.55	1.35	1.19	0.60
50th Percentile	**4.88**	**5.42**	**5.61**	**5.77**	**5.92**	**6.37**
75th Percentile	7.63	9.02	9.56	10.06	10.59	12.07
95th Percentile	11.52	14.38	15.45	16.50	17.54	20.54
5 Years						
5th Percentile	-1.31	-2.77	-3.31	-3.87	-4.44	-6.21
25th Percentile	2.60	2.34	2.23	2.13	1.96	1.57
50th Percentile	**4.84**	**5.35**	**5.50**	**5.64**	**5.80**	**6.20**
75th Percentile	6.99	8.23	8.68	9.10	9.57	10.79
95th Percentile	10.01	12.42	13.27	14.08	14.96	17.32
10 Years						
5th Percentile	0.21	-0.67	-0.99	-1.40	-1.83	-3.17
25th Percentile	3.04	3.00	2.97	2.92	2.86	2.62
50th Percentile	**4.77**	**5.20**	**5.35**	**5.49**	**5.65**	**6.01**
75th Percentile	6.33	7.34	7.69	8.03	8.40	9.34
95th Percentile	8.42	10.24	10.87	11.48	12.13	13.93

RVK

Monte Carlo Analysis

Percentage Chance of Achieving or Exceeding Return Target – Frontier #2

1 Year	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
Target 0%	78	74	73	72	71	69
Target 3%	63	62	62	62	62	61
Target 4%	58	58	58	58	59	58
Target 4.5%	55	56	56	56	56	57
Target 5%	**51**	**53**	**54**	**54**	**55**	**56**
Target 6%	45	49	50	51	51	53
3 Years						
Target 0%	87	83	82	81	80	77
Target 3%	68	67	67	66	66	65
Target 4%	59	60	61	61	61	61
Target 4.5%	54	56	57	58	58	59
Target 5%	**49**	**53**	**54**	**54**	**55**	**57**
Target 6%	39	46	47	49	50	52
5 Years						
Target 0%	91	88	86	85	84	81
Target 3%	71	70	70	70	69	68
Target 4%	60	62	63	63	63	63
Target 4.5%	55	58	59	59	59	60
Target 5%	**48**	**53**	**54**	**55**	**56**	**57**
Target 6%	36	44	46	47	49	51
10 Years						
Target 0%	96	93	92	92	90	87
Target 3%	76	75	75	74	74	73
Target 4%	62	64	65	65	66	65
Target 4.5%	54	59	60	60	61	62
Target 5%	**46**	**52**	**54**	**55**	**56**	**58**
Target 6%	30	41	43	45	47	50

RVK

Monte Carlo Analysis

Expected Wealth including Cash Flows (in $ Millions) – Frontier #2

1 Year	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
1st Percentile	$23.0	$21.3	$20.8	$20.1	$19.5	$17.7
5th Percentile	$25.9	$25.0	$24.7	$24.4	$24.0	$23.0
25th Percentile	$28.2	$27.9	$27.9	$27.7	$27.7	$27.3
50th Percentile	**$29.6**	**$29.7**	**$29.8**	**$29.8**	**$29.9**	**$30.1**
75th Percentile	$30.9	$31.5	$31.7	$32.0	$32.2	$32.9
95th Percentile	$32.9	$34.3	$34.8	$35.3	$35.9	$37.4
99th Percentile	$34.3	$36.4	$37.1	$37.8	$38.5	$40.7
3 Years						
5th Percentile	$37.0	$35.3	$34.8	$34.2	$33.6	$31.6
25th Percentile	$41.6	$41.1	$41.0	$40.9	$40.7	$40.2
50th Percentile	**$44.4**	**$44.9**	**$45.2**	**$45.4**	**$45.6**	**$46.1**
75th Percentile	$47.2	$48.9	$49.4	$50.0	$50.7	$52.5
95th Percentile	$51.4	$54.9	$56.1	$57.3	$58.8	$62.6
5 Years						
5th Percentile	$51.7	$49.1	$48.3	$47.3	$46.2	$43.2
25th Percentile	$59.3	$58.8	$58.6	$58.4	$58.2	$57.2
50th Percentile	**$63.9**	**$65.1**	**$65.5**	**$65.8**	**$66.2**	**$67.2**
75th Percentile	$68.7	$71.7	$72.9	$73.9	$75.1	$78.3
95th Percentile	$76.3	$82.7	$85.0	$87.3	$89.9	$97.4
10 Years						
5th Percentile	$55.0	$50.9	$49.5	$47.9	$46.3	$41.3
25th Percentile	$70.0	$69.4	$69.4	$69.0	$68.6	$67.2
50th Percentile	**$80.4**	**$83.7**	**$84.9**	**$85.9**	**$86.9**	**$89.5**
75th Percentile	$91.4	$99.7	$102.6	$105.5	$108.7	$117.6
95th Percentile	$109.3	$126.6	$133.1	$139.8	$147.4	$169.4

Starting market value as of 7/1/2016 is assumed to be $34.1 million per ISC Staff.

RVK

Cash Flow Stress Testing

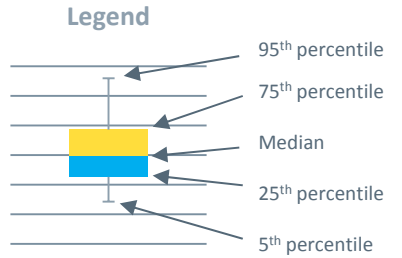
Distributions/Costs

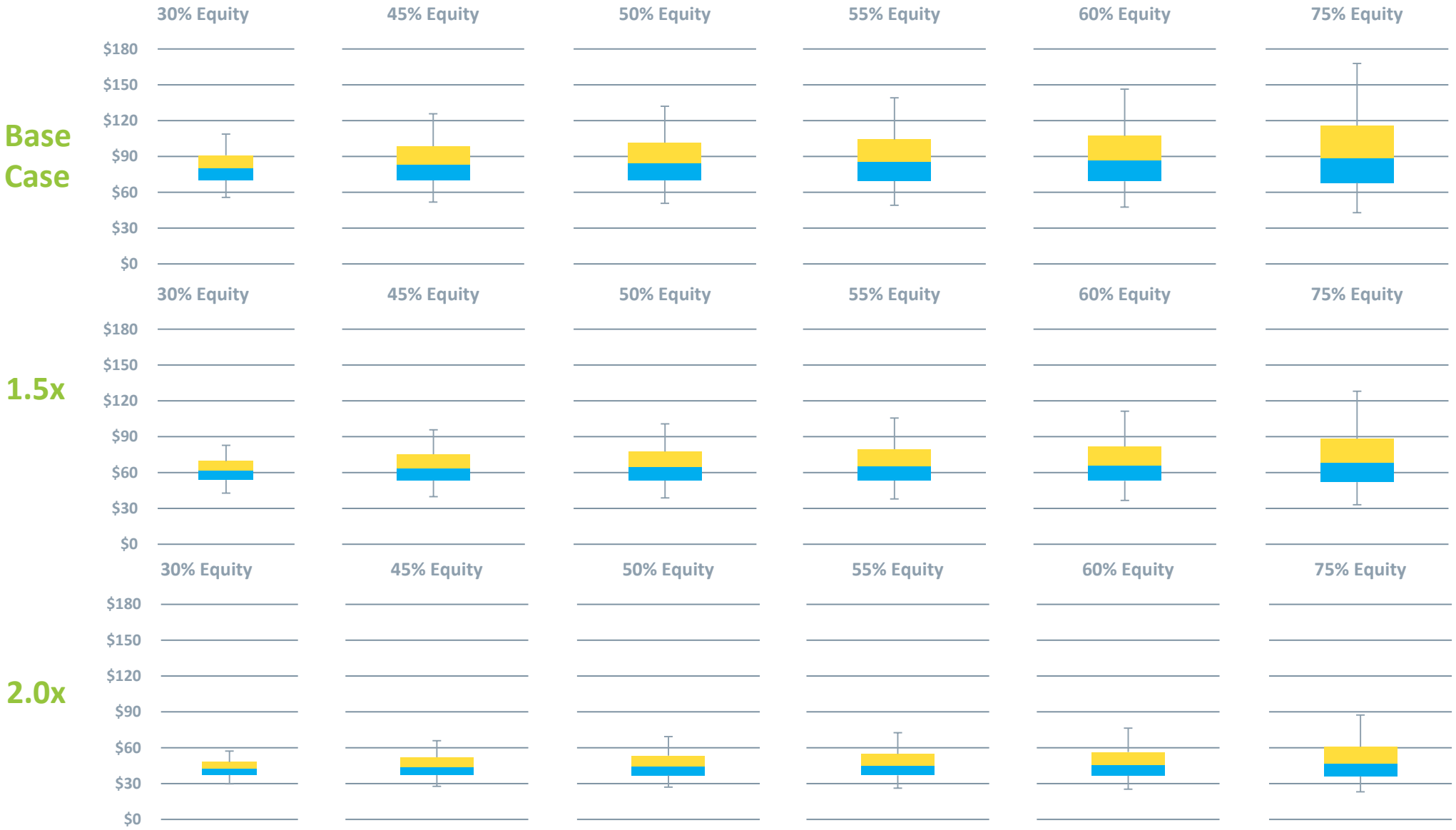
- Due to the uncertainty of the project it is difficult to predict the cost and timing.
- In order to help address this uncertainty, RVK included two extreme scenarios of anticipated cash flows to evaluate the implications of costs that exceed expectations:
  - If costs materialize differently than expected, it could severely impact the long-term growth and/or fiscal sustainability of the assets.
  - Choosing an asset allocation that can weather the demands of up to double the outflows/costs is something that should be kept in mind—implications include sensitivity to losses in the portfolio and certain liquidity needs.
  - RVK has included two more extreme versions of the cash flows
    - **1.5x the current predicted costs/distributions**
    - **2.0x the current predicted costs/distributions**
- *Should the ISC spend more of the fund than anticipated by current projections, there would be less capital available for investment and hence a lower terminal value at the end of the life of the fund.*
- The follow slides provide detail on the results of the stress testing with different asset allocation mixes.

RVK

Monte Carlo Analysis – 10 Years

Expected Wealth including Cash Flows (in $ Millions) – Frontier #2





Starting market value as of 7/1/2016 is assumed to be $34.1 million per ISC Staff.

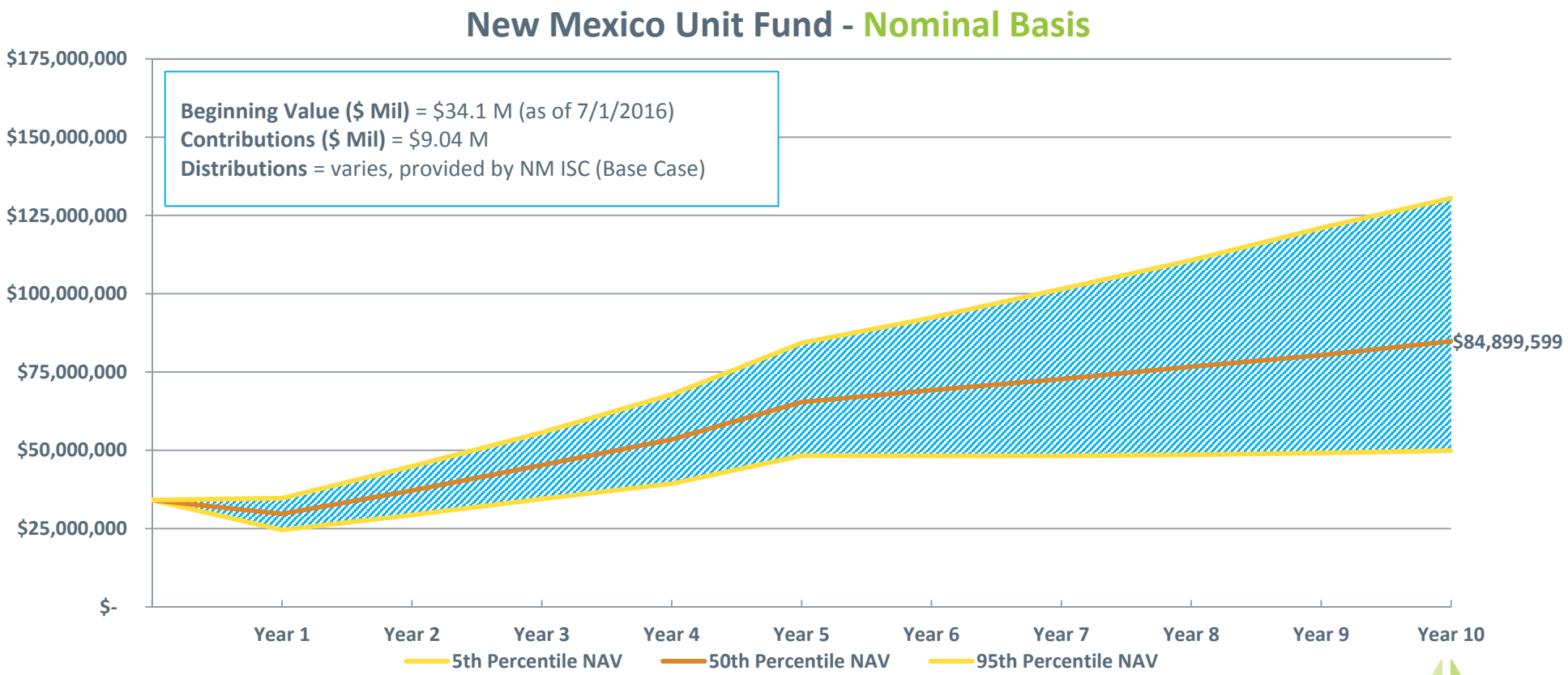
RVK

Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Base Case

50% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		



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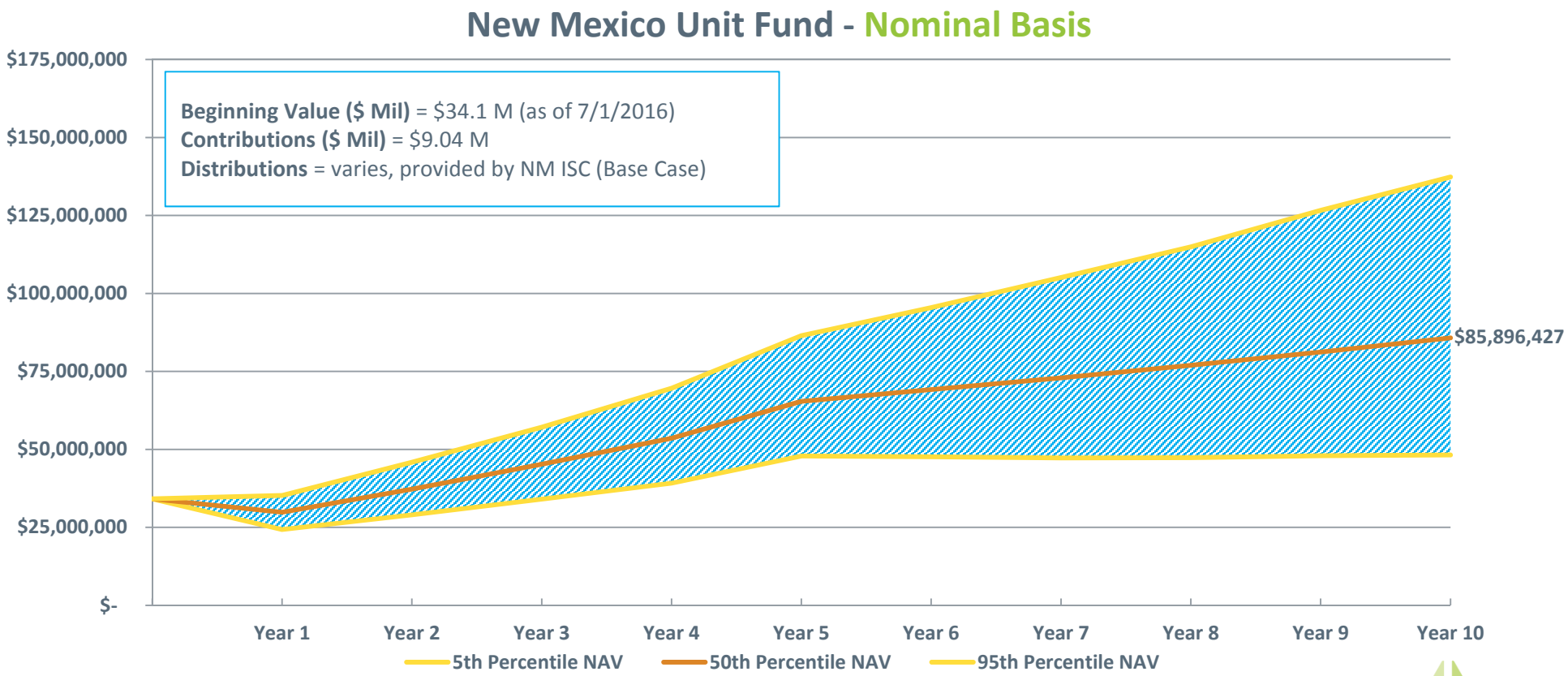
Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Base Case

55% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		



RVK

New Mexico Unit Fund

Investment Options Management Fees

- As a client of the SIC, the Interstate Stream Commission has the option to implement its preferred asset allocation through either active or passive management, as well as a combination thereof.
- RVK has provided a range of the various effective fee implications across the potential portfolio mixes to demonstrate the weighted average fee from either implementation approach.
  - Passive Implementation 0.07% - 0.10% of assets
  - Active Implementation 0.30% - 0.44% of assets

Weighted Average Fees (Passive)									
Market Cap/Style	Management	Benchmark	Inv. Mgmt. Fee	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
Large Cap US	Passive	Russell 1000 Index	0.02%	14.00%	21.00%	23.00%	25.00%	27.00%	35.00%
Small/Mid Cap US*	Active*	70% R 2000/ 30% R Mid Cap	0.66%	4.00%	7.00%	7.00%	8.00%	9.00%	10.00%
Non-US Developed	Passive	MSCI EAFE Index	0.04%	9.00%	13.00%	15.00%	17.00%	18.00%	23.00%
Non-US Emerging	Passive	MSCI Emerging Markets Index	0.14%	3.00%	4.00%	5.00%	5.00%	6.00%	7.00%
Core Bonds	Passive	Barclays US Agg Bond Index	0.04%	70.00%	55.00%	50.00%	45.00%	40.00%	25.00%
Total				100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
TOTAL Fees				**0.07%**	**0.08%**	**0.08%**	**0.09%**	**0.10%**	**0.10%**

Weighted Average Fees (Active)									
Market Cap/Style	Management	Benchmark	Inv. Mgmt. Fee	30% Equity	45% Equity	50% Equity	55% Equity	60% Equity	75% Equity
Large Cap US	Active	Russell 1000 Index	0.42%	14.00%	21.00%	23.00%	25.00%	27.00%	35.00%
Small/Mid Cap US	Active	70% R 2000/ 30% R Mid Cap	0.66%	4.00%	7.00%	7.00%	8.00%	9.00%	10.00%
Non-US Developed	Active	MSCI EAFE Index	0.55%	9.00%	13.00%	15.00%	17.00%	18.00%	23.00%
Non-US Emerging	Active	MSCI Emerging Markets Index	0.74%	3.00%	4.00%	5.00%	5.00%	6.00%	7.00%
Core Bonds Plus	Active	Barclays Universal Bond Index	0.20%	70.00%	55.00%	50.00%	45.00%	40.00%	25.00%
Total				100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
TOTAL Fees				**0.30%**	**0.35%**	**0.36%**	**0.38%**	**0.40%**	**0.44%**

*The Small/Mid Cap mandate does not currently have a passive option available. Mixed (active and passive) implementation would produce fees between either choices.

**Fees directly charged by the underlying investment managers to manage the assets. Neither SIC or RVK receive any portion of these fees.

RVK

Appendix 2:
Active/Passive Investing Review

Definitions

Passive Investing

- True passive investing is the replication of the basket of investments comprising a market with perfect rebalancing and representation of each underlying asset
- Passive investment strategies as implemented with real-world constraints such as transaction costs and liquidity attempt to match market performance with as little tracking error (volatility of manager positive and negative excess return) as possible
- There are a spectrum of choices in executing a passive or near passive approach (see table on following page)

Active Investing

- Active strategies begin with the premise that an “active” selection of investment assets based on manager investment skill and/or the exploitation of certain market inefficiencies will result in a higher return than holding the entire basket of market assets

Indexing Approaches

Indexing Approach	% of Index Holdings	Expected Performance Difference	Description
Full Replication	All	None	Holds each security in a benchmark to its index weight. The classic example of full replication is the Vanguard S&P 500.
Sampling	Most	Minor Difference +/-	Using a factor model to optimally determine the necessary set of securities to replicate the benchmark risk profile. Used when full replication isn't possible, or for tax-efficiency, etc.
Synthetic	None	Minor Difference +/-	Using derivatives to replicate benchmark exposure, e.g., portable alpha strategies.
Enhanced Indexing	Most	Outperform	All or some of the above, enhanced indexers try to replicate the risk profile of the index while outperforming it through marginal variations.
Structured Portfolios	Depends	Outperform	A strict set of rules designed to exploit inefficiencies in a particular market segment, e.g., Dimensional Fund Advisors (DFA).

The Active vs. Passive Debate

- **The benefits of active management versus a comparable passively managed investment is an ongoing debate**
- **While the debate is academically interesting, the only responsible answer must be a highly unsatisfying "it depends"**
- **Results differ depending on the asset class or market segment in question**
- **Other factors directly impacting the debate include:**
  - Market cycles and time period of observance
  - Availability and ease of indexing

The Active vs. Passive Debate

The Case for Passive Investing

- **Lower fees** - guaranteed "head start" relative to active management
- **Lower maintenance** - no benchmark risk due to active "bets", so it is less resource intensive to select, monitor, and terminate managers
- **No timing (managers) risk** - cannot make ill-timed move from one underperforming active manager to another
- **Little manager selection skill required** - gaining market exposure is relatively straightforward
- **Efficient markets theory** - if markets are efficient, then active management is expensive and potentially detrimental to performance

The Active vs. Passive Debate

The Case for Active Investing

- **Markets are efficient, but investors are not** - if no market is entirely efficient, then there is the potential for active outperformance
- **Fundamentals can be accounted for** - valuation and other fundamentals can be incorporated to ensure that investments are not merely following prices (i.e. no "rear-view mirror" investing, or need to follow P/E expansion unless commensurate growth is expected)
- **Avoid concentration risk** - if a sector or stock becomes a large position relative to others in the index, an active manager can react accordingly
- **Markets need active investors** - markets will not function properly without active management, as someone has to do the "dirty work"

Market Cycles

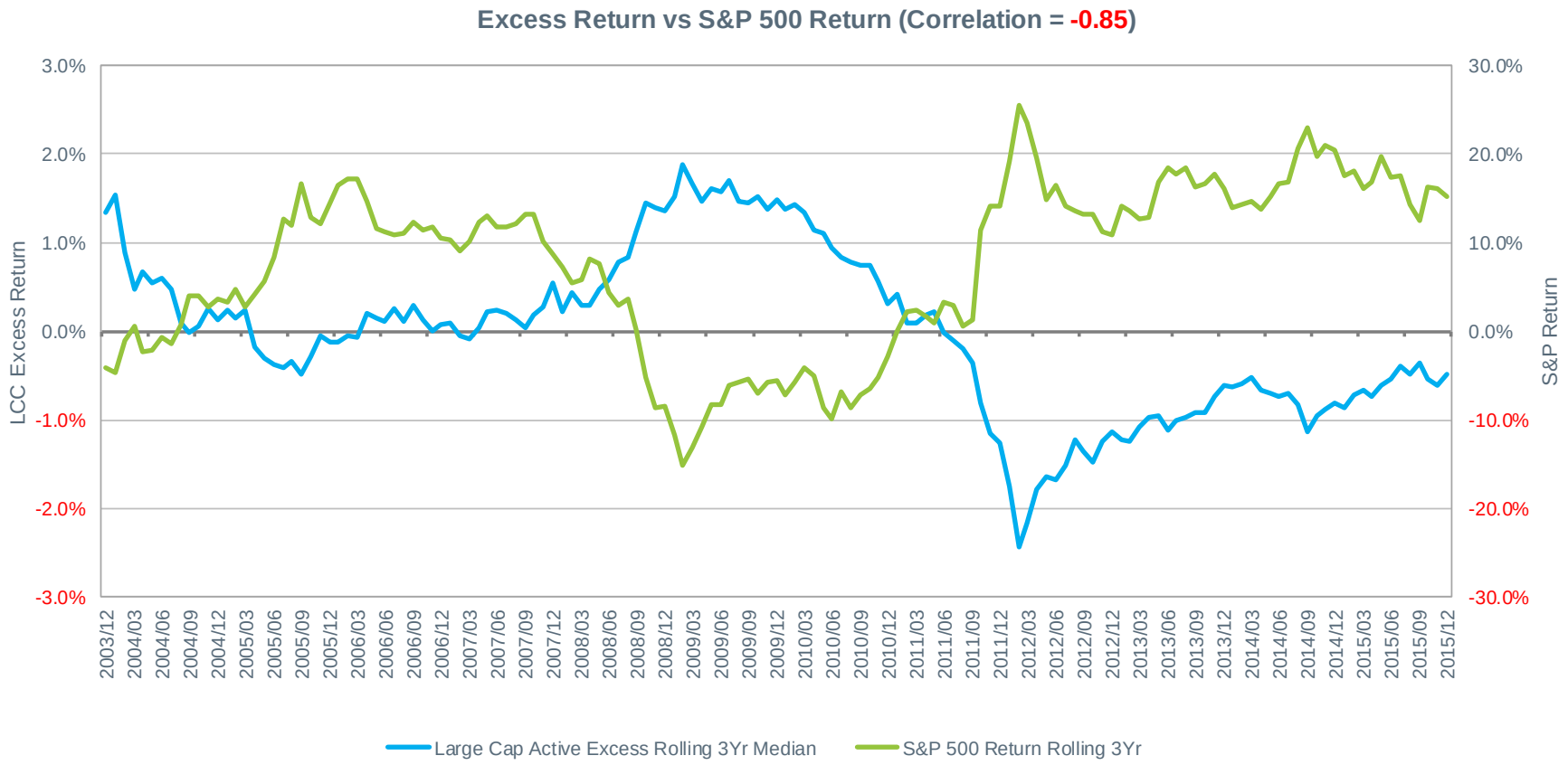
Overview

- **A case can be made for active or passive management, depending on the time period analyzed**
  - During bear stock markets active equity managers tend to outperform (fear breeds opportunity), and vice versa for bull markets
  - Please see examples of general trends on the following pages
- **Investors must take caution not to embrace active or passive management based on recent trends**

Market Cycles

Equity Example

- **A case can be made for active or passive management, depending on the time period, or "regime", analyzed**
  - Active management tends to perform better during periods of weak absolute returns



Active vs. Passive Summary

Availability & Ease of Indexing

- **For some asset classes, investable indices do not exist or are imperfect**
  - Some asset classes can be implicitly and explicitly expensive to index
    - Example: Barclays Aggregate Bond Index has approximately 9,000 holdings making it very difficult to replicate
    - Some smaller markets lack liquidity and therefore carry a higher price tag for investors making indexing less advantageous
- **Investors should consider:**
  - Index manager fees
  - Trading costs
  - Opportunity costs
  - Potential index replication errors
  - Flexibility with tax management, gain/loss harvesting and social screens

Active vs. Passive Summary

- **Passive management has many compelling attributes**
- **Active management can add value across various markets or risk regimes**
- **Benefits of active management tend to hinge on the investor's ability to select better than average managers**
- **We frequently recommend active management styles, but recognize that there are situations in which passive investing can bring with it economic benefits, investment simplicity, and competitive relative returns**
  - *For example, large cap US equity is often regarded as a particularly efficient market, providing less opportunity for active managers to add value above the index. Many plan sponsors decide to index large cap US equity in order to focus their efforts on selecting top managers in less efficient markets, such as small cap and international, where the potential for active manager alpha is possibly higher.*
- **One simple and opportunistic way to evaluate a potential move to passive management is in connection with a manager termination**

Methodology

- **Rolling 3-Year Excess Returns**
  - Uses data starting in January 2001
- **Net of Fees**
  - Fee assumptions based on eVestment Alliance peer group median
  - Given the following mandate sizes:

$500M	$200M
• Core/Core Plus Fixed Income • US Large Cap • Non-US Large Cap	• US Small Cap • US Mid Cap • Emerging Markets

Considerations

- **Potential survivorship bias**
  Constrained analysis to start in January 2001, mitigating survivorship bias from periods prior to “good” data
- **Head count vs. invested assets**
  The study examines the average performance of the peer group, but does not account for actual assets invested in the various products
- **Index dependency**
  Index providers differ in methodology, holdings, and reconstitution – all of which can have an impact on relative performance of active managers vs. the passive index

Source: Blanchett, David and Israelsen, Craig. “Active Vs. Passive”. January/February 2009, Vol. 12 No.1, Journal of Indexes

Manager Excess Returns Summary

Long-Term 3-Year Rolling Average (Net of Fees)

January 2001 – December 2015

US Equity			
	25th Percentile	Median	75th Percentile
US Large Cap Core Equity	1.51%	-0.02%	-1.57%
US Mid Cap Core Equity	1.23%	-0.63%	-2.49%
US Small Cap Core Equity	2.85%	0.73%	-1.24%

International Equity			
	25th Percentile	Median	75th Percentile
Non-US Large Cap Core Equity	1.47%	-0.05%	-1.44%
Emerging Markets Equity	3.12%	0.74%	-1.45%

Fixed Income			
	25th Percentile	Median	75th Percentile
Core Plus Fixed Income	1.79%	0.91%	0.08%

Excess return is calculated versus universe-specific benchmark.
January 2001 represents the start of the first 3-year period.

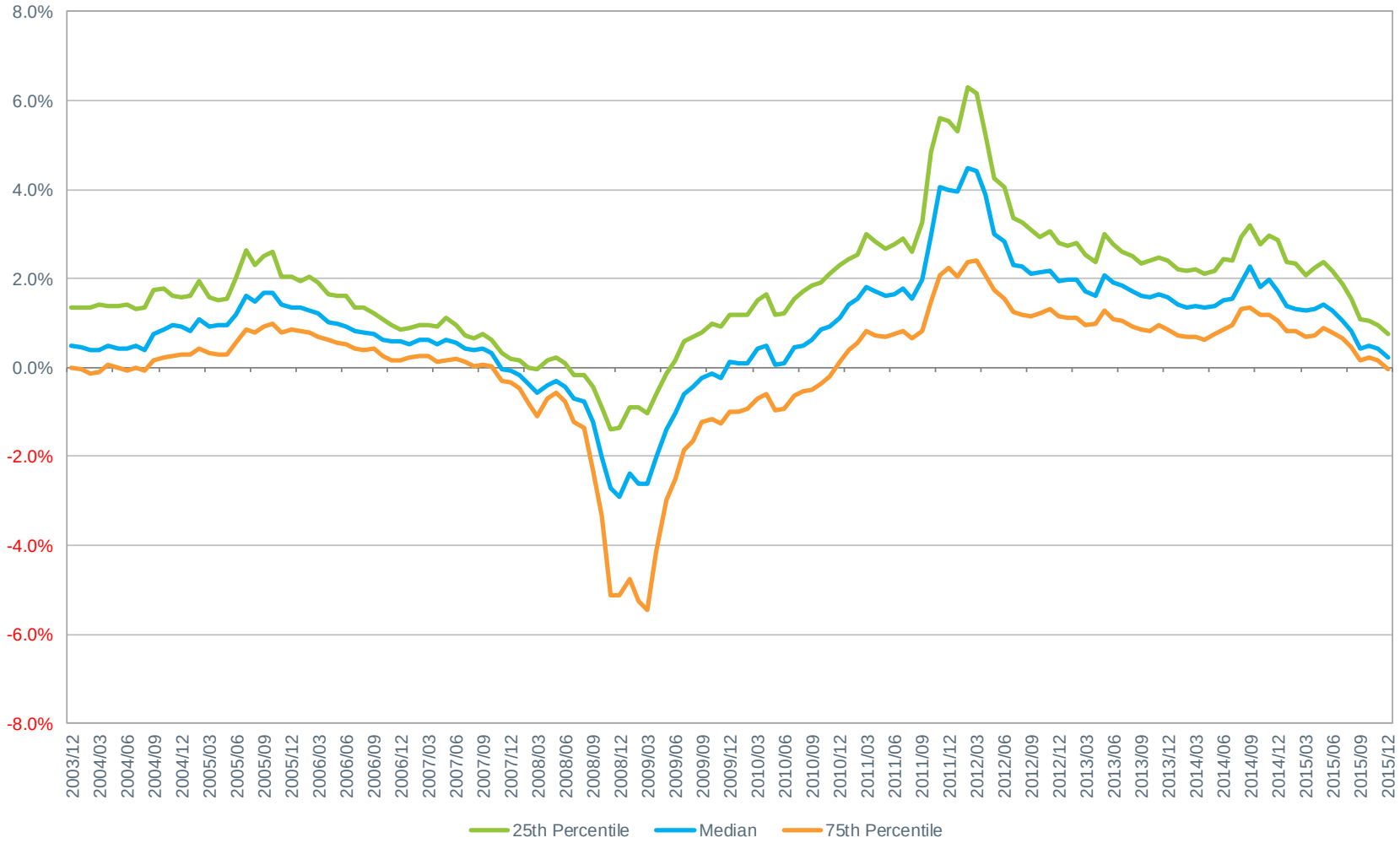
RVK

FIXED INCOME

Core Plus Fixed Income

Manager Excess Returns – Rolling 3-Year Periods (beginning January 2001)

Excess Returns are performed relative to the **BC Aggregate Bond Index**
Assumed Annual Management Fee **25.5 bps**
Peak Population: **135**



eVestment Alliance Manager Database Comparison

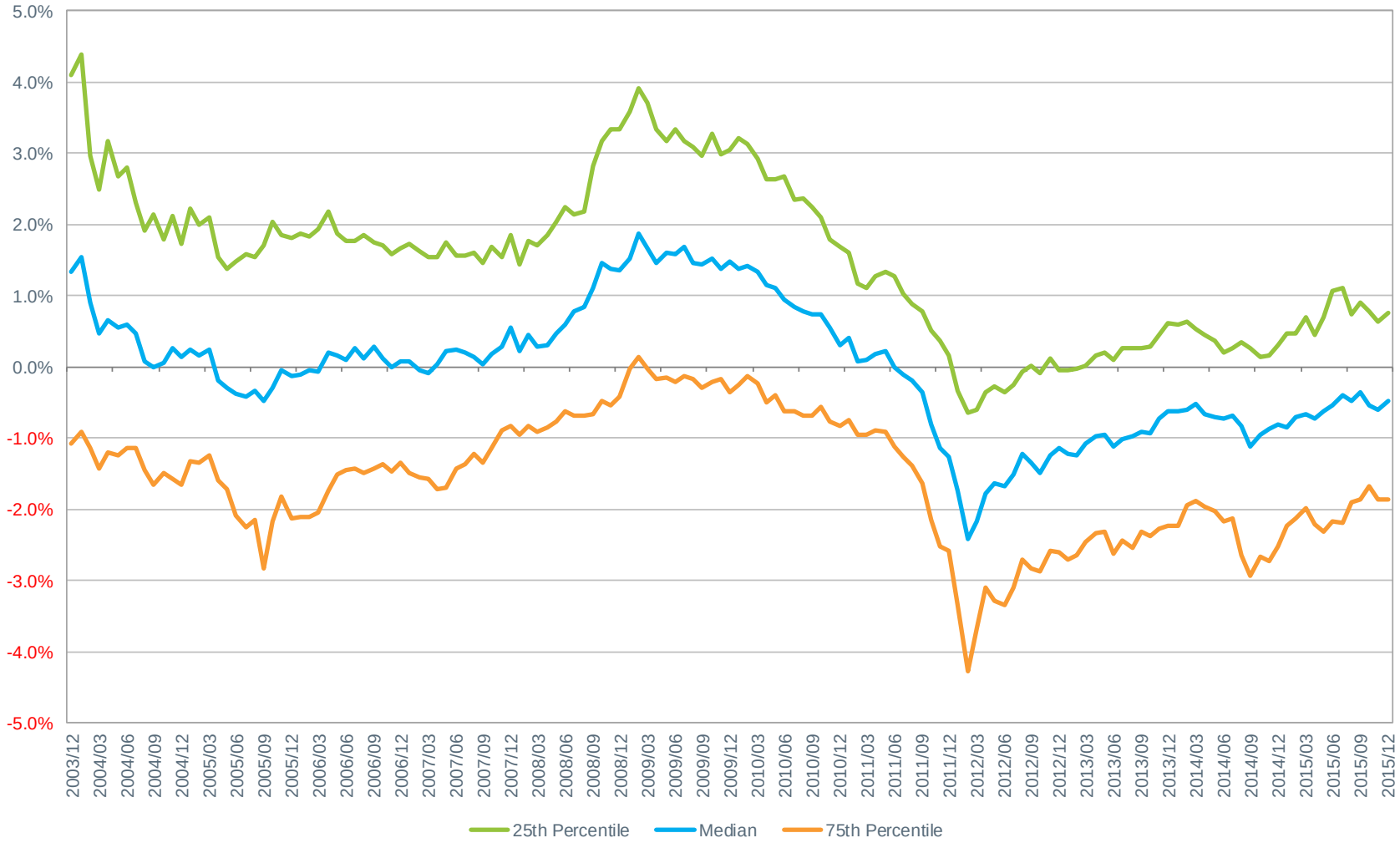
RVK

DOMESTIC EQUITY

US Large Cap Core Equity

Manager Excess Returns – Rolling 3-Year Periods (beginning January 2001)

Excess Returns are performed relative to the **Russell 1000 Index**
Assumed Annual Management Fee **41.5 bps**
Peak Population: **391**



eVestment Alliance Manager Database Comparison

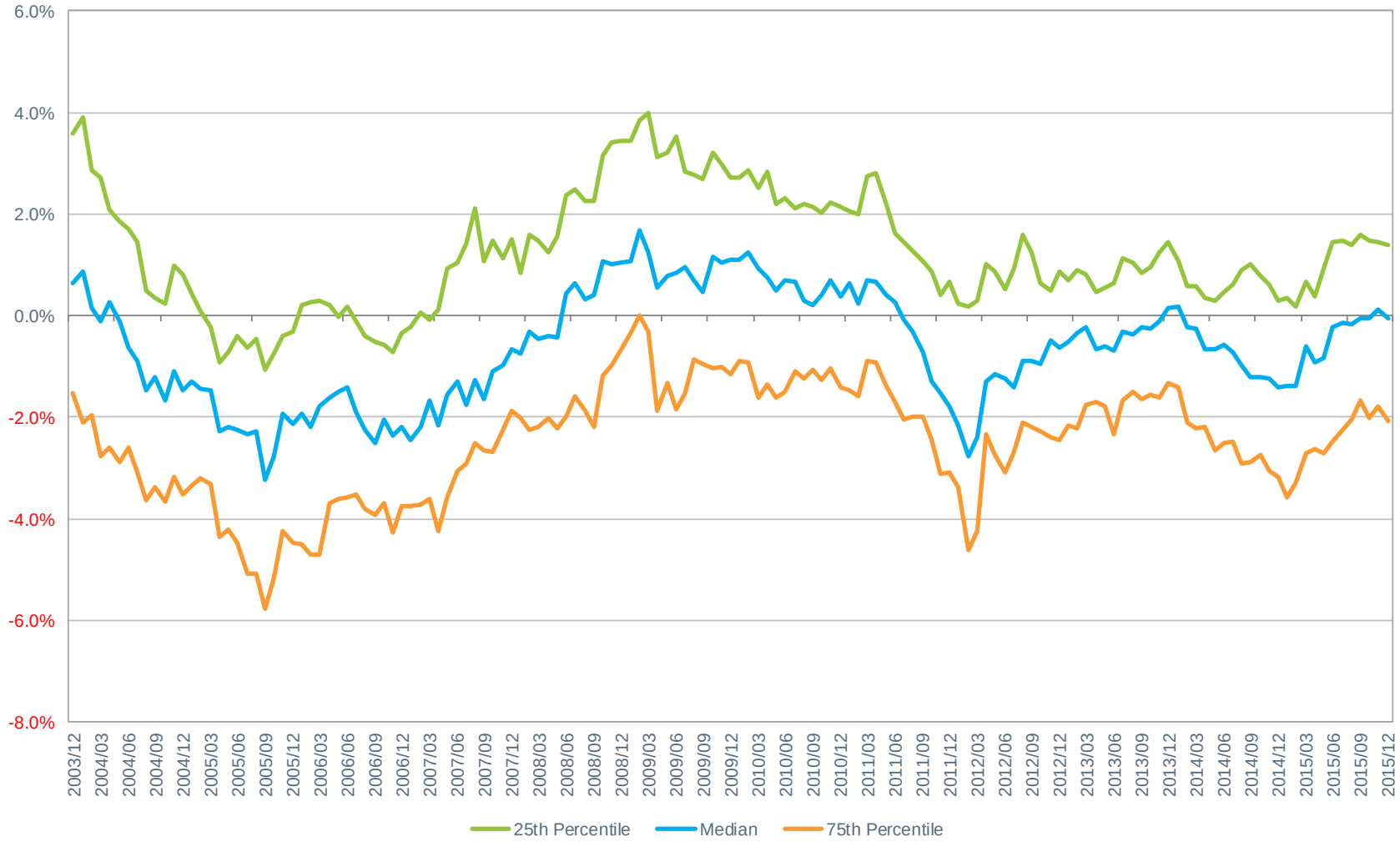
RVK

DOMESTIC EQUITY

US Mid Cap Core Equity

Manager Excess Returns – Rolling 3-Year Periods (beginning January 2001)

Excess Returns are performed relative to the **Russell Mid-Cap Index**
Assumed Annual Management Fee **59 bps**
Peak Population: **78**



eVestment Alliance Manager Database Comparison

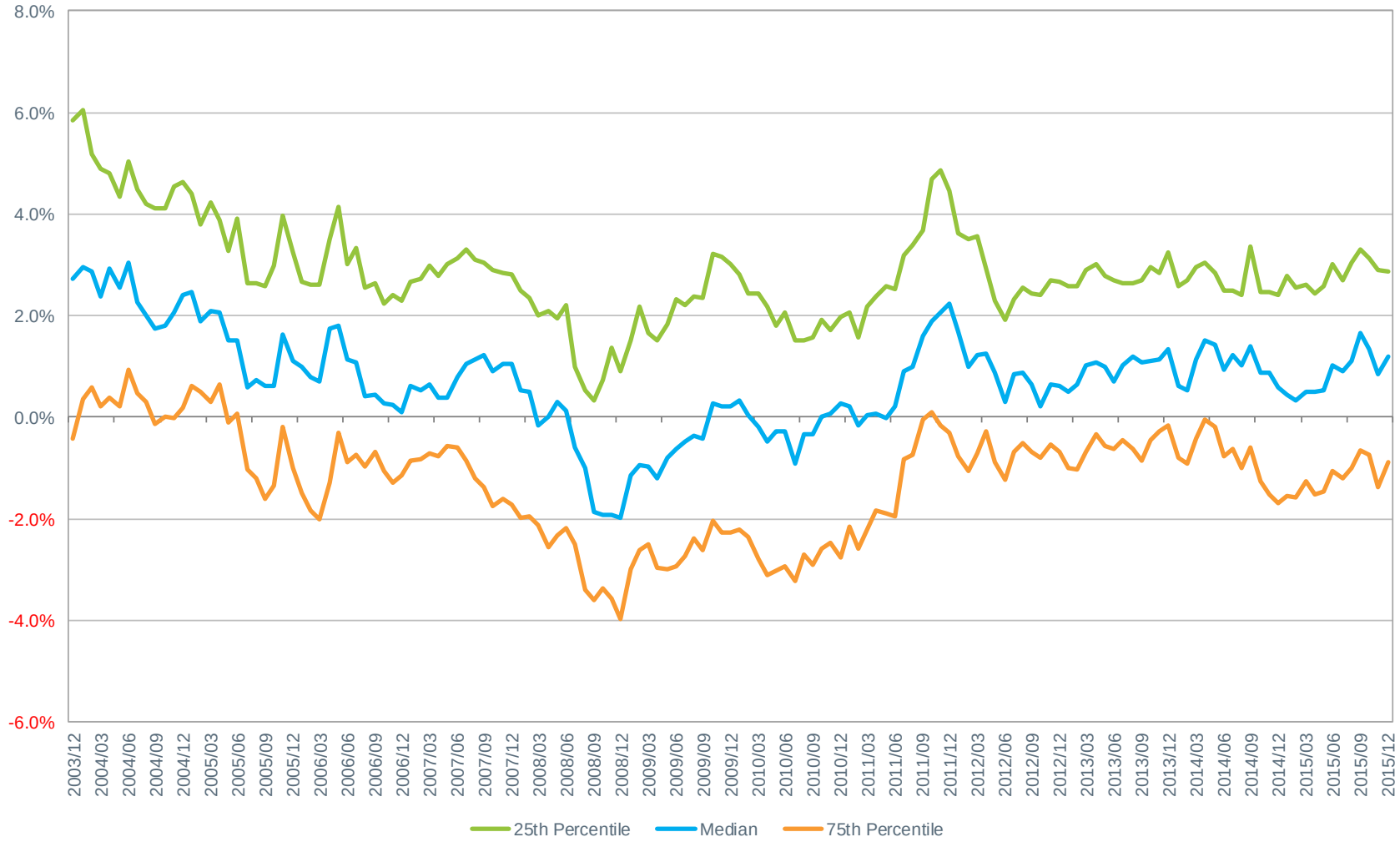
RVK

DOMESTIC EQUITY

US Small Cap Core Equity

Manager Excess Returns – Rolling 3-Year Periods (beginning January 2001)

Excess Returns are performed relative to the **Russell 2000 Index**
Assumed Annual Management Fee **74 bps**
Peak Population: **154**



eVestment Alliance Manager Database Comparison

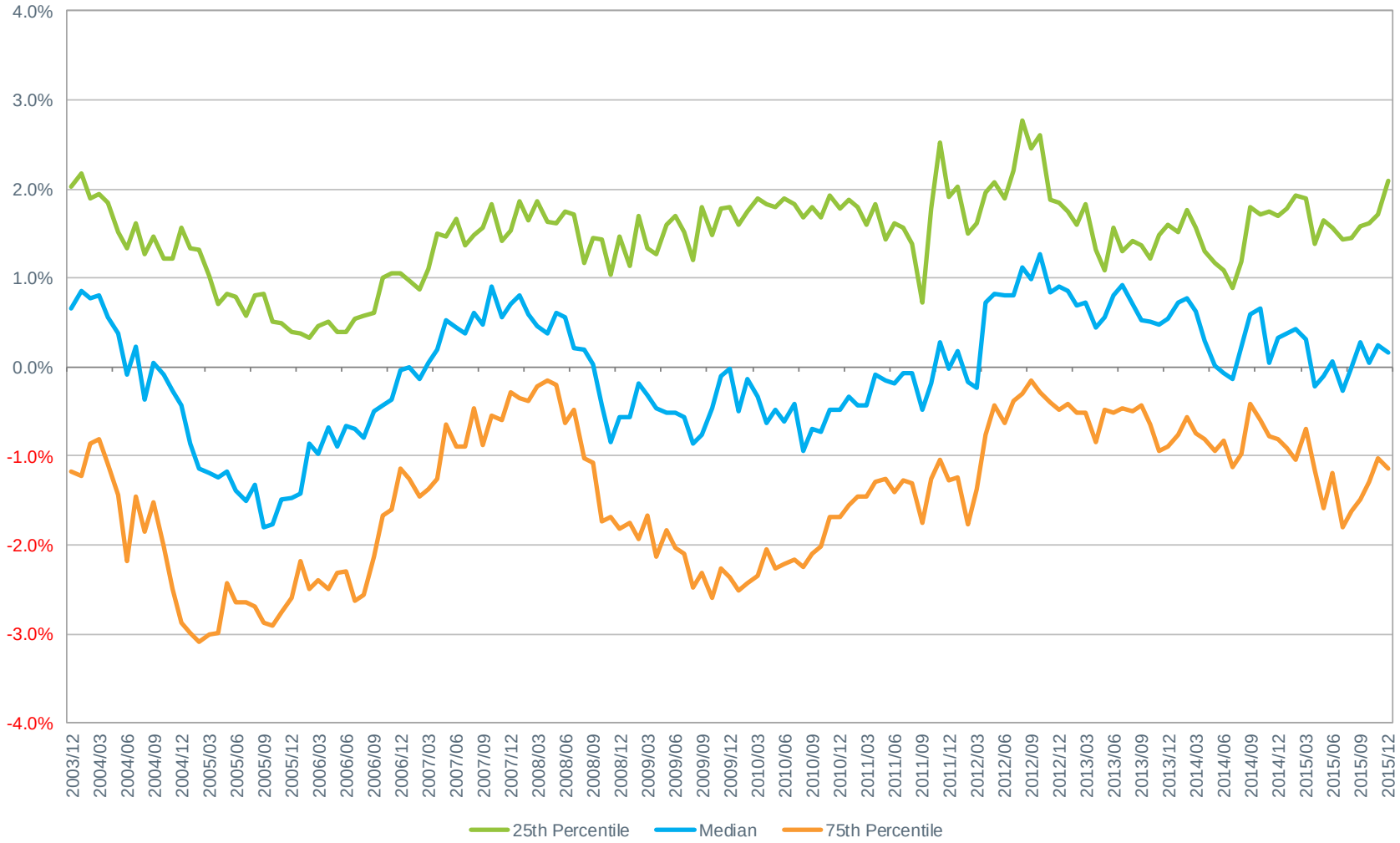
RVK

INTERNATIONAL EQUITY

Non-US Large Cap Core Equity

Manager Excess Returns – Rolling 3-Year Periods (beginning January 2001)

Excess Returns are performed relative to the **MSCI EAFE Index**
Assumed Annual Management Fee **50 bps**
Peak Population: **67**



eVestment Alliance Manager Database Comparison

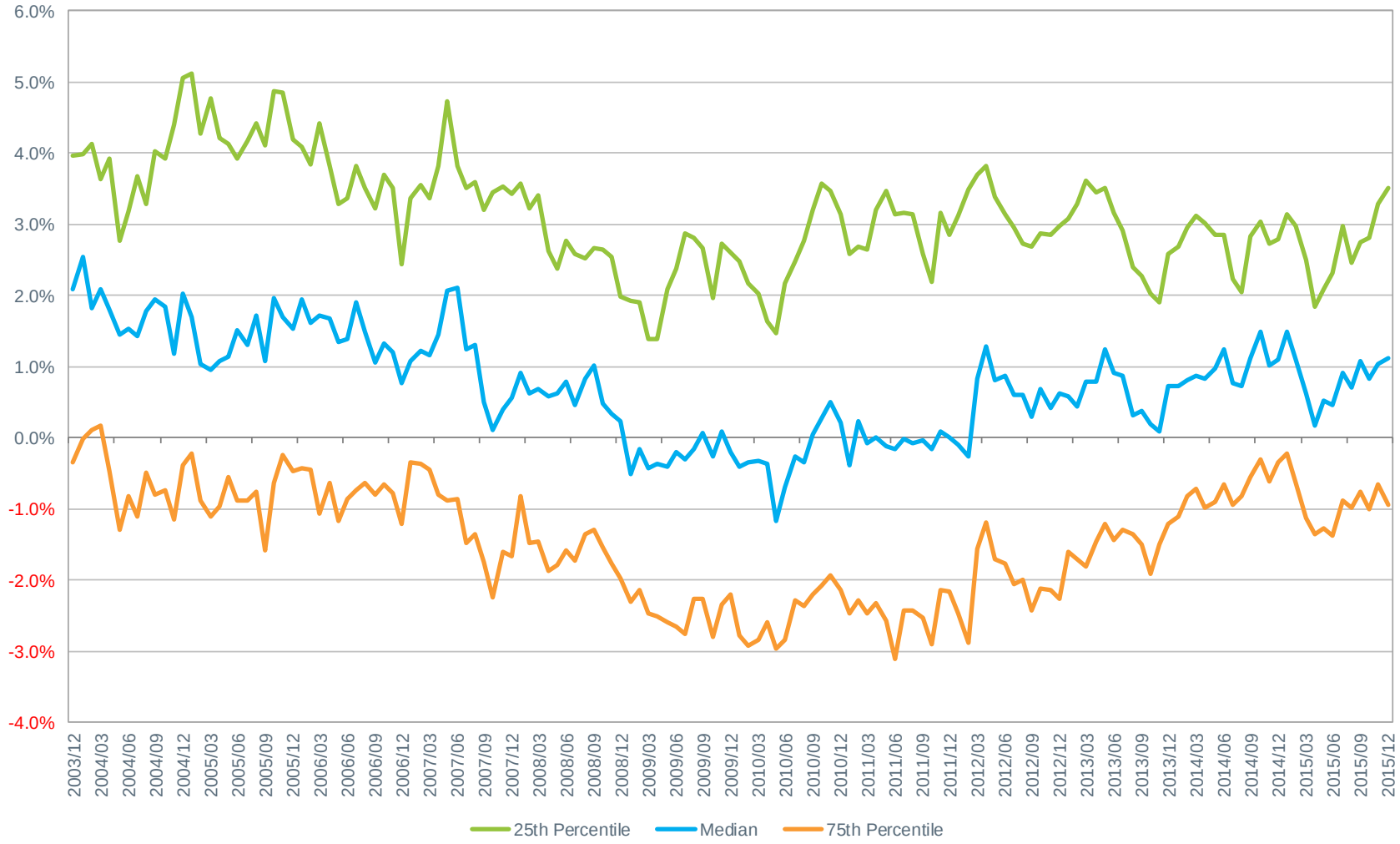
RVK

INTERNATIONAL EQUITY

Emerging Markets Equity

Manager Excess Returns – Rolling 3-Year Periods (beginning January 2001)

Excess Returns are performed relative to the **MSCI Emerging Markets Index**
Assumed Annual Management Fee **84 bps**
Peak Population: **224**



eVestment Alliance Manager Database Comparison

RVK

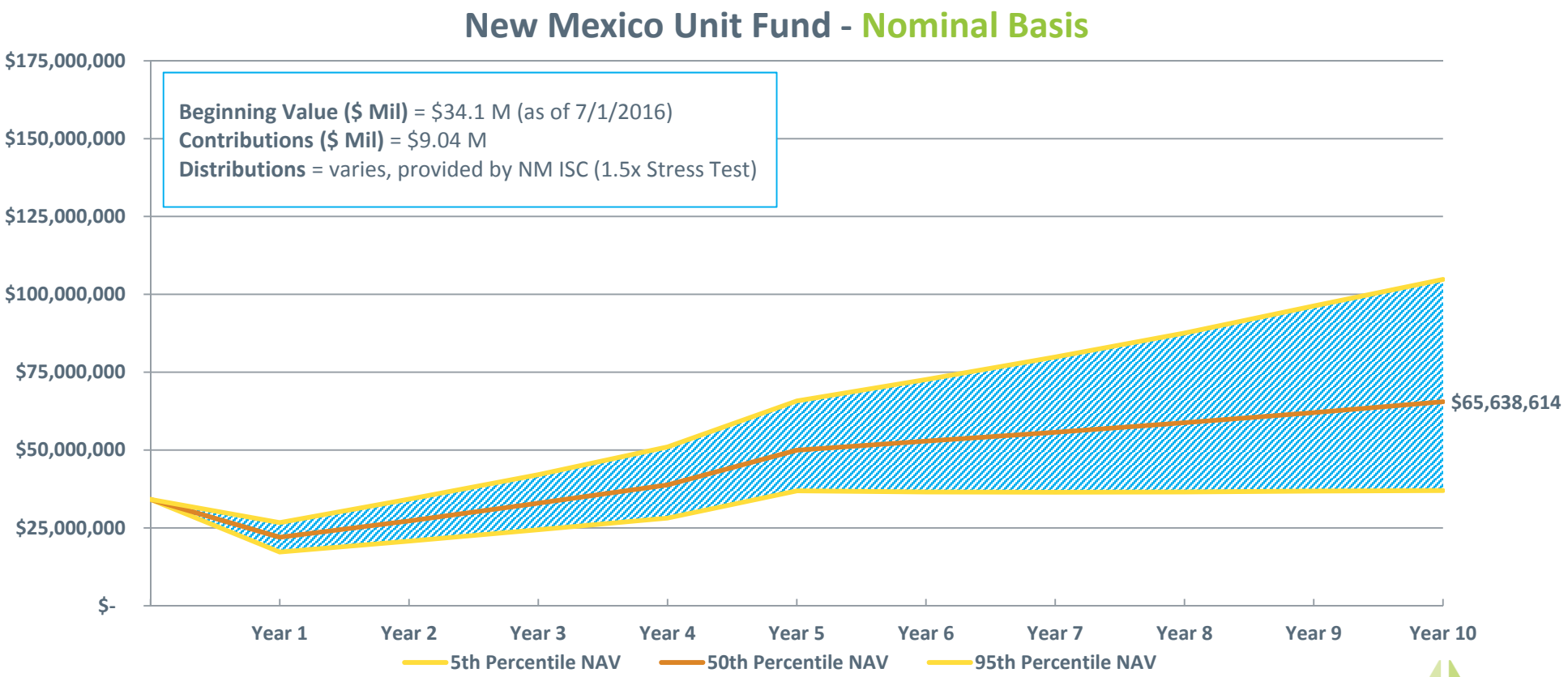
Appendix 3:
Supplemental Information

Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Stress Tested CFs 1.5x

55% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		
Estimated Costs (annual) – 1.5 times Stress Test	**-8.648**	**-22.725**	**-5.025**	**-5.025**	**-5.025**	**--**	**-46.448**
Estimated Costs (per month) **- 1.5 times Stress Test**	-0.721	-1.894	-0.419	-0.419	-0.419		



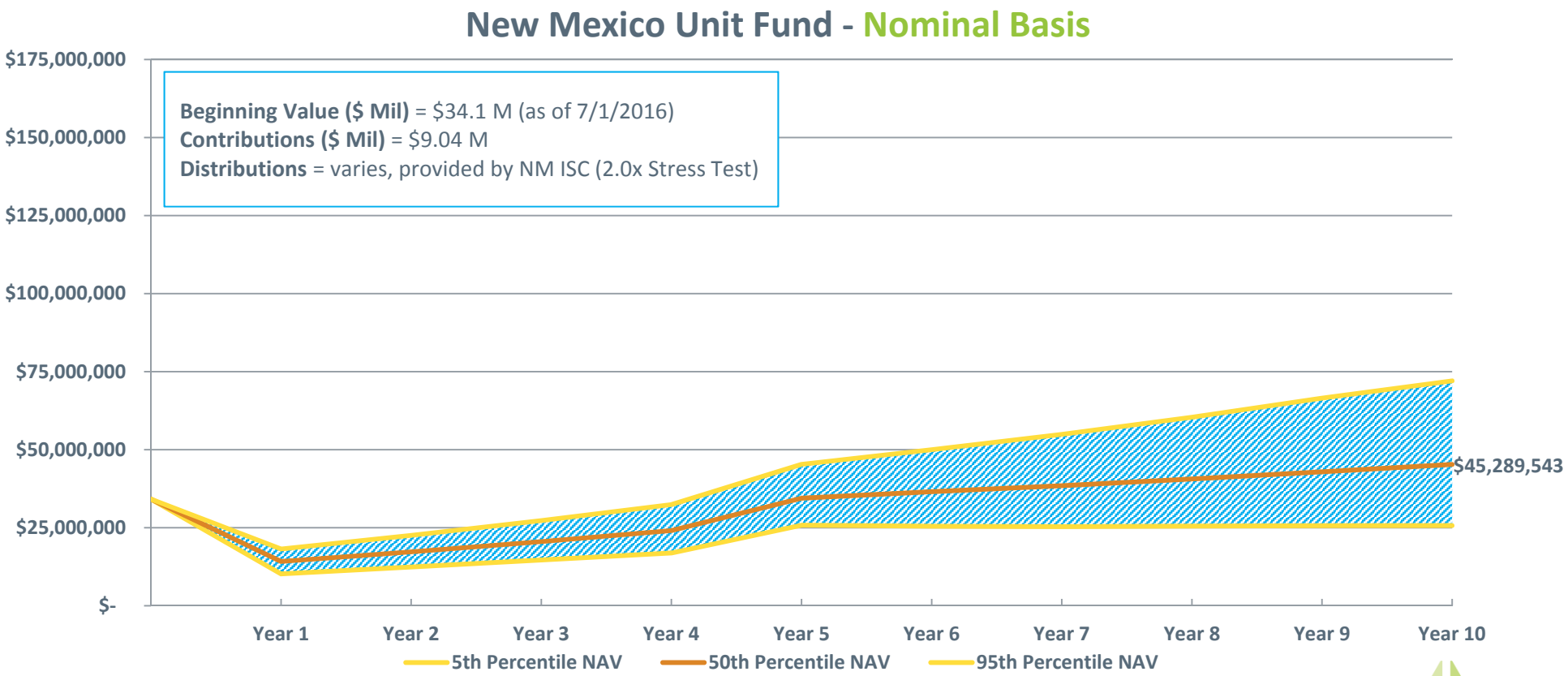
RVK

Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Stress Tested CFs 2.0x

55% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		
Estimated Costs (annual) – 2.0 times Stress Test	**-11.530**	**-30.300**	**-6.700**	**-6.700**	**-6.700**	**--**	**-61.930**
Estimated Costs (per month) **– 2.0 times Stress Test**	-0.961	-2.525	-0.558	-0.558	-0.558		

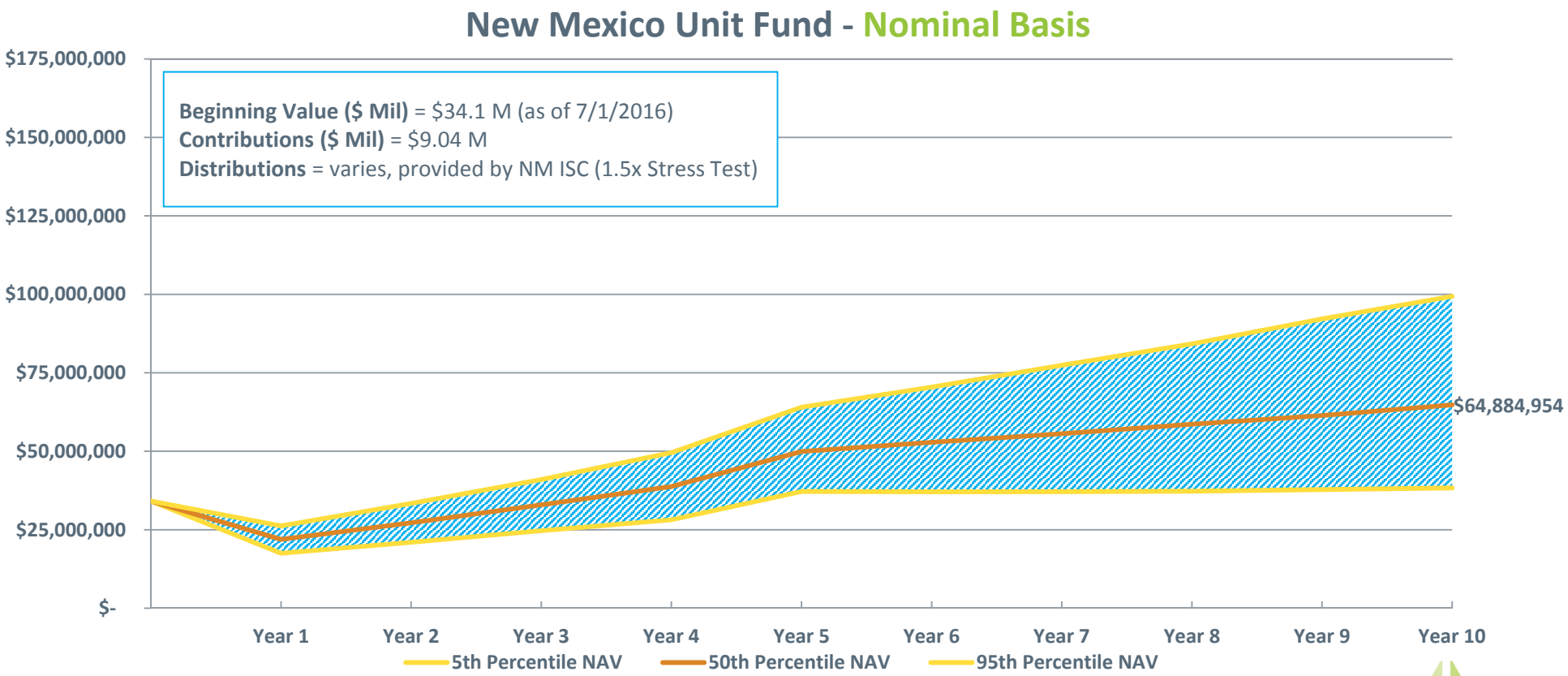


Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Stress Tested CFs 1.5x

50% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		
Estimated Costs (annual) – 1.5 times Stress Test	**-8.648**	**-22.725**	**-5.025**	**-5.025**	**-5.025**	**--**	**-46.448**
Estimated Costs (per month) **- 1.5 times Stress Test**	-0.721	-1.894	-0.419	-0.419	-0.419		



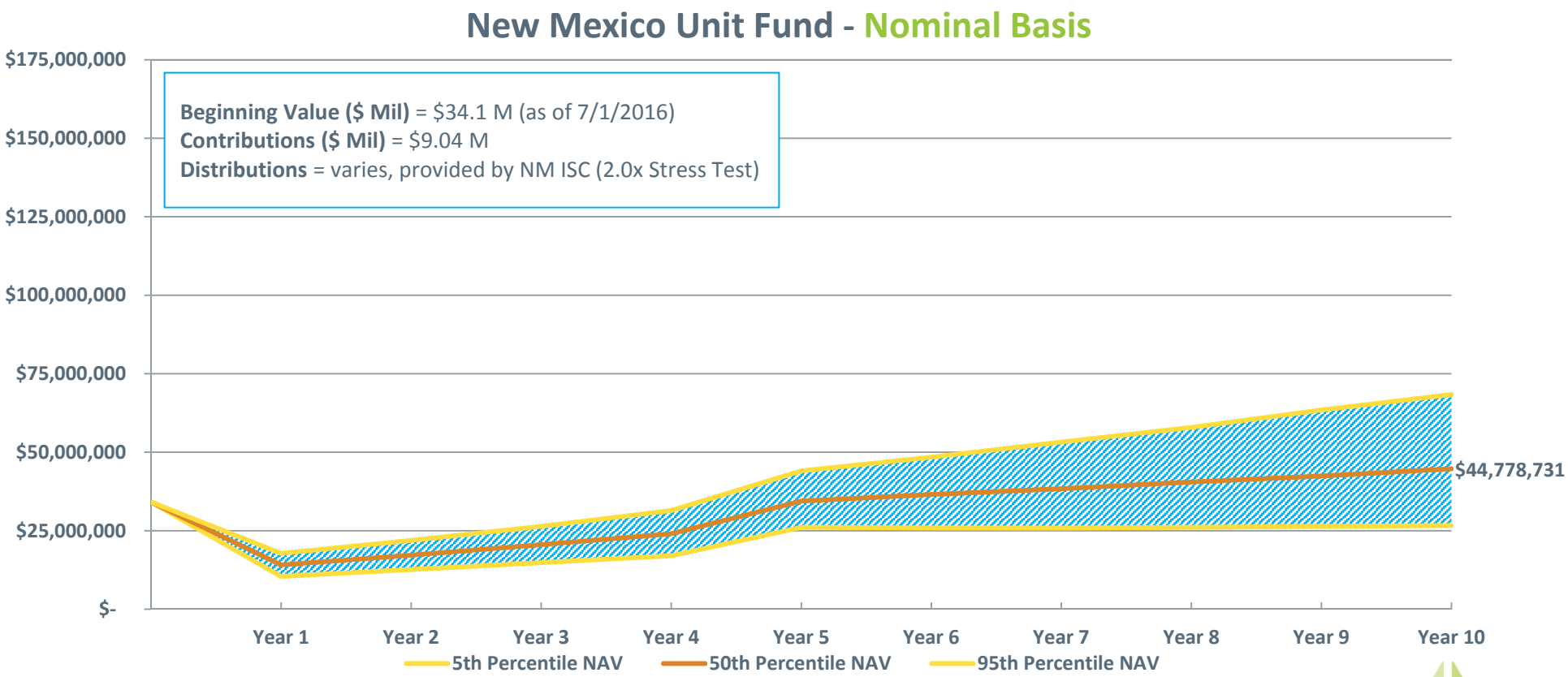
RVK

Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Stress Tested CFs 2.0x

50% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		
Estimated Costs (annual) – 2.0 times Stress Test	**-11.53**	**-30.300**	**-6.700**	**-6.700**	**-6.700**	**--**	**-61.930**
Estimated Costs (per month) **– 2.0 times Stress Test**	-0.961	-2.525	-0.558	-0.558	-0.558		



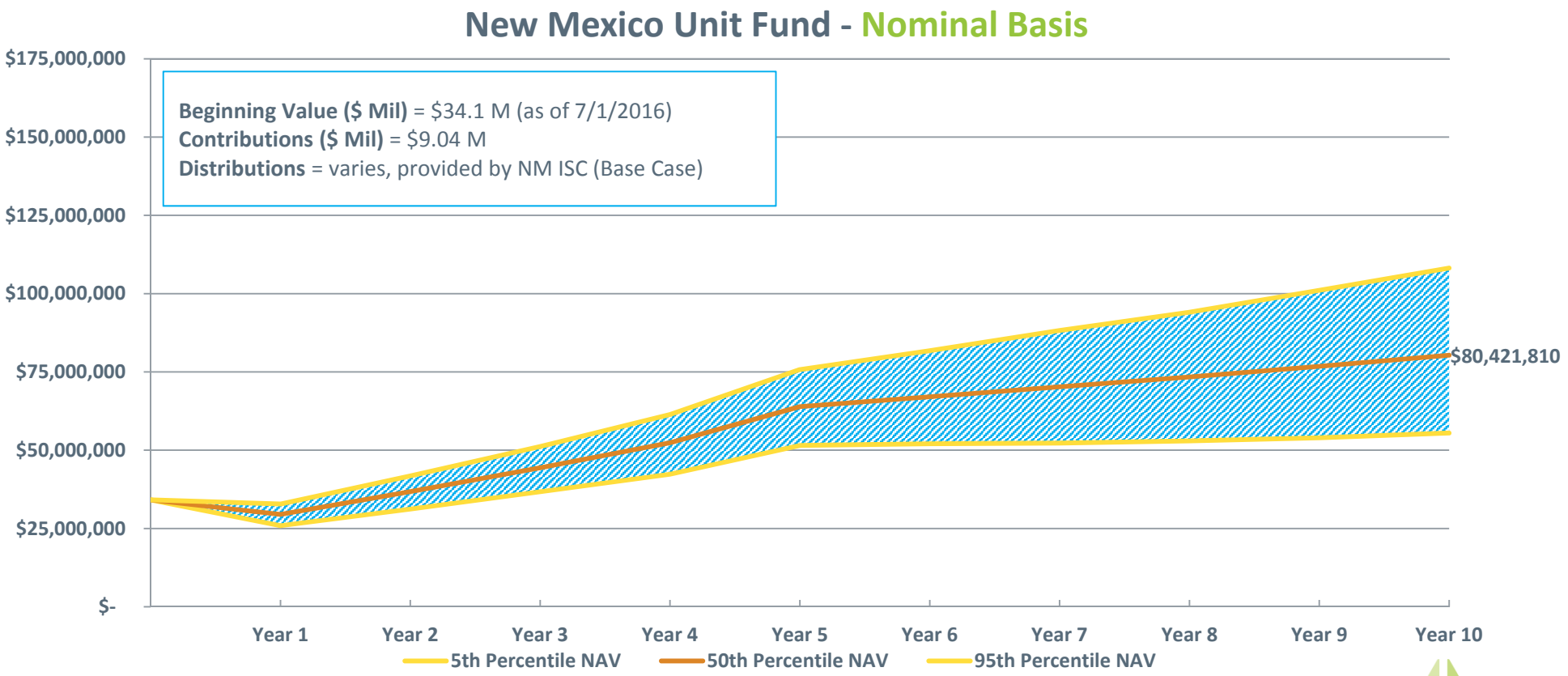
RVK

Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Base Case

30% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		



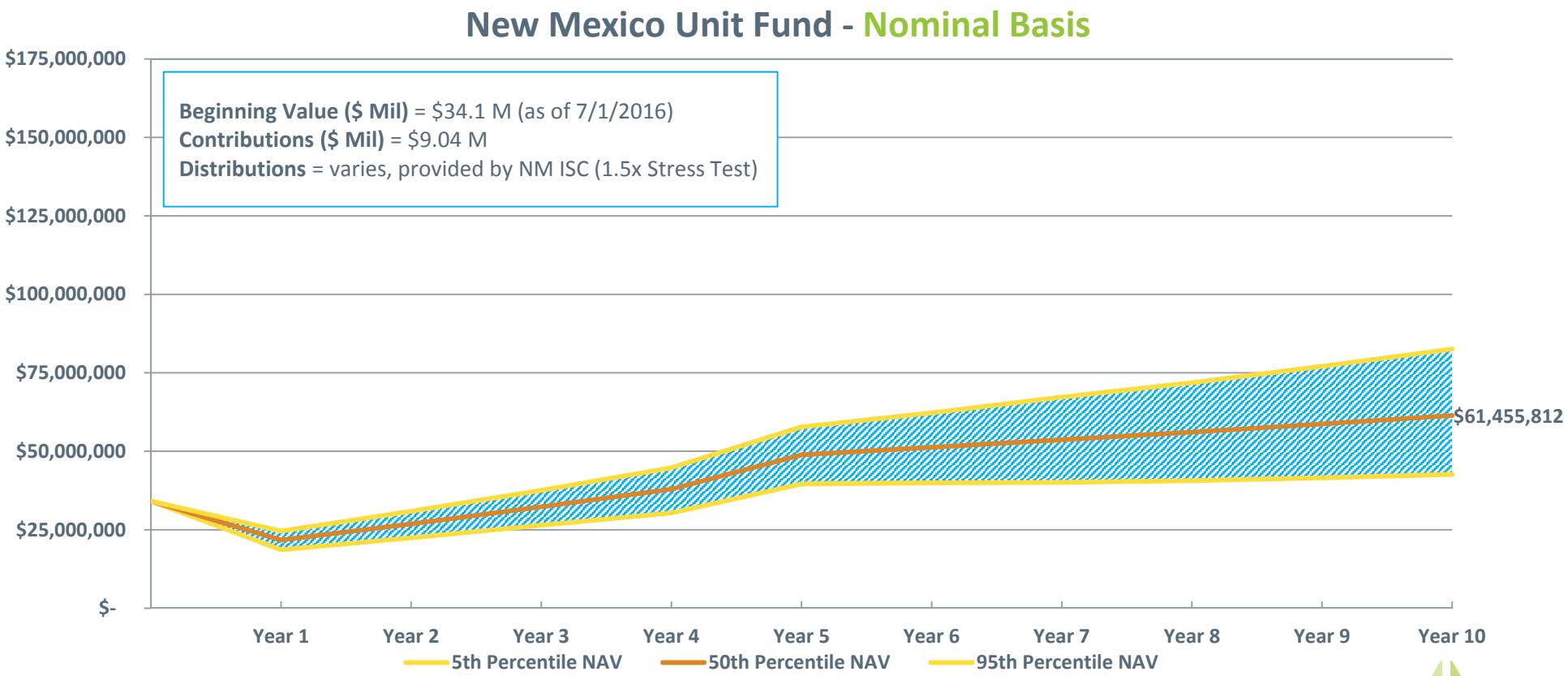
RVK

Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Stress Tested CFs 1.5x

30% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		
Estimated Costs (annual) – 1.5 times Stress Test	**-8.648**	**-22.725**	**-5.025**	**-5.025**	**-5.025**	**--**	**-46.448**
Estimated Costs (per month) **- 1.5 times Stress Test**	-0.721	-1.894	-0.419	-0.419	-0.419		



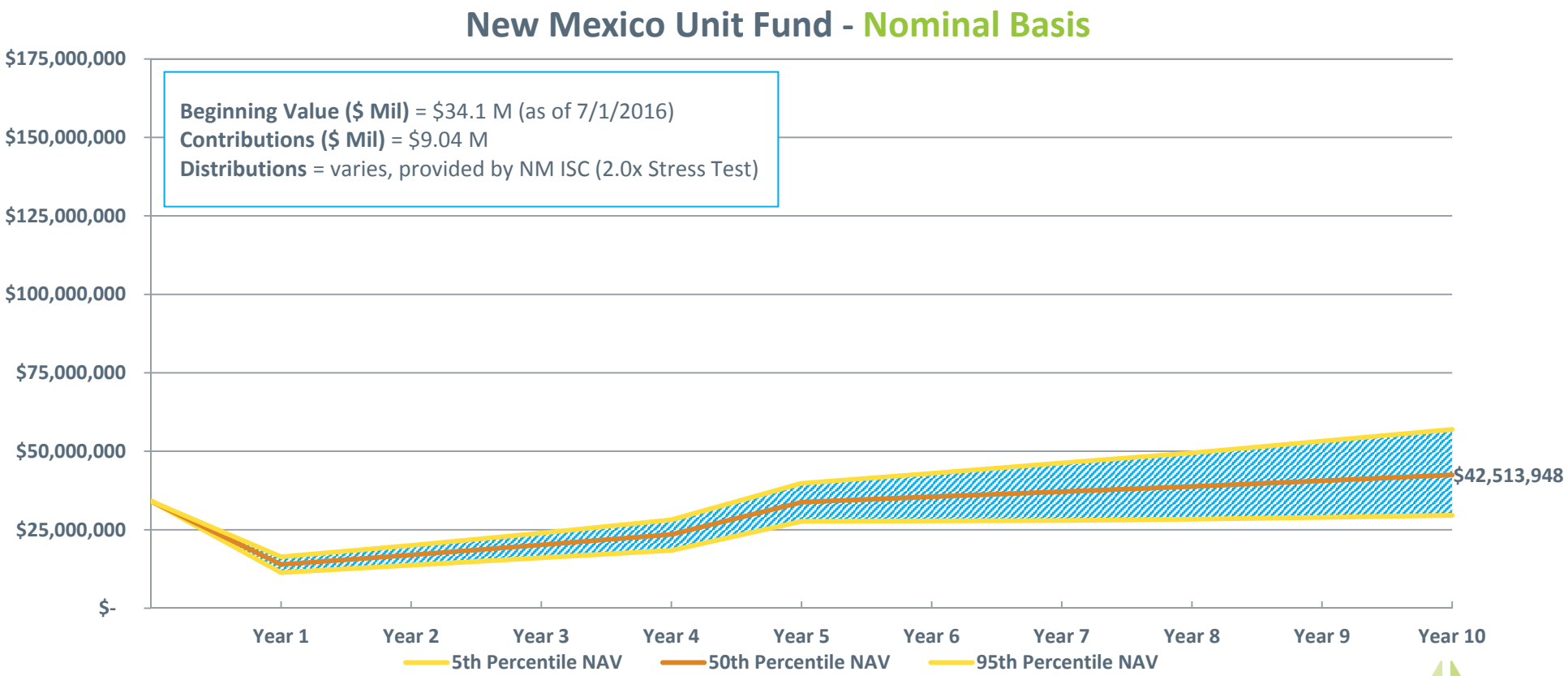
RVK

Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Stress Tested CFs 2.0x

30% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		
Estimated Costs (annual) – 2.0 times Stress Test	**-11.530**	**-30.300**	**-6.700**	**-6.700**	**-6.700**	**--**	**-61.930**
Estimated Costs (per month) **– 2.0 times Stress Test**	-0.961	-2.525	-0.558	-0.558	-0.558		



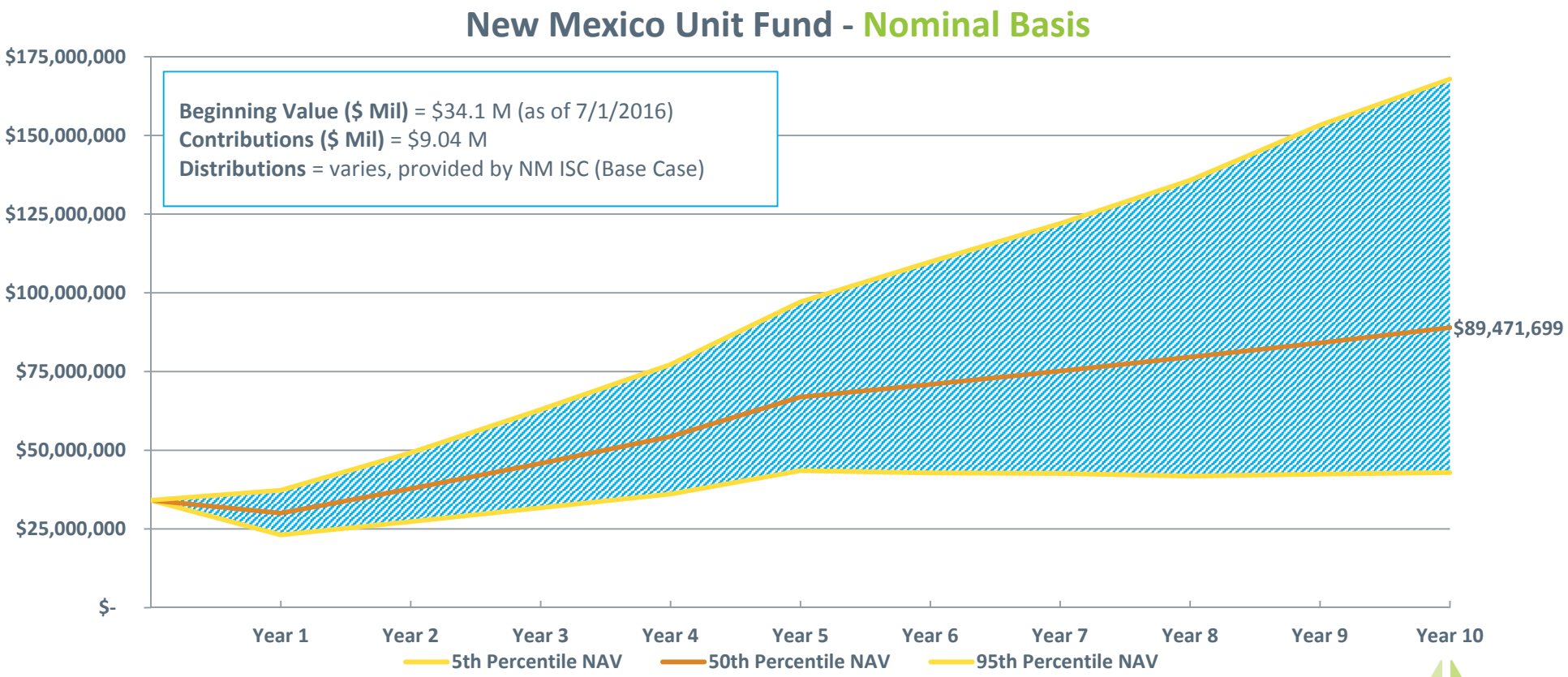
RVK

Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Base Case

75% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		



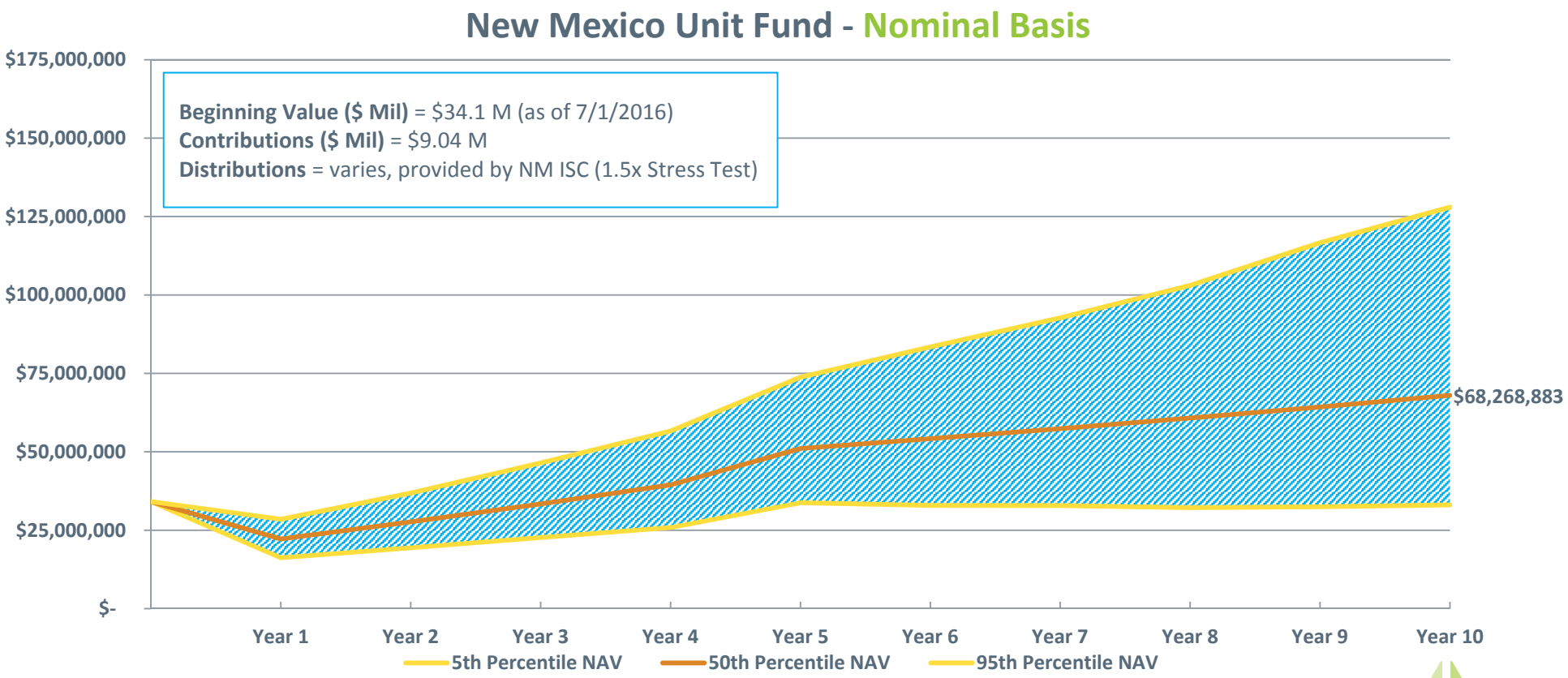
RVK

Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Stress Tested CFs 1.5x

75% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		
Estimated Costs (annual) – 1.5 times Stress Test	**-8.648**	**-22.725**	**-5.025**	**-5.025**	**-5.025**	**--**	**-46.448**
Estimated Costs (per month) **- 1.5 times Stress Test**	-0.721	-1.894	-0.419	-0.419	-0.419		



RVK

Cash Flow Analysis

New Mexico Unit Fund - Nominal Basis – Stress Tested CFs 2.0x

75% Equity Portfolio from Frontier #2

(in $ millions)	FY 16	FY17	FY18	FY19	FY20	FY21	TOTAL
Estimated Costs (annual)	**-5.765**	**-15.150**	**-3.350**	**-3.350**	**-3.350**	**--**	**-30.965**
Estimated Costs (per month)	-0.480	-1.263	-0.279	-0.279	-0.279		
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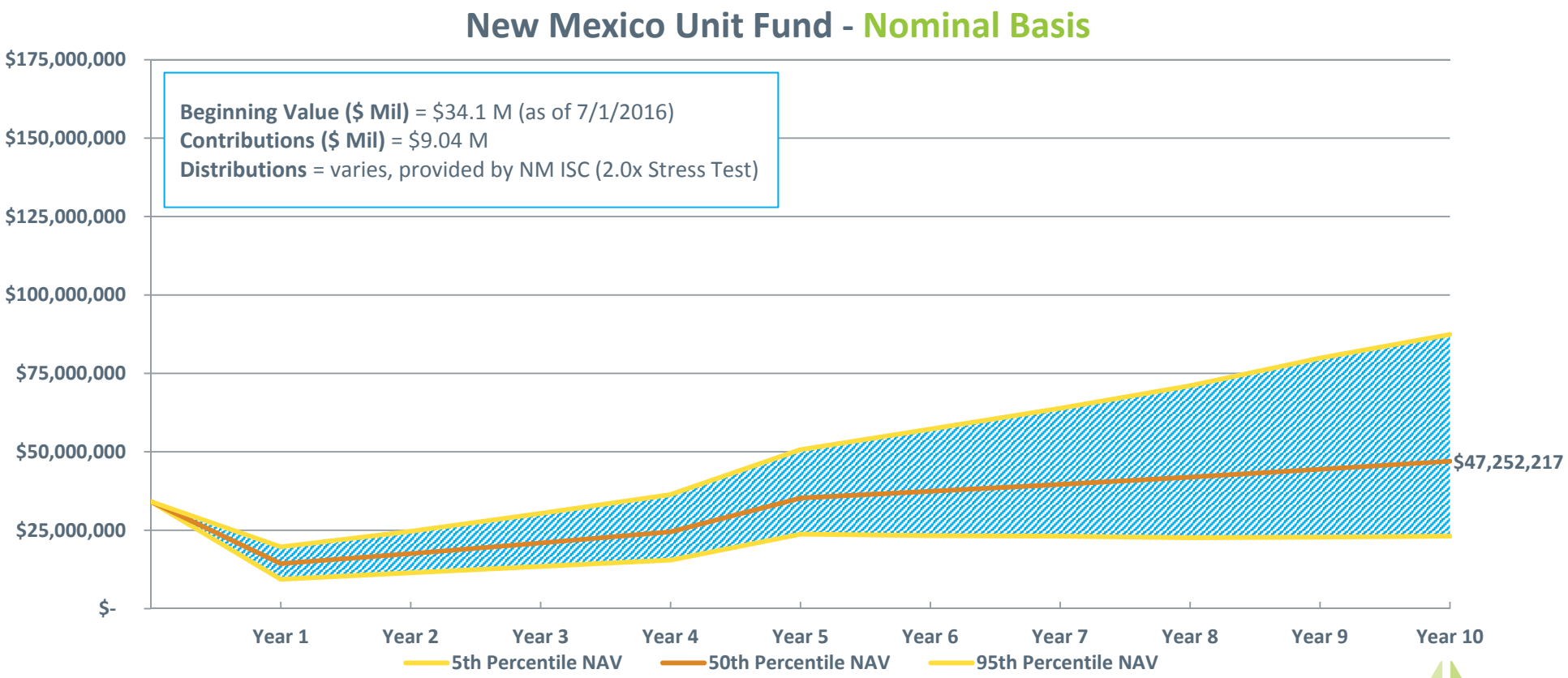
Estimated Costs (per month) **– 2.0 times Stress Test**	-0.961	-2.525	-0.558	-0.558	-0.558		



RVK

RVK Team

Marcia Beard – Senior Consultant, Principal
Project Role: Senior Advisor

Marcia Beard is a Senior Consultant with RVK and is located in our Portland office. She joined the firm in 1996 and has more than 30 years of experience in investment consulting and asset management industry. In addition to her consulting responsibilities, Marcia serves as Chair of the firm's monthly consultant meetings.

As a Consultant, Marcia has extensive experience working with corporations, government entities, and endowments and foundations. Marcia's experience includes developing investment policy statements, formulating asset allocations, developing and implementing asset class manager structure, conducting manager searches, performance attribution and monitoring, and ongoing investment manager due diligence.

Prior to joining RVK, Marcia was a Vice President and Team Leader for U.S. Bank of Oregon's Corporate Asset Management Team. Earlier in her career, Marcia was an Assistant Vice President at Oregon Bank and worked for U.S. National Bank of Danville, Illinois. Marcia graduated cum laude from the University of Illinois, earning a Bachelor of Science degree in Agriculture Economics. Marcia is a shareholder of the firm and also serves on the company's Board of Directors.

Matthias Bauer, CFA – Consultant
Project Role: Team Lead

Matthias joined RVK in 2007 and serves as a Consultant in our Portland office. In his role he actively consults to and leads teams for the firm's two largest State permanent funds. Matthias has executed and presented complex financial modeling—including ones similar to the initiative presented here—in a clear and comprehensible manner to Board and Council members as well the public with a wide-ranging level of understanding for financial concepts.

In addition to his consulting relationships, he is involved in the firm's capital market assumptions process, serves as a key member of RVK's Asset/Liability Team which is responsible for highly customized studies that include deterministic, stochastic and sensitivity analyses as well as the firm's Custom Target Retirement Date Funds research efforts.

Matthias earned a Bachelor of Arts degree in Finance from Portland State University and holds the Chartered Financial Analyst designation. He is a member of the CFA Institute and a member of the CFA Society of Portland.

RVK Team

Cole Bixenman – Investment Associate
Project Role: Team Support

Cole is an Investment Associate with RVK and is located in our Portland office. He works closely with consulting teams on a variety of projects including asset allocation studies, manager structure analysis, managing transition and rebalancing of client portfolios, and client education presentations. Cole is also involved in the firm's capital market assumptions process. He has experience working with a diverse client base including several public pensions, corporate pensions, endowments, foundations, insurance reserves, and defined contribution plans.

He joined RVK in 2011 as an Investment Manager Research Intern in June 2011 and was hired as an Investment Analyst following his internship. In 2013, Cole was promoted to Senior Investment Analyst and Team Leader. He was promoted to Investment Associate in 2014. Cole graduated from Linfield College with a Bachelor of Science degree in Finance, with a minor in Economics. He graduated with Cum Laude honors in 2011. Cole was born and raised in Federal Way, WA.

Scope of Work

Investment Advice for the New Mexico Unit Fund

Purpose: The purpose of this work order is to provide investment advice and recommendations to the New Mexico Interstate Stream Commission for investment of a portion of the New Mexico Unit Fund by the New Mexico State Investment Council.

Task	Description	Deliverables
1	Project management and invoicing.	Telephone calls or teleconferences as needed.
2	Provide general investment consulting services covering assets, strategies, investment issues, data needs and educational needs of the Commission and staff.	Teleconferences and in-person meetings, as necessary. Presentations to legislative bodies and/or committees on topics selected by the Interstate Stream Commission or staff, upon request.
3	Conduct cash-flow analysis of the New Mexico Unit Fund in cooperation with the ISC staff.	Cash-flow statement
4	Provide advice, and prepare an investment plan for submittal to the New Mexico State Investment Council ("SIC"), all in accordance with SIC policies.	Investment plan that addresses, at a minimum, the following: • Investment objectives • Portfolio asset and risk allocation to recommended asset classes • Asset class rebalancing policies • Other and related topics In-person presentation and recommendation to the Interstate Stream Commission.
5	Assist in the implementation of the adopted investment plan. Review performance, and recommend re-allocation of assets, as necessary.	Teleconferences and in-person meetings, as necessary. Written recommendations for re-allocation of assets.

RVK

Rebalancing

Asset Class Rebalancing Policy

The Agency, on an ongoing basis and in accordance with market fluctuations, shall ensure that the investment portfolio is rebalanced so it remains within the range of targeted allocations set forth in Schedule I (*to be determined once asset allocation is selected*).

The Agency desires a disciplined rebalancing program that avoids any temptation to "time the market." The Agency also desire a rebalancing program that minimizes unnecessary trading costs. As such, the following general rebalancing procedures shall be applied:

1. At any time that an asset class falls outside of the ranges detailed in Schedule I (*to be determined once asset allocation is selected*), it shall be rebalanced back to its target allocation. Quarterly reports shall be provided as a basis for this.
2. Proceeds from rebalancing shall be allocated to asset classes that are below their Policy target levels in a manner that brings the other categories as close to target as possible (asset classes that are most underweight should receive greater proportion, etc.).
3. Cash flows shall be used to the extent possible to aid in rebalancing the assets.

RVK

Additional Information

Definition of Terms

- **Asset Allocation** is a systematic analysis of the properties of specified asset classes to determine the allocation of those assets that meet the return targets of a portfolio.
- **Correlation** is a statistical measure of the relationship between asset class returns. A value of 1.00 is a perfect correlation; that is, the asset classes always move in the same direction. A value of –1.00 indicates a perfect negative correlation, in which the asset classes always move in opposite directions of each other. A value of 0 indicates there is no relationship between the direction of returns of the two asset classes. Correlation calculations only consider the direction of changes relative to two variables and not the magnitude of those changes.
- The **Efficient Frontier** is the set of portfolios that minimizes risk at given target levels of return. This process takes into account the risk, return and correlation of the asset classes to arrive at the most efficient set of portfolios.
- **Expected Equity Beta** is a measure of the sensitivity of a portfolio to movements in the Large Cap US Equity market. It is a measure of a portfolio's non-diversifiable or systematic risk.
- **Performance Expectation** is the best estimate of the average annual percentage increase in the value of an asset class over the next ten years.
- **Risk** is quantified by the standard deviation of returns. Also known as the volatility of returns, it provides a statistical range of performance relative to the average expectations. With this measure, we can establish a level of "confidence" about the expected range of returns for the portfolios.
- **RVK Liquidity Metric** is a qualitative method for determining the relative amount of liquidity in a portfolio. The characteristics considered when determining relative liquidity include trading volume, gates for redemption, leverage, nature of transactions, and pricing mechanisms. The RVK Liquidity Metric is calculated using investment weights applied to each corresponding asset class liquidity rating. See next page for more details.
- **Thematic Classification** - Represents dedicated manager allocations; as such, thematic allocations are approximations. RVK categorizes asset classes as Alpha, Capital Appreciation, Capital Preservation, and Inflation as displayed in the table on the next page.

RVK Liquidity Metric

Asset Class	Thematic Bucket	Liquidity Bucket	RVK Liquidity Metric
Large Cap US Equity	Capital Appreciation	Liquid	95
Small/Mid Cap US Equity	Capital Appreciation	Liquid	85
Non-US Developed Equity	Capital Appreciation	Liquid	90
Emerging Markets Equity	Capital Appreciation	Liquid	85
Fixed Income	Capital Preservation	Liquid	85

Appendix 4:

2016 RVK Capital Market Assumptions White Paper

2016 CAPITAL MARKETS ASSUMPTIONS

RVK, Inc. (“RVK”) Asset Allocation – Capital Markets Assumptions

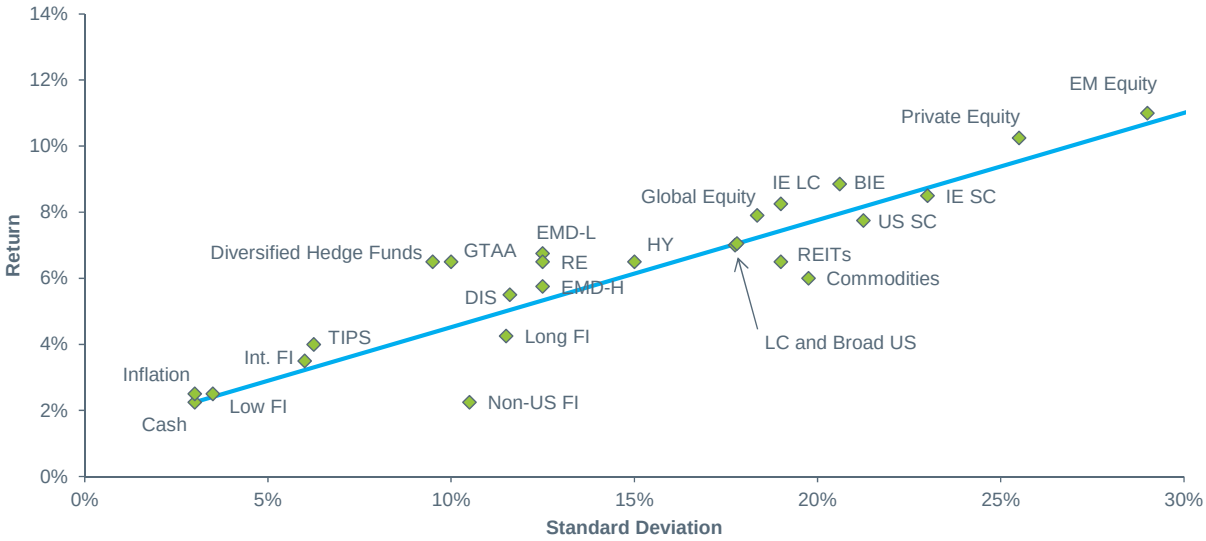
This white paper serves as a guide to help clients understand the methodology RVK used to develop our 2016 capital markets assumptions. Asset allocation is the single most important decision our clients make, and asset allocation modeling outputs are highly dependent upon the asset class assumption inputs. Therefore, RVK created the following long-term forward-looking expected asset class assumptions through a rigorous multi-step process, which involves detailed research and employs firm wide resources.

This white paper first walks through our expectations for inflation and is followed by detailed analysis of the major asset classes utilized by our clients. Our forward-looking, long-term return and risk assumptions as of December 31, 2015 are listed below in **Figure 1** followed by our capital markets line on the next page.

Figure 1: 2016 Asset Class Return and Risk Assumptions

Asset Class	Return (Nominal Arithmetic)	Risk (Standard Deviation)
Cash and Inflation		
US Inflation	2.50%	3.00%
Cash Equivalents	2.25%	3.00%
Fixed Income		
Intermediate Duration Fixed Income	3.50%	6.00%
Non-US Dev’d Sovereign FI (UH)	2.25%	10.50%
TIPS	4.00%	6.25%
Low Duration Fixed Income	2.50%	3.50%
Long Duration Fixed Income	4.25%	11.50%
High Yield	6.50%	15.00%
Emerging Markets Debt (Hard)	5.75%	12.50%
Emerging Markets Debt (Local)	6.75%	12.50%
US Equity		
Large/Mid Cap US Equity	7.00%	17.75%
Small Cap US Equity	7.75%	21.25%
Broad US Equity	7.05%	17.80%
International Equity (Non-US)		
Dev'd Large/Mid Cap Int'l Equity	8.25%	19.00%
Dev'd Small Cap Int'l Equity	8.50%	23.00%
Emerging Markets Equity	11.00%	29.00%
Broad International Equity	8.85%	20.60%
Global Equity	7.90%	18.35%
Real Estate		
Core Real Estate	6.50%	12.50%
Global REITs	6.50%	19.00%
Master Limited Partnerships	9.00%	22.00%
Alternative Strategies		
Diversified Hedge Funds	6.50%	9.50%
GTAA	6.50%	10.00%
Private Equity	10.25%	25.50%
Commodities	6.00%	19.75%
Diversified Inflation Strategies	5.50%	11.60%

Figure 2: 2016 RVK Capital Markets Line



US INFLATION AND CASH EQUIVALENTS

Figure 3: Inflation and Cash Equivalents Assumptions

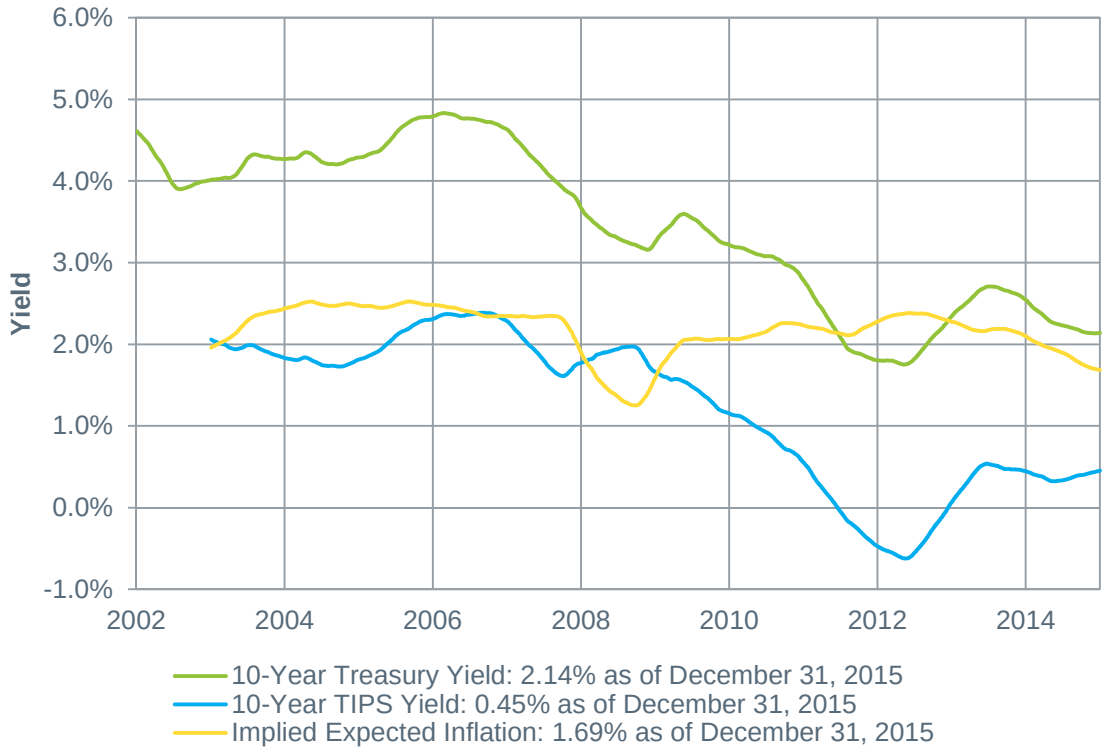
Asset Class	2015			2016			One Year Adjustment		
	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %
US Inflation	2.50	3.00	2.46	2.50	3.00	2.46	0.00	0.00	0.00
Cash Equivalents	2.25	3.00	2.21	2.25	3.00	2.21	0.00	0.00	0.00

US Inflation

Understanding inflation is fundamental to providing investors with a gauge of the expected real returns on their investments (i.e., the return after the erosion of purchasing power). Below we discuss various approaches to gauge future inflation expectations.

A commonly referenced[1] measure of expected future inflation is the "break-even inflation rate." This rate approximates the expected inflation compensation using the difference between the yield-to-maturity of nominal and inflation-linked Treasury securities of equivalent maturities. For 10-year Treasury securities as of December 31, 2015 the average-to-date differential was 2.14%, the rolling one-year average was 1.69%, and the rolling one-month average was 1.52%.

Figure 4: Rolling 252 Business Day Average of Market Inflation Expectations



Implied Expected Inflation is the difference between the nominal 10-Year Treasury Yield and the 10-Year TIPS Yield. Calculation is based on business day periodicity. There are 3,003 observations shown on this chart.
Source: US Department of the Treasury (www.treasury.gov) (2016)

[1] "Although clues about inflation expectations abound in financial markets, inflation-indexed securities would appear to be the most direct source of information about inflation expectations and real interest rates." Remarks by Governor Ben S. Bernanke. Before the Investment Analysts Society of Chicago, Chicago, Illinois April 15, 2004 http://www.federalreserve.gov/boarddocs/speeches/2004/20040415/default.htm.

Figure 5 below shows the results for implied expected inflation using point in time data as of December 31, 2015 across various maturities. The data resembles a nominal rate yield curve, and reflects the differences in expectations depending on the time horizon being examined.

Investors should note that ex-ante market expectations for inflation can be markedly different than realized inflation. Implied expected inflation is simply market participants' best guess for average inflation over a specific time period. If you believe that realized inflation will be higher than implied inflation then you would prefer holding TIPS versus Treasuries. If you believe that realized inflation will be lower than implied inflation then holding Treasuries would be preferred. If the expectation is for realized inflation to match implied inflation you should be indifferent between TIPS and Treasuries.

Figure 5: Market Expectations for Inflation

As of December 31, 2015	5-Year	7-Year	10-Year	20-Year	30-Year
Treasury Yield	1.76%	2.09%	2.27%	2.67%	3.01%
TIPS Yield	0.45%	0.59%	0.73%	1.07%	1.28%
Implied Expected Inflation	1.31%	1.50%	1.54%	1.60%	1.73%

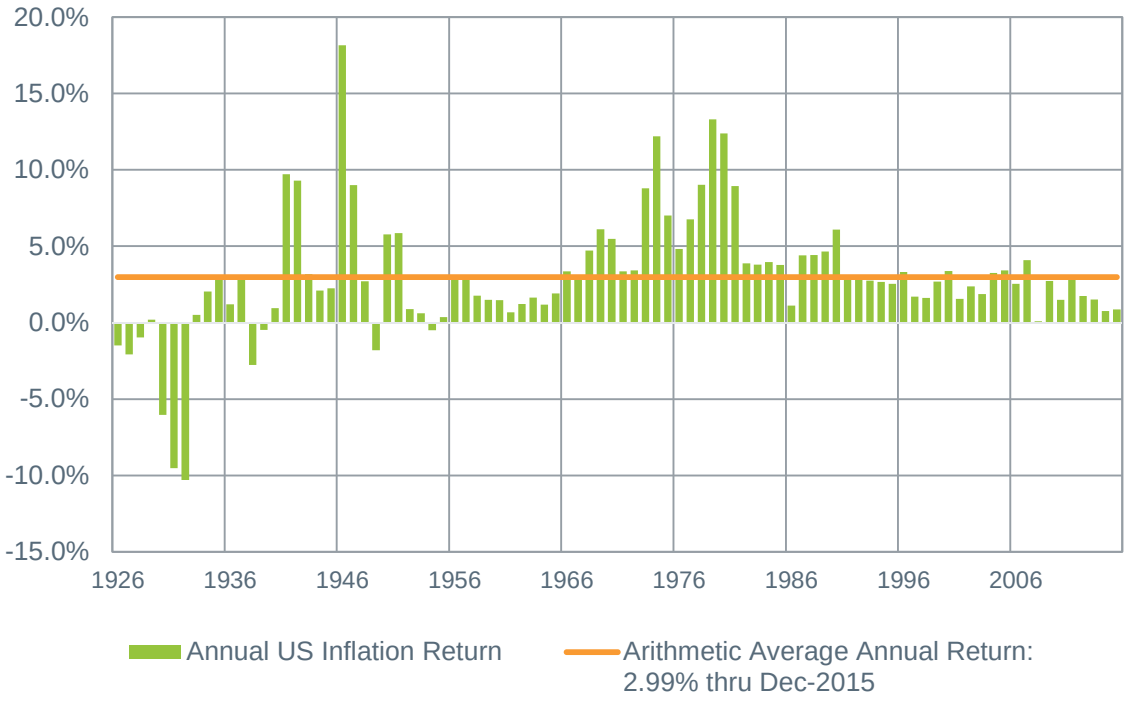
Implied Expected Inflation is the difference between the nominal Treasury Yield and the TIPS Yield.
Source: US Department of the Treasury (www.treasury.gov) (2016)

Another useful exercise is to review historical inflation. Below we review the Ibbotson US Inflation[2] series for a historical measure of the price inflation experienced in the United States. **Figure 6**

[2] The Consumer Price Index for All Urban Consumers ("CPI-U"), not seasonally adjusted, is used to measure inflation, which is the rate of change of consumer goods prices. Unfortunately, the inflation rate as derived by the CPI is not measured over the same period as the other asset returns. All security returns are measured from one month-end to the next month-end. CPI commodity prices are collected during the month. Thus, measured inflation rates lag the other series by about one-half month. Prior to January 1978, the CPI (as compared with CPI-U), not seasonally adjusted, was used. For the period 1978 through 1987, the index uses the year 1967 in determining the items comprising the basket of goods. Following 1987, a three-year period, 1982 through 1984, was used to

shows annual calendar year historical US inflation rates. The figure demonstrates that while recent inflation has been low (near or below the long run average), the US has experienced several periods of high inflation in the past.

Figure 6: Annual US Inflation Return



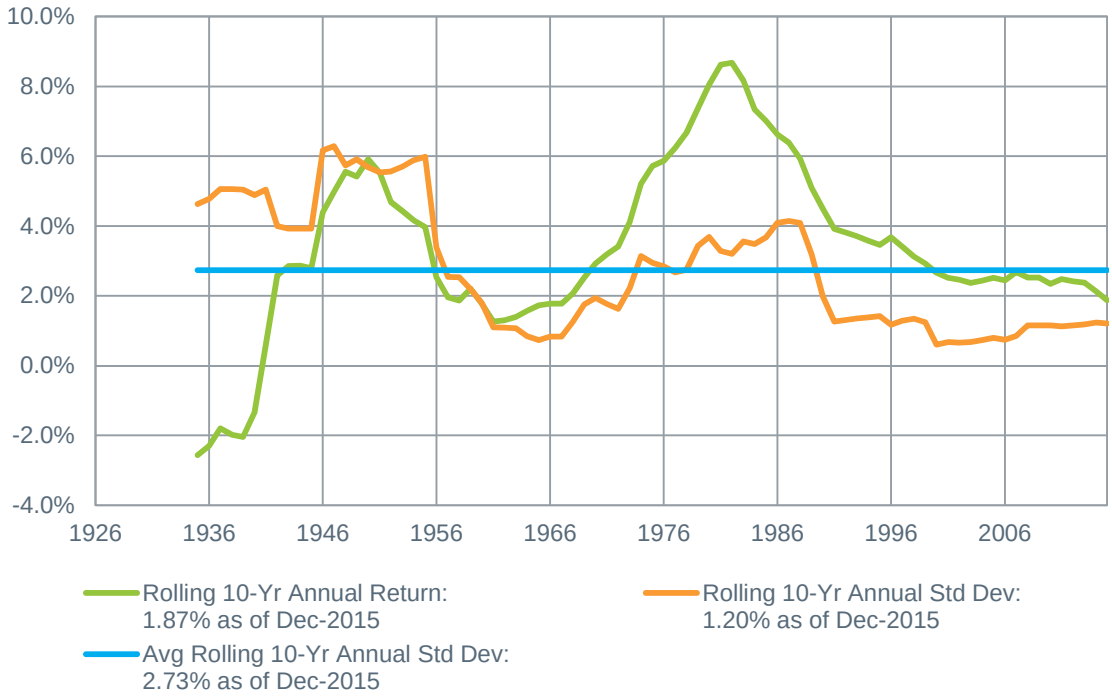
Source: Ibbotson Associates. (2016)

An analysis of rolling period inflation volatility, as illustrated in **Figure 7** below, reveals that near-term inflation volatility has remained consistently low over the past 30 years. However, given current economic uncertainties, and with the federal funds target rate at historic lows, we believe the potential for higher volatility in the future is a possibility.

determine the items making up the basket of goods. For additional information, please refer to the DOL web page @ http://stats.bls.gov.

All arithmetic mean returns shown above are calculated by taking the arithmetic average of the *n* one-year compound returns (based on monthly or quarterly data as appropriate for the index) over the stated analysis period. All volatilities shown above are calculated by taking the standard deviation of the *n* one-year compound returns (based on monthly or quarterly data as appropriate for the index) over the stated analysis period. All average annual premium and real return calculations shown above are the arithmetic average of the *n* one-year arithmetic differences between two indices (for return premiums) or an index and the CPI-U (for real returns) over the stated analysis period. Where shown, geometric returns are compounded over the analysis period, and then shown on an annualized basis.

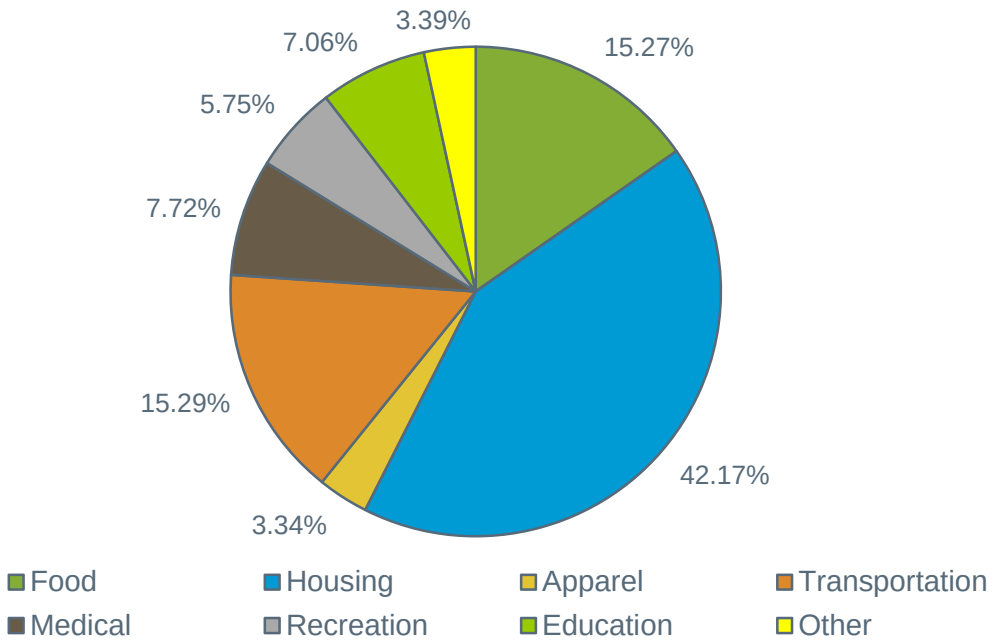
Figure 7: Rolling 10-Year Annualized US Inflation and Standard Deviation



Source: Ibbotson Associates. (2016)

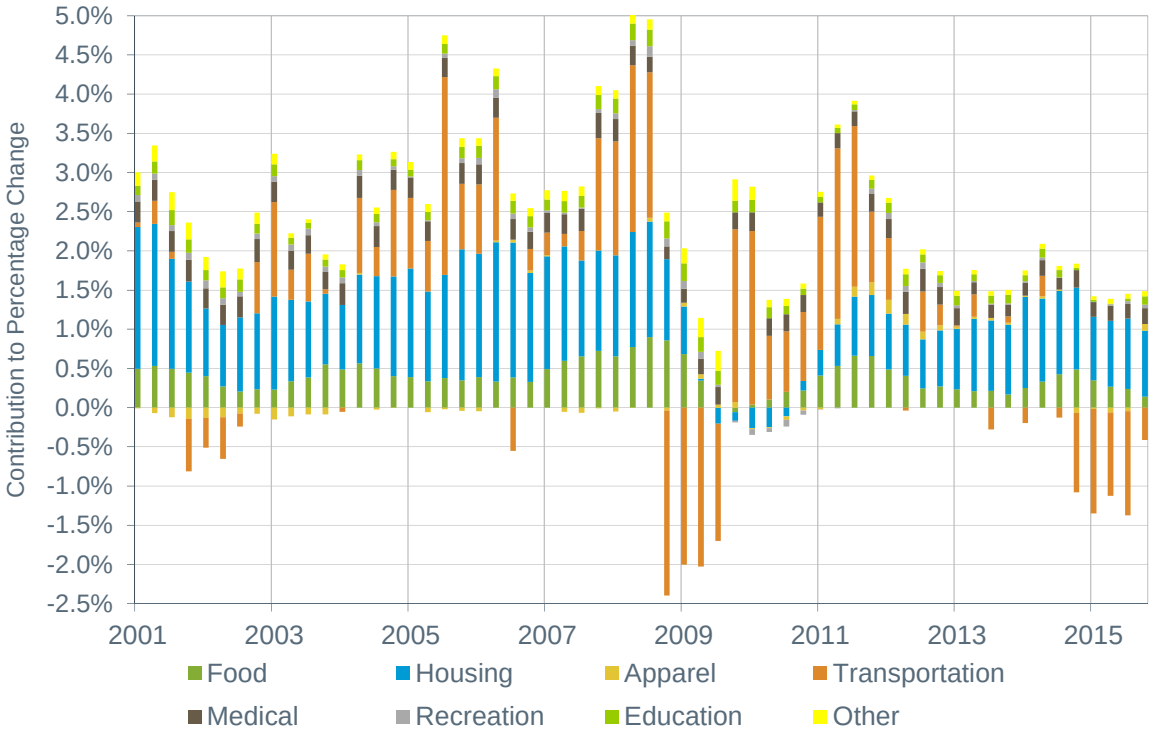
Figure 8 and **Figure 9** below provide insight into the components and drivers of movements of inflation as measured by the Consumer Price Index ("CPI"). A number of different categories contribute to headline inflation with housing being the largest component and transportation the most volatile.

Figure 8: CPI Current Composition - 1 Year Lag



Source: Bureau of Labor Statistics. (2016)

Figure 9: Contribution to CPI YoY Change (Not Seasonally Adjusted) in CPI



Source: Bloomberg. (2016)

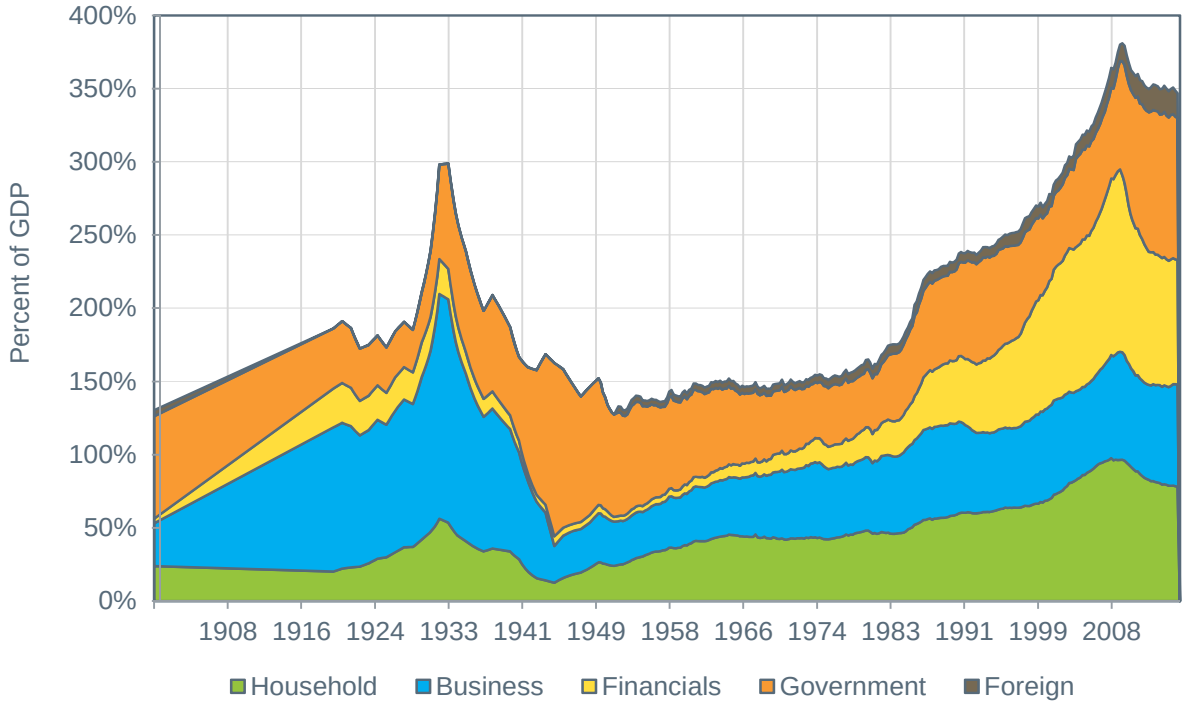
Inflation has trended downward of late, but given the significant Fed balance sheet expansion (**Figure 15**) since the 2008 financial crisis, inflationary concerns also merit consideration.

In general, it is difficult to singularly describe the cause of inflation, as a number of underlying variables can influence price levels. Swift increases in aggregate demand (e.g. abnormal fiscal expansion), supply shocks (e.g. oil supply constraints) and monetary expansion (too much money chasing scarce goods) have all influenced inflationary regimes in the past. Therefore, to project the future path of inflation it is critical to examine the current economic backdrop as it will dictate whether deflationary or inflationary pressures ultimately persist.

So where does the United States currently stand and what factors are relevant?

As seen in **Figure 10**, the US economy has experienced a large buildup of debt in both the public and private sector. Such growth in credit, outpacing growth in the broader economy (i.e. an increase in the debt/GDP ratio), can lead to debt-deflation as market participants attempt to deleverage to sustainable levels. However, this also produces a strong incentive to expand the money supply and reduce the value of debt in real terms. In the recent environment of expanding credit, inflation has remained steadily low and current bond yields suggest that market participants are not particularly worried about increased inflation.

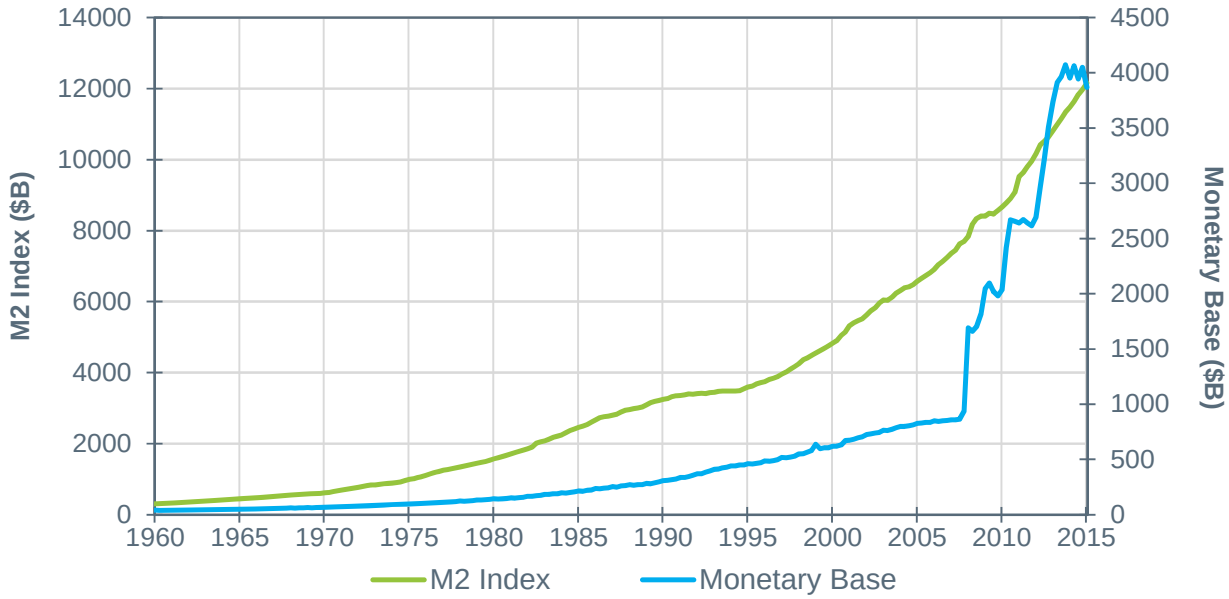
Figure 10: US Credit Market Debt as % of GDP



Data as of September 30, 2015.
Source: Bloomberg. (2016)

As shown in **Figure 11**, the Federal Reserve expanded the monetary base (i.e., currency + bank reserves) rapidly after the Great Financial Crisis – more than quadrupling its size in a very short time period. This expansion was driven by an anemic economy, liquidity concerns, and fears of a deflationary spiral. However, this increase in the monetary base has not led to a commensurate increase in broader measures of the money supply – with M2 growing mostly along a steady trend averaging about 6% a year.

Figure 11: M2 Money Supply and Monetary Base

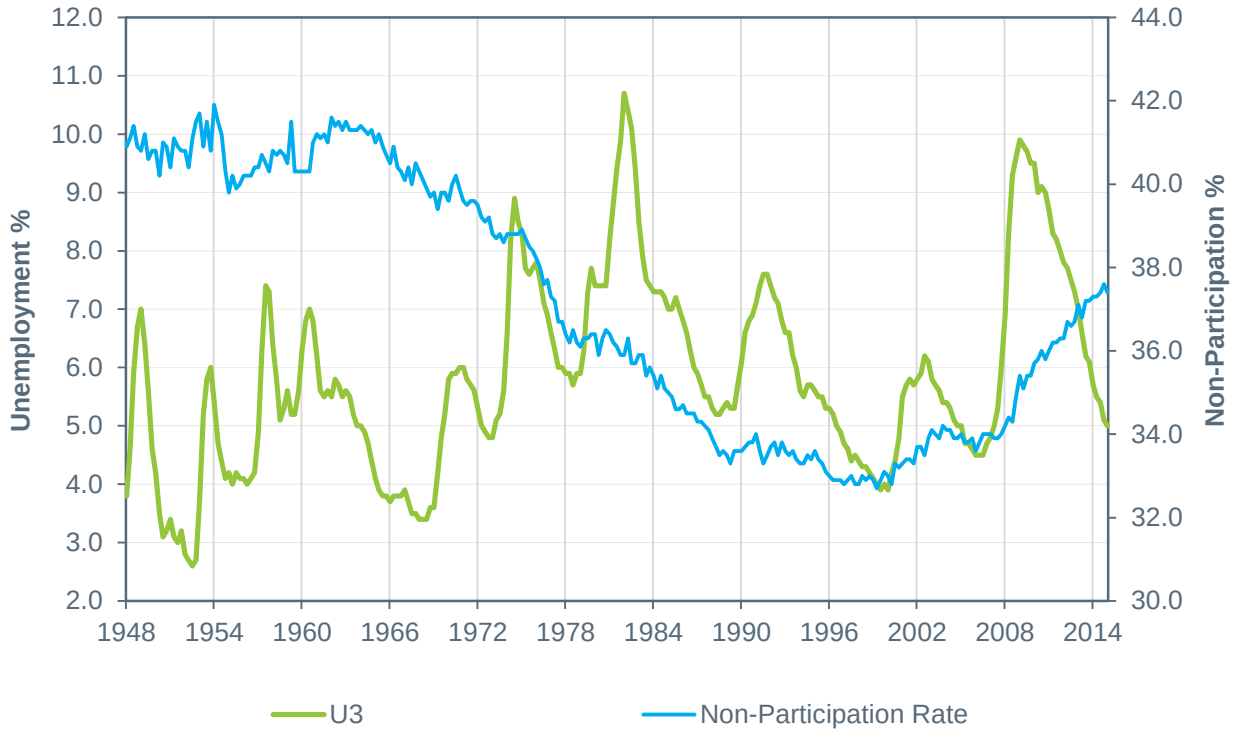


Source: Bloomberg. (2016)

History suggests that an expansion in the monetary base can be inflationary. Additionally, in a fractional reserve banking system, increases in the monetary base have typically resulted in increases in the broader money supply. Recently this interaction has not been inflationary. Why?

One explanation has to do with the motivation behind fiscal and monetary expansion. Recent deficit spending has only replaced corresponding declines in private sector spending at the onset of the financial crisis. In addition, the Federal Reserve's actions are not motivated by a desire to absolve blame for profligate fiscal policy, but rather to heal a troubled economy. Some examples, as illustrated in the following figures, include the labor market and the general scope of spare capacity in the economy.

Figure 12: US Unemployment Rate and Labor Force Participation Rate



Source: Bloomberg (2016)

Figure 13: Spare Economic Capacity

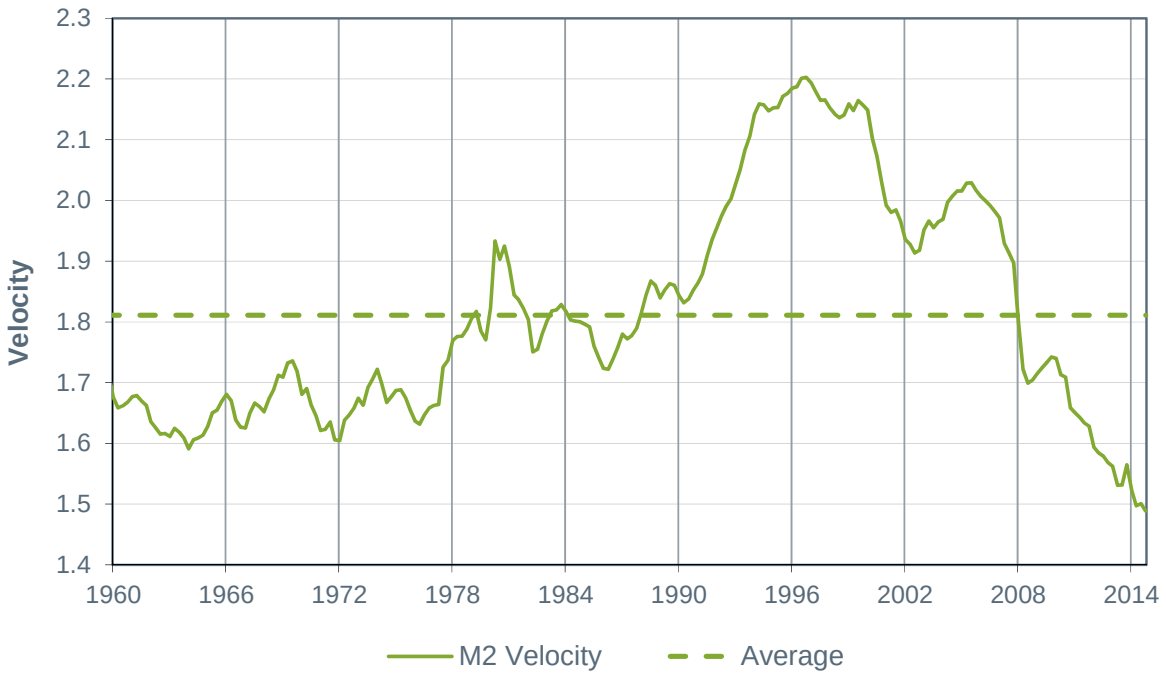
	Current Level*	Long-Term Average	Standard Deviation
Goods Sector			
Manufacturing capacity utilization	76.1%	80.2%	5.2%
Mining capacity utilization	79.6%	87.2%	3.7%
Services Sector			
Utilities capacity utilization	75.6%	86.8%	5.2%
Housing/Real Estate Sector			
Rental vacancy rate	7.0%	7.4%	1.5%
Owner-occupied vacancy rate	1.9%	1.6%	0.4%
Labor Market			
US Unemployment rate (U-3)	5.0%	5.8%	1.6%
US Labor Force Non-Participation Rate	37.4%	37.1%	3.1%
US Employment to Population Ratio	59.5%	59.2%	2.8%
Eurozone Unemployment Rate	10.7%	9.6%	1.3%
Oil Sector			
Weekly US Field Production of Crude Oil	9,202	6,766	1,309
US Stock Crude Oil (Million Barrels)	487	336	34

* Current level data is as of 12/31/2015 with the exception of Eurozone Unemployment Rate which is as of 09/30/2015.

Source: Bloomberg and US Energy Information Administration. (2016)

Reluctant to extend credit in a weak economy, banks have opted to retain increases in the monetary base as excess reserves. This partially explains the drop in the velocity of money (shown below), or the average frequency in which money is spent over time.

Figure 14: Velocity of M2

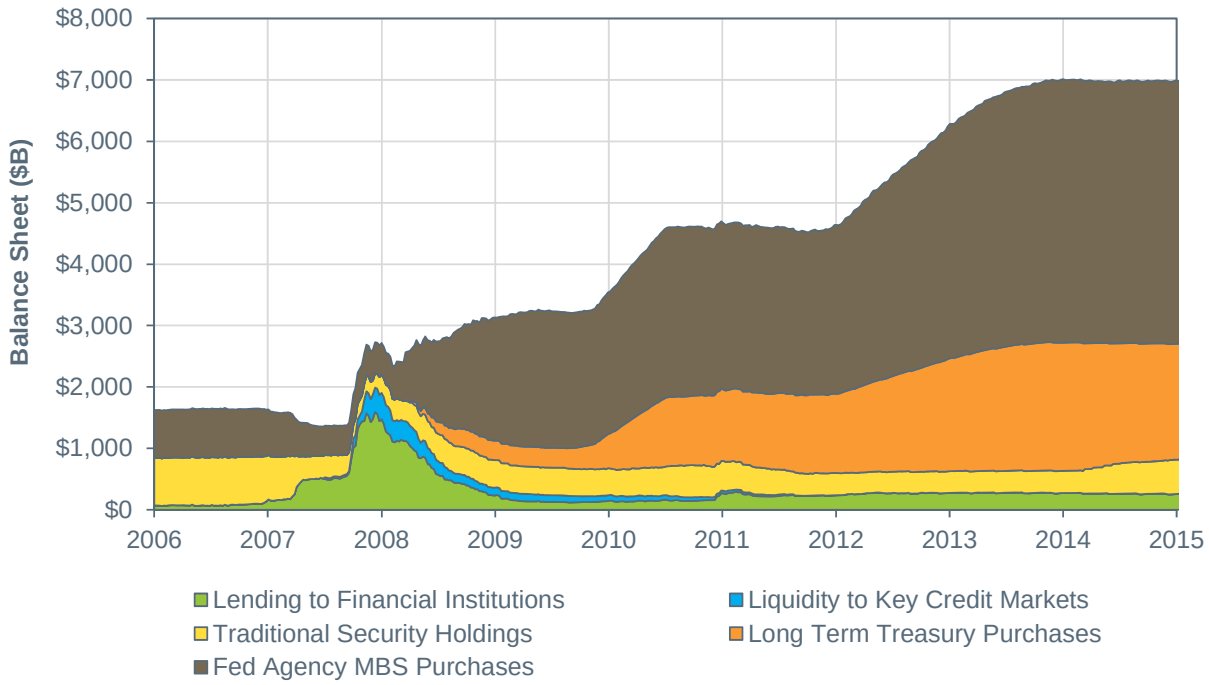


Data as of September 30, 2015.
Source: Bloomberg. (2016)

An important consideration is at what point lenders (or borrowers) will be more optimistic with their economic outlooks and seek to extend (or take) loans. In the past, we would expect this to lead to growth in the money supply and to higher levels of inflation. Here, the Federal Reserve would seek to balance inflation and growth by setting short-term interest rates. Additionally, the Federal Reserve now has an expanded tool kit to combat rampant inflation.

First, the Federal Reserve could sell portions of their portfolio and absorb excess liquidity. As in **Figure 15**, the Fed's balance sheet expanded rapidly between 2009 and 2014 through debated quantitative easing policies. This effort attempts to stimulate spending and address fears of deflation, as the Fed's typical tool to boost demand – lowering short-term interest rates – is ineffective with short-term rates already at exceptionally low levels.

Figure 15: Federal Reserve Balance Sheet



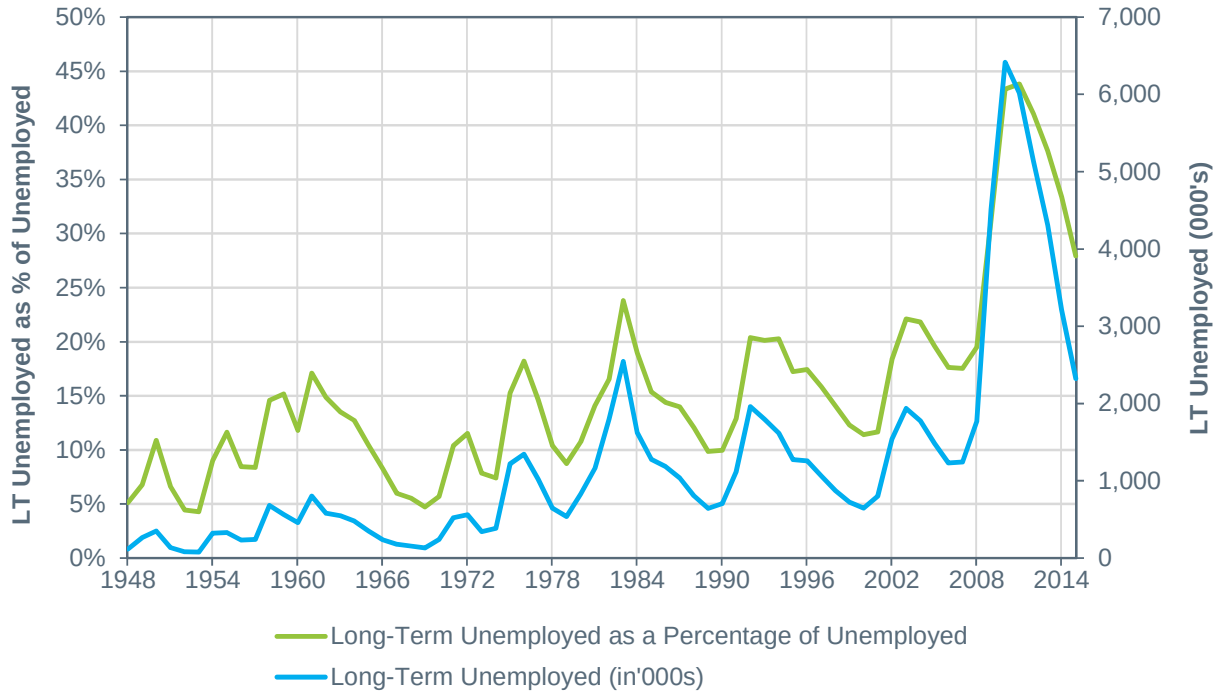
Source: Bloomberg. (2016)

Second, through legislative changes enacted in 2008 the Federal Reserve can (and now does) pay interest on excess reserves. But, as rates rise and lending begins to pick up, the Federal Reserve can raise the rate on which they pay reserves. This would reduce lending growth and help prevent the increase in the monetary base from being inflationary (though this is not costless to implement).

These are unchartered waters and the ability and desire of the Federal Reserve to combat inflation when it does surface is uncertain. First, the Federal Reserve's new tools are untested and it remains to be seen whether it will be able to adequately orchestrate its monetary policy objectives. Second, a controlled higher rate of inflation may not be all bad for the economy as a whole. As referenced, the growth in both private and public sector credit is substantial so a higher rate of inflation could help reduce debt burdens in real terms while reducing the real cost of borrowing. Finally, even if the Fed can competently execute on its dual mandate of supporting employment and promoting stable prices, it may be politically difficult to balance the two.

The recent recession was deep and may result in a higher level of natural unemployment[3] as reflected in long-term unemployment trends as shown in **Figure 16**. In this environment, raising rates to control inflation could be difficult. Another factor to consider is how all of these pressures affect the US dollar, as deflationary pressures from a strengthening dollar could "import deflation". A further strengthening dollar is of course not a given, though recent global market turmoil has reminded investors that growth and debt concerns are not solely a US phenomenon, and that matters are perhaps relatively worse abroad.

Figure 16: Trends in Long-Term Unemployment

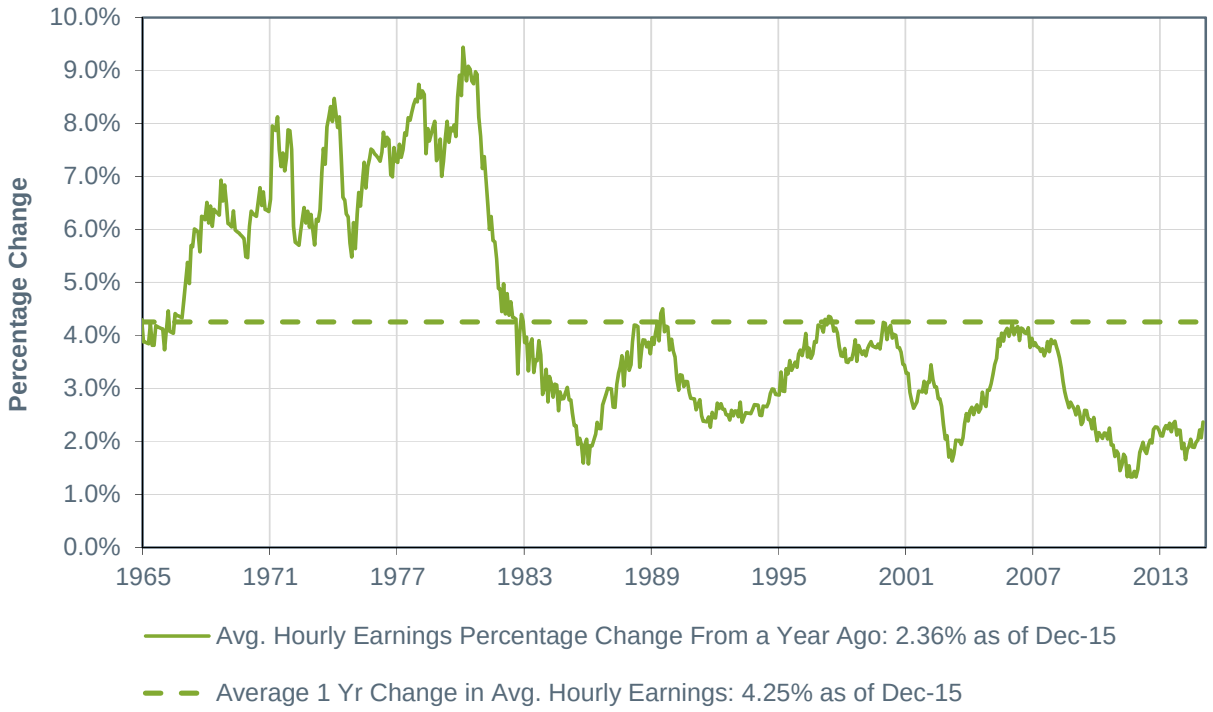


Source: Bureau of Labor Statistics. (2016)

In conclusion, we believe that given current and past accommodative economic policies it is entirely possible that inflation could arise at some point in the future. For the near term, however, sustained increases in inflation are unlikely as spare economic capacity and continued labor market weakness (as illustrated in **Figure 12**, **Figure 13**, **Figure 16**, and **Figure 17**) should keep wage growth low. This latter point is perhaps even more important when considering that labor now represents a larger portion of output costs as the US continues to transition from a manufacturing to a service based economy. RVK acknowledges that escalating labor costs could contribute to inflation, but despite significant improvements (particularly domestically), global labor market conditions still pose a headwind. Additionally, the depressed level of the velocity of money (**Figure 14**) does not suggest marked near-term inflation increases.

[3] See FRBSF Economic Letter 2011-05, published February 14, 2011, *"What is the New Normal Unemployment Rate?"*

Figure 17: Trends in Average Hourly Earnings of Production/Nonsupervisory Employees



Source: US Department of Labor: Bureau of Labor Statistics. (2016)

Considering all of the previously mentioned factors, RVK maintains its forecast for long-term inflation (below historical averages) at 2.50%, while also holding the standard deviation constant at 3.00%.

Cash Equivalents

The historical performance of short-term instruments, as measured by the Bank of America ML US 3-Month Treasury Bill Index as of December 31, 2015, indicates that cash equivalents have provided an average annual return of 5.43% with an annual standard deviation of 4.03% since inception (1/1/1978). The effective yield as of December 31, 2015 was 0.01% with an average yield of 2.28% since effective yield data became available (12/31/1996).

	BofA ML US 3-Month Treasury Bill (since 1/1/1978)	US 30 Day T-Bill (since 1/1/1926)
Average Annual Return	5.43%	3.46%
Average Annual Real Return	1.62%	0.50%
Annual Standard Deviation	4.03%	3.11%

The US 30 Day T-Bill Index reports average annualized returns as of December 31, 2015, of 3.46% with an annual standard deviation of 3.11% since inception (1/1/1926).

Real returns for the Bank of America ML US 3-Month Treasury Bill Index have averaged approximately 1.62% annually since inception (1/1/1978). Real returns on US 30 Day T-Bill investments have averaged approximately 0.50% annually since inception (1/1/1926).

Given current low yields, but also acknowledging that they will not remain this low endlessly, we set the long-term return expectation for cash equivalents at 2.25% while holding standard deviation at 3.00%.

FIXED INCOME

RVK creates assumptions for several fixed income asset classes, and our 2016 return and risk assumptions can be found in **Figure 18**.

Figure 18: Fixed Income Assumptions

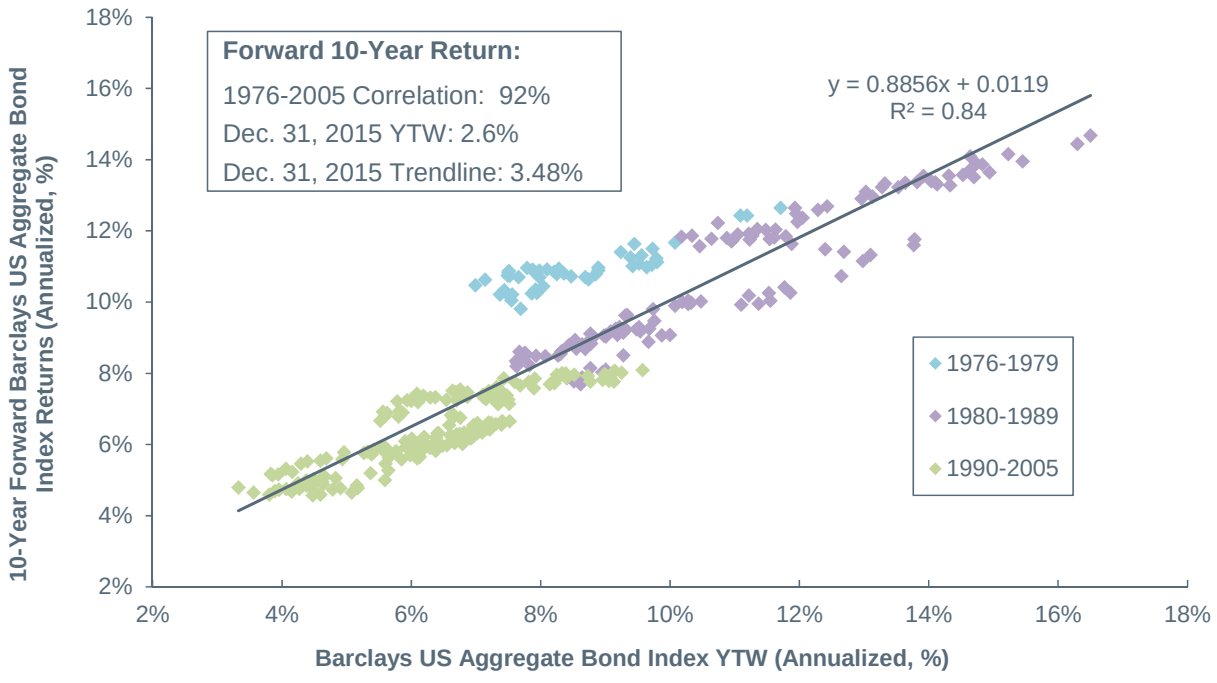
Asset Class	2015			2016			One Year Adjustment		
	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %
Int. Duration Fixed Income	3.50	6.00	3.33	3.50	6.00	3.33	0.00	0.00	0.00
Non-US Dev Sov. Fixed Inc. UH	2.50	10.50	1.97	2.25	10.50	1.72	-0.25	0.00	-0.25
Emerging Markets Debt (Hard)	--	--	--	5.75	12.50	5.02	--	--	--
Emerging Markets Debt (Local)	--	--	--	6.75	12.50	6.03	--	--	--
TIPS	4.00	6.25	3.81	4.00	6.25	3.81	0.00	0.00	0.00
Low Duration Fixed Income	2.50	3.50	2.44	2.50	3.50	2.44	0.00	0.00	0.00
Long Duration Fixed Income	4.00	11.50	3.37	4.25	11.50	3.62	+0.25	0.00	+0.25
High Yield	6.00	15.00	4.95	6.50	15.00	5.46	+0.50	0.00	+0.51

The factors we utilize for estimating fixed income returns include, but are not limited to, yield, changes in interest rates and spreads, and duration.

Yield

The yield (to worst) of a fixed income security is the anticipated return to an investor based on interest payments, and other factors including call options. Therefore, as **Figure 19** illustrates, initial period yields (as represented by the Barclays US Aggregate Bond Index) have historically been a reasonable starting point when forecasting future fixed income returns. Low bond yields now typically indicate low bond returns in the future, and vice versa.

Figure 19: Relationship between YTW and Forward 10 Year Returns



Source: Bloomberg (2016)

Interest Rates
We consider interest rate expectations when estimating fixed income returns. Interest rate changes effect fixed income investments in multiple ways. In the short-term, if interest rates rise, fixed rate bonds will incur principal losses; and if rates fall, the opposite will occur. However, in the long-term, rising interest rates result in higher yields/incomes. We consider this trade-off between short- and long-term effects of interest rate changes, and the timing of such changes, on future fixed income returns when deriving our assumptions.

The prices of longer-maturity bonds are more sensitive to changing interest rates because the income on a fixed income security is fixed. For example, let's consider a 10-year bond with a 2% yield and a scenario where the interest rate increases in 2 years by 2%, resulting in a similar newly issued bond paying 4% interest. This means that your old bond is less valuable now because for the remaining 8 years of the bond's life it will pay 2% interest versus the newly issued bond paying 4% interest. However, if your initial bond matured in three years instead of ten, then the impact is less severe as your old bond only has one year of inferior payments.

Duration
The example in the interest rate section shows the significance of the duration of a fixed income investment to its future returns. Duration is a measure of how long (in years) it takes for the price of a bond to be repaid by its cash flow, as well as an indicator of interest rate sensitivity. Therefore, duration is a relevant consideration that impacts both return and risk assumptions.

While the assumption timeframe is long-term, the horizon period is still finite. Rising rates have the potential to increase long-term fixed income returns through additional future income, but they can also cause (be offset by) short-term market impairment. Therefore, the closer the asset class duration is to the investment horizon, the closer the return assumption (generally) is to the market yield – all else equal.

Spread
We also consider credit conditions and the spread of yields over US Treasuries when forecasting return assumptions. We compare the current level of spread for a particular asset class to its long-term average to estimate the impact of potential spread level movements on future returns.

It is also important to note that while the above stated factors generally inform the direction and magnitude of our decisions, we also consider qualitative and triangulation issues, as well as additional factors as needed, when arriving at final assumption values.

2016 Forecast
Overall, we currently expect future fixed income returns to be suppressed – compared to long-term historical average returns – due to low present yields and potential initial losses due to rising interest rates. However, over time, rising interest rates will result in higher yields which will help offset poor returns in the near-term.

US Intermediate Duration Fixed Income

	2016	2015	Change
Expected Return	3.50%	3.50%	No Change
Expected Risk	6.00%	6.00%	No Change

RVK analyzes US intermediate duration investment-grade fixed income investments using the Barclays US Aggregate Bond Index. The below tables and figures show the relevant statistics for the benchmark as of December 31, 2015.

Return

We have maintained our long-term return forecast for US intermediate duration fixed income at 3.50%. While the since inception annual return (listed below) is significantly higher than our forecast, it should be noted that the since inception return captures a period of relatively high and declining interest rates. Current interest rates do not support a forward-looking return like we have witnessed in the past.

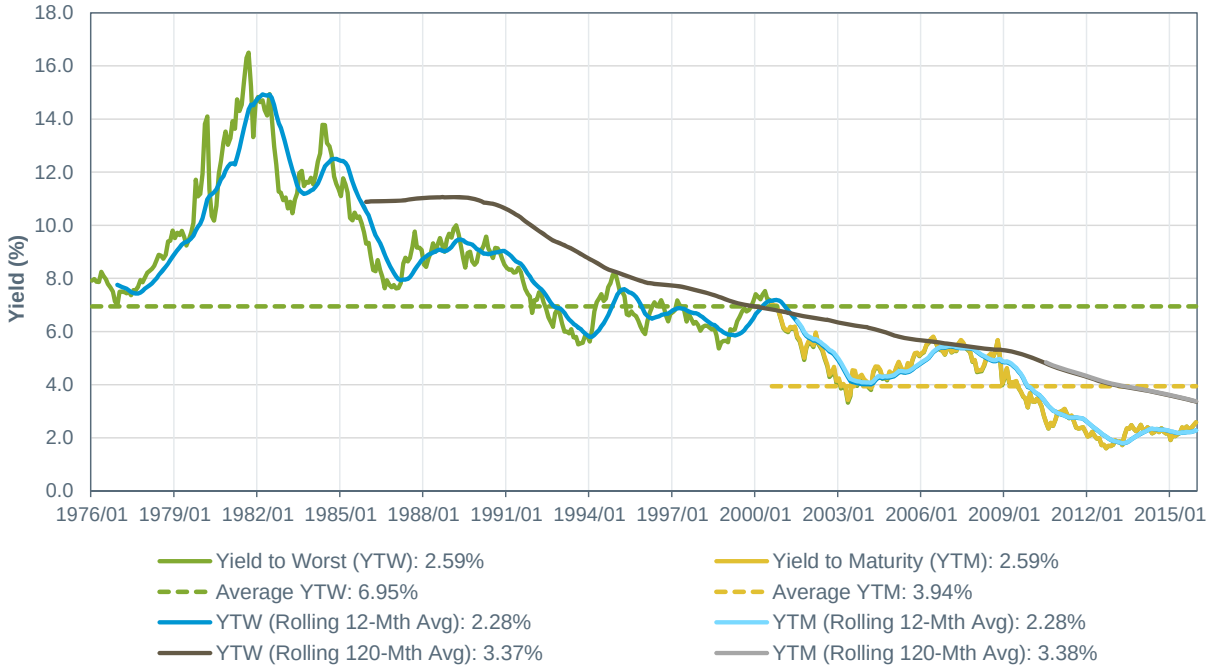
Volatility

We have also held the expected standard deviation constant at 6.00% compared to last year's forecast. Although index volatility has been decreasing over recent years we believe there is the potential for additional volatility given the increasing duration of the index. Economic uncertainties and potential subsequent interest rate movements also suggest caution.

	12/31/2015	12/31/2014	10 Year Average (12/31/2015)	Average Since Inception (1/31/1989)
YTW	2.59%	2.25%	3.37%	5.31%
Modified Duration	5.68%	5.55%	4.90%	4.68%
Average Monthly OAS	0.56%	0.48%	0.71%	0.56%

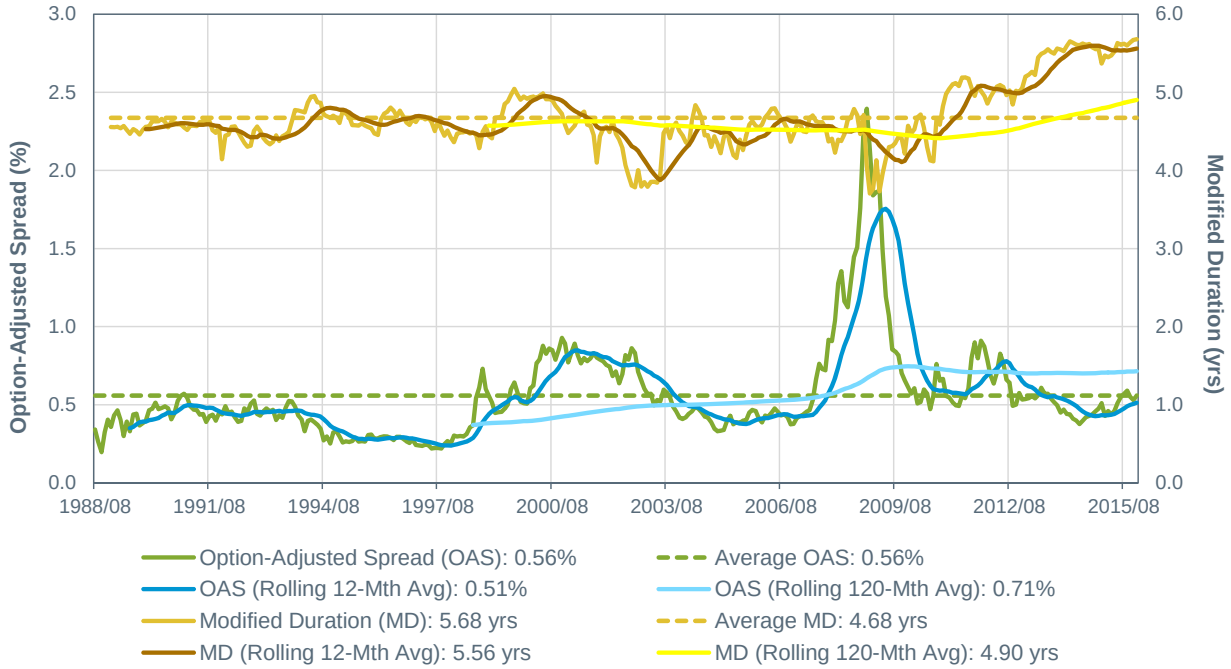
	10 Years (12/31/2015)	Since Inception (12/31/1976)
Average Annual Return	4.65%	7.91%
Annual Standard Deviation	3.16%	6.88%

Figure 20: Barclays US Aggregate Bond Index Yield to Worst and Yield to Maturity



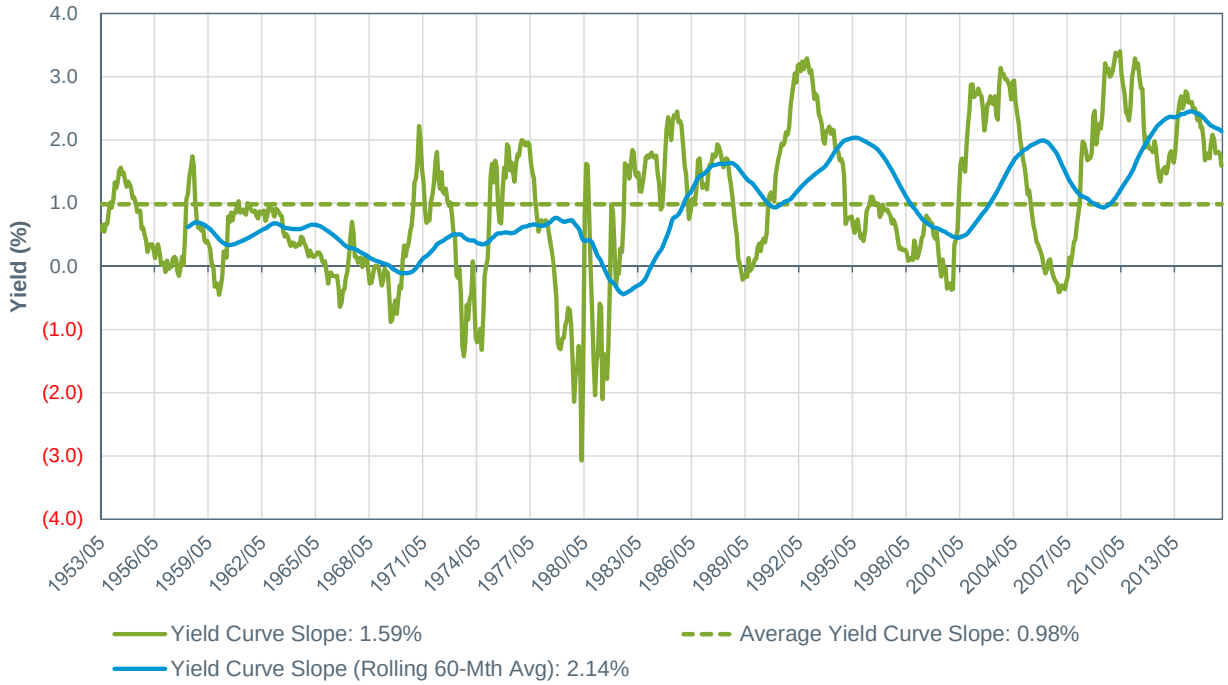
Average Yield to Worst is for the time period Jan-1976 through Dec-2015.
Average Yield to Maturity is for the time period Aug-2000 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

Figure 21: Barclays US Aggregate Bond Index Option-Adjusted Spread and Modified Duration



Average Option-Adjusted Spread is for the time period Aug-1988 through Dec-2015.
Average Modified Duration is for the time period Jan-1989 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

Figure 22: Market Cycle: Yield Curve Slope US 10-Year Treasury vs. US 1-Year Treasury



The yield curve slope shown is the difference between the US 10-Year Treasury Yield and US 1-Year Treasury Yield.
Average Yield Curve Slope is for the time period Apr-1953 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: US Department of the Treasury. (2016)

Non-US Fixed Income

	2016	2015	Change
Expected Return	2.25%	2.50%	-0.25%
Expected Risk	10.50%	10.50%	No Change

RVK analyzes non-US government bond investments using the Citigroup Non-US World Government Bond Index USD Unhedged ("Citi Non-US WGB Index") as a proxy for this asset class. We use the USD Unhedged index to eliminate the impact of currency hedging decisions. We believe that while currency does not structurally add value over the long-term as a strategic allocation, it could be a source of alpha for an active non-US fixed income mandate.

Return

We expect very low returns for the non-US government bonds over the next 10 years due to extremely low present yields and potential losses from expected increases to interest rates. Therefore, we have decreased our long-term return forecast for Non-US Developed Sovereign Fixed Income (Unhedged) to 2.25%. The below charts provide further yield, spread, and duration details.

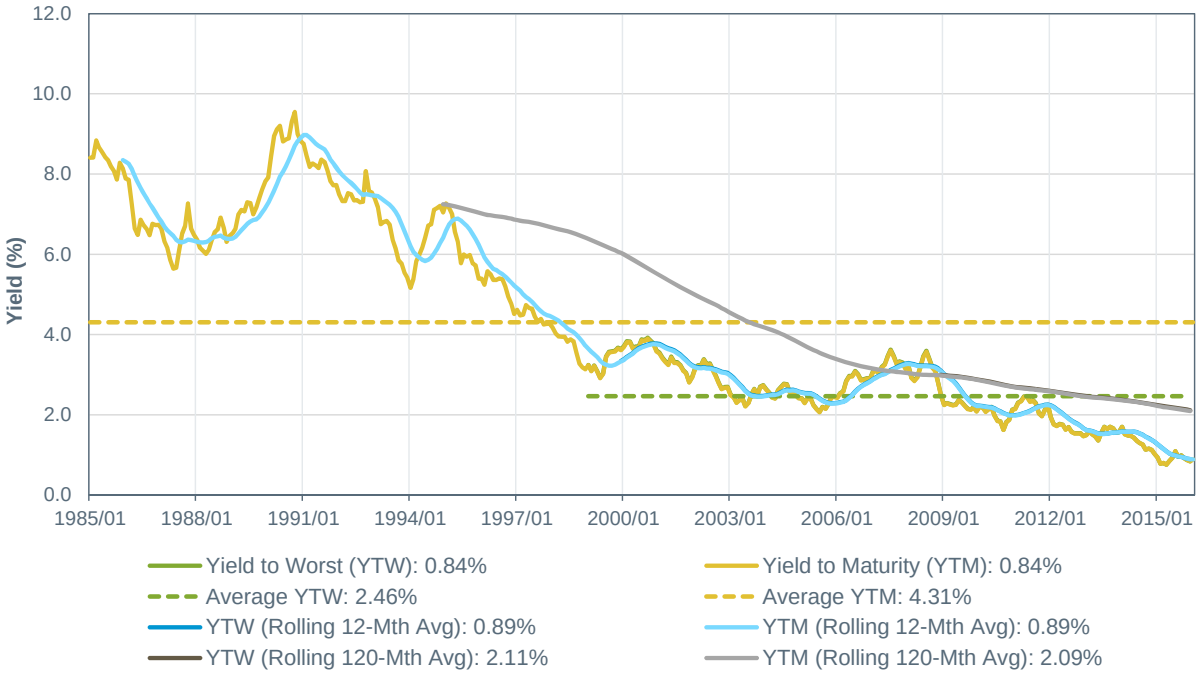
Volatility

We have maintained the expected annual standard deviation forecast for Non-US Developed Sovereign Fixed Income (Unhedged) at 10.50%.

	12/31/2015	12/31/2014	10 Year Average
YTW	0.84%	1.03%	2.11%
Modified Duration	8.11 Years	7.85 Years	6.90 Years
Average Monthly OAS	0.08%	0.18%	0.23%
Credit Quality	Aa3	Aa3	-

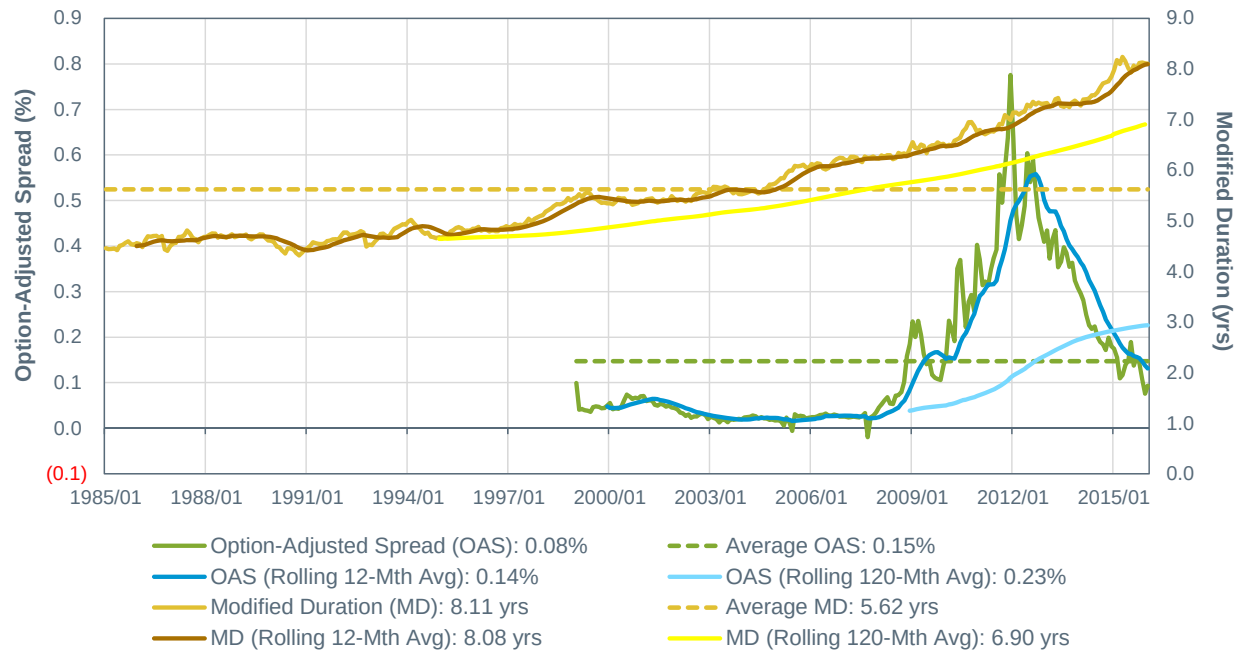
	10 Years	Since Inception (12/31/1985)
Average Annual Arithmetic Return	3.05%	8.36%
Annual Standard Deviation	5.90%	12.02%

Figure 23: Citi Non-US World Government Bond Index Yield to Worst and Yield to Maturity



Average Yield to Worst is for the time period Jan-1999 through Dec-2015.
Average Yield to Maturity is for the time period Jan-1985 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: The Yield Book, Inc. (2016)

Figure 24: Citi Non-US World Government Bond Index Option-Adjusted Spread and Modified Duration



Average Option-Adjusted Spread is for the time period Jan-1999 through Dec-2015.
Average Modified Duration is for the time period Jan-1985 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: The Yield Book, Inc. (2016)

US Treasury Inflation Protected Securities ("TIPS")

	2016	2015	Change
Expected Return	4.00%	4.00%	No Change
Expected Risk	6.25%	6.25%	No Change

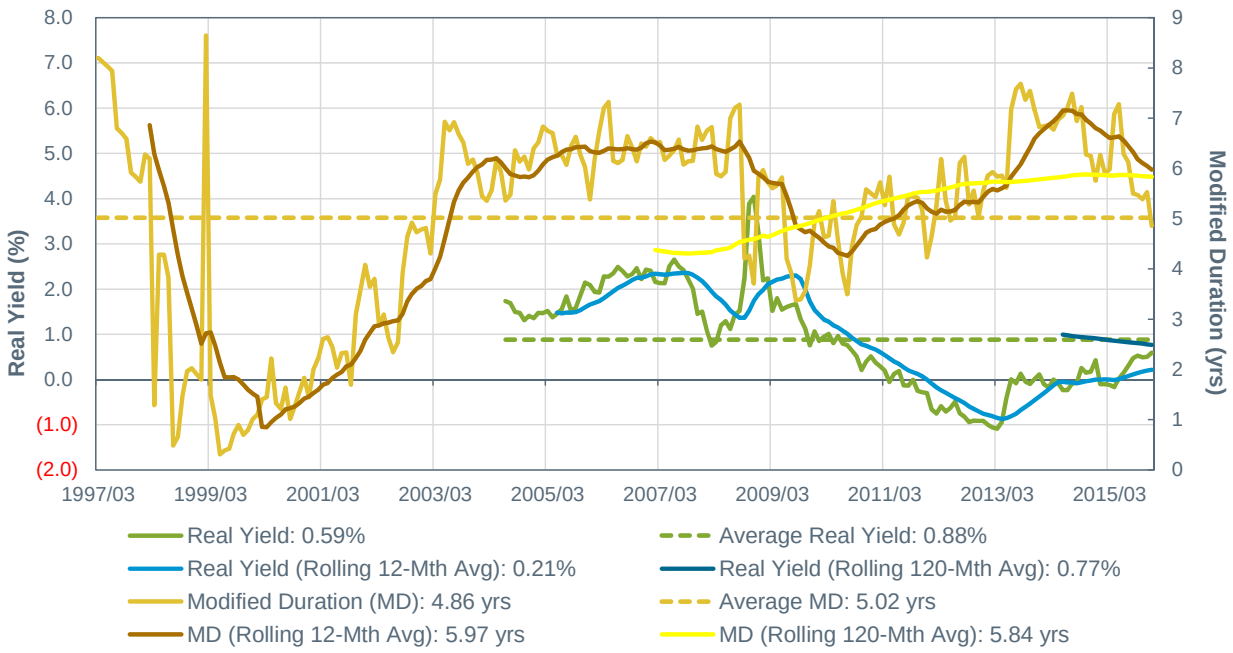
TIPS are a relatively immature asset class in the United States, and hence the performance history of the selected index, the Barclays US TIPS Index, is limited (1997). TIPS are inflation-linked securities whereby the principal is adjusted relative to the index ratio CPI-U. The coupon is fixed relative to principal with semi-annual interest payments. We review real yield, plus inflation, as a starting point for return considerations.

We have maintained our long-run return forecast for TIPS of 4.00% and our long-run standard deviation assumption of 6.25%. **Figure 25** provides further yield and duration details.

	12/31/2015	12/31/2014	10 Year Average
Real Yield	0.59%	0.42%	0.77%
Modified Duration	4.86 Years	5.76 Years	5.84 Years

	10 Years	Since Inception (12/31/1997)
Average Annual Arithmetic Return	3.93%	5.65%
Annual Standard Deviation	7.15%	6.29%

Figure 25: Barclays US Treasury US TIPS Index Real Yield and Modified Duration



Average Real Yield is for the time period Jun-2004 through Dec-2015.
Average Modified Duration is for the time period Mar-1997 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

US Low Duration Fixed Income

	2016	2015	Change
Expected Return	2.50%	2.50%	No Change
Expected Risk	3.50%	3.50%	No Change

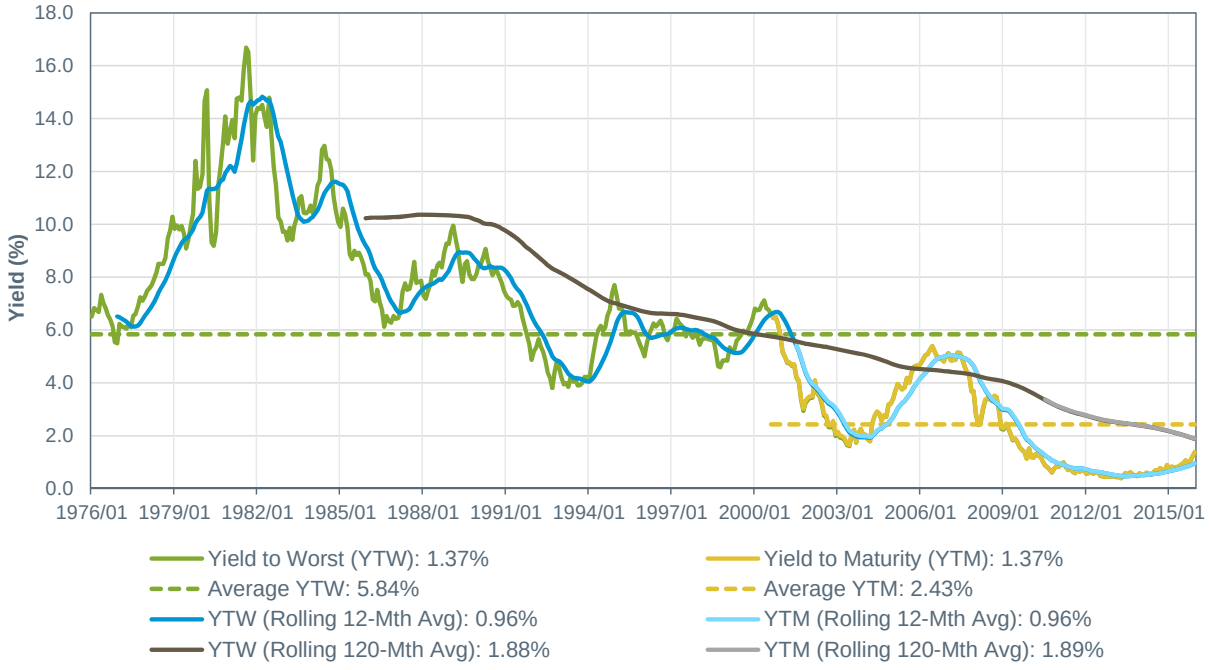
Low duration strategies are managed against the Barclays US 1-3 Year Gov't/Credit Index.

We have maintained our long-term return expectation for low duration fixed income strategies at 2.50%. Our standard deviation assumption also remains unchanged at 3.50%. **Figure 26** and **Figure 27** provide further yield, spread, and duration details.

	12/31/2015	12/31/2014	10 Year Average	Since Inception (1/31/1976)
YTW	1.37%	0.89%	1.88%	5.84%
Monthly OAS	0.30%	0.20%	0.38%	N/A
Modified Duration	1.88 Years	1.93 Years	1.84 Years	N/A

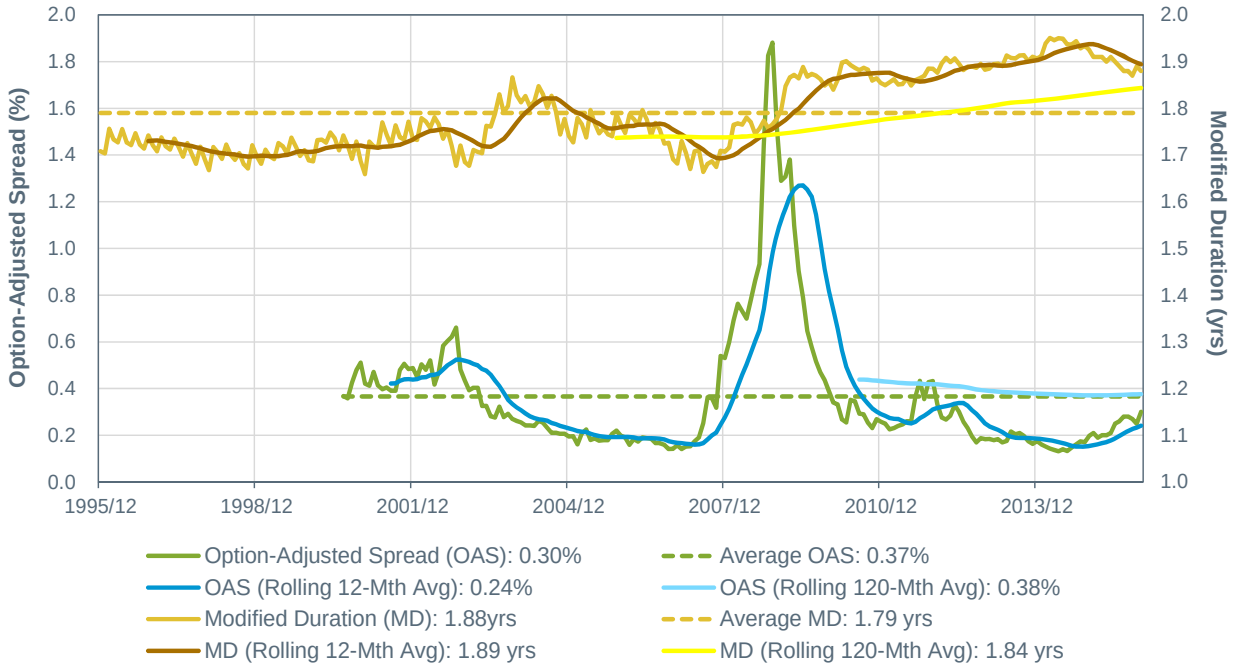
	10 Years	Since Inception (12/31/1976)
Average Annual Return	2.74%	6.57%
Annual Standard Deviation	2.14%	4.57%

Figure 26: Barclays US 1-3 Year Gov't/Credit Index Yield to Worst and Yield to Maturity



Average Yield to Worst is for the time period Jan-1976 through Dec-2015.
Average Yield to Maturity is for the time period Aug-2000 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

Figure 27: Barclays US 1-3 Year Gov't/Credit Index Option-Adjusted Spread and Modified Duration



Average Option-Adjusted Spread is for the time period Aug-2000 through Dec-2015.
Average Modified Duration is for the time period Dec-1995 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

US Long Duration Fixed Income

	2016	2015	Change
Expected Return	4.25%	4.00%	+0.25%
Expected Risk	11.50%	11.50%	No change

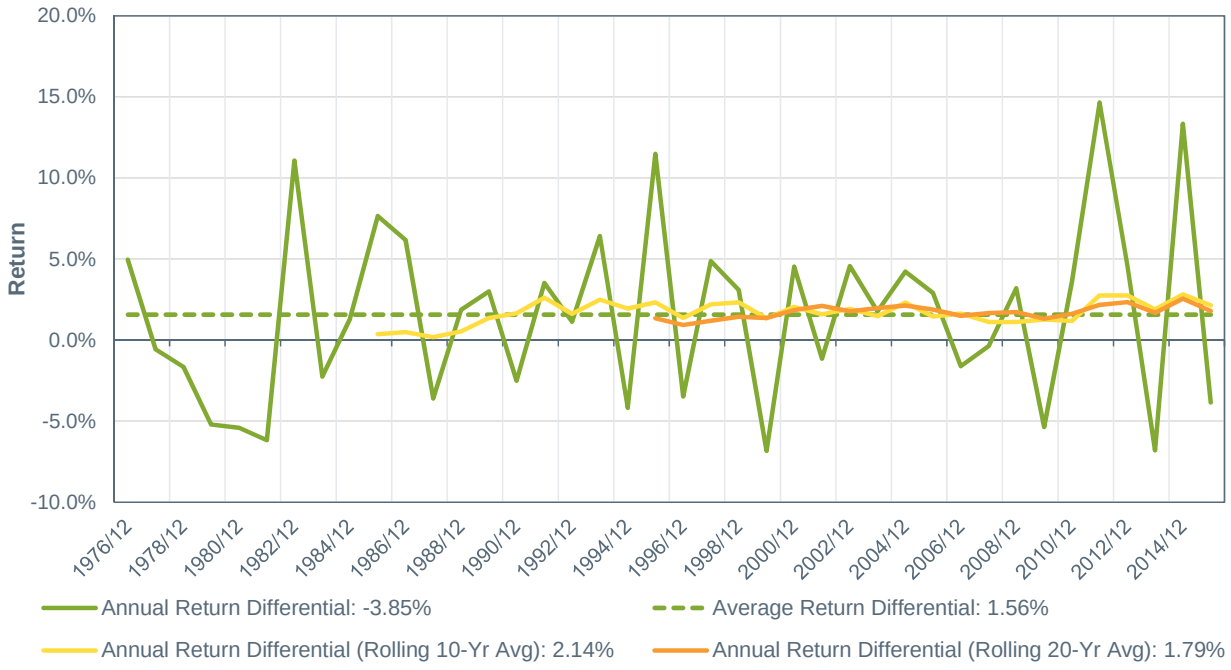
Long duration strategies are typically managed against the Barclays US Long Government/Credit Index. The arithmetic average spread in annual returns between the Barclays US Long Government/ Credit Index and the Barclays US Aggregate Index has been 1.56% since 1976 (see **Figure 28**).

Given rising yields, we have increased our long-term return expectation for Long Duration Fixed Income strategies to 4.25%. We have maintained our standard deviation assumption of 11.50%. **Figure 29**, **Figure 30** and **Figure 31** provide further yield, spread, and duration details.

	12/31/2015	12/31/2014	10 Year Average	Common Available Avg (12/31/1989)
YTW	4.19%	3.78%	4.81%	6.06%
Monthly OAS	1.38%	1.19%	1.11%	0.71%
Modified Duration	14.67 Years	14.72 Years	12.93 Years	11.04 Years

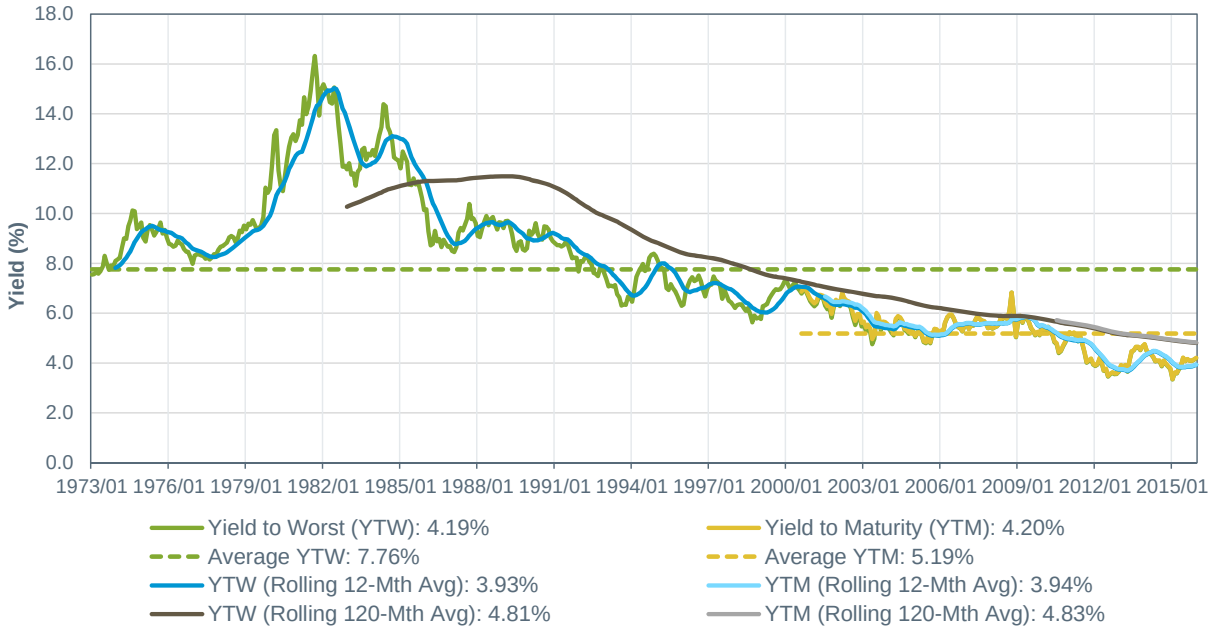
	10 Years	Since Inception (12/31/1973)
Average Annual Return	6.45%	9.08%
Annual Standard Deviation	9.47%	11.16%

Figure 28: Annual Return Differential Barclays US Long Gov't/Credit Index vs. Barclays US Aggregate Index



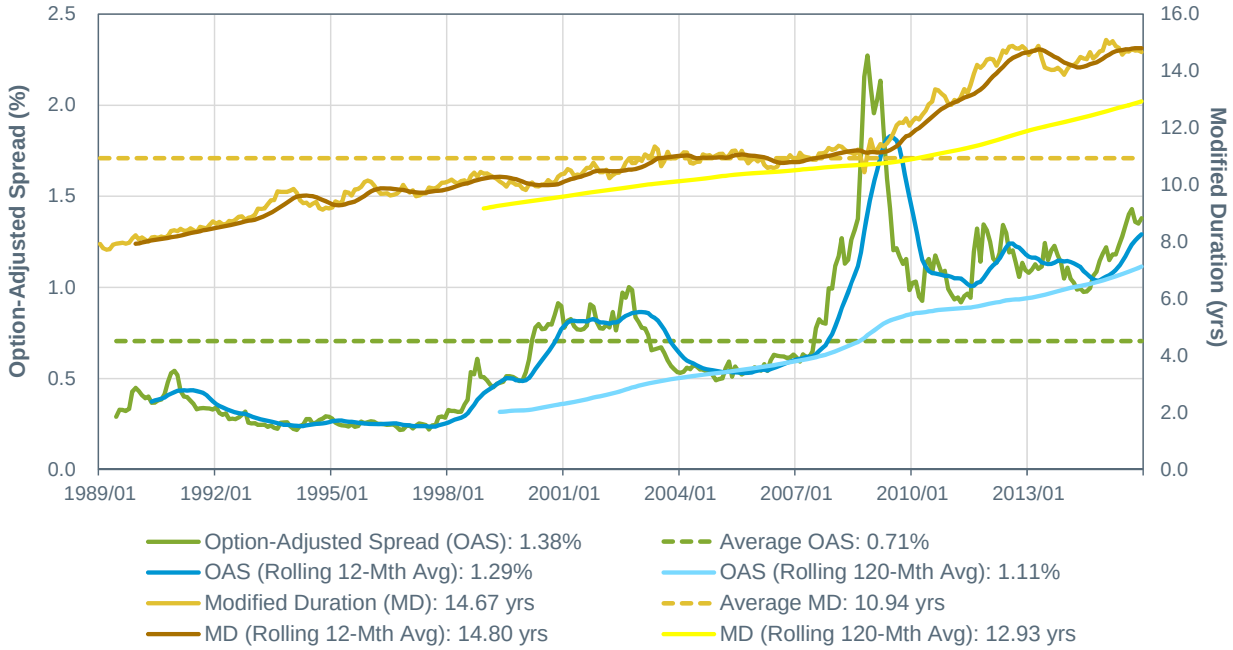
Source: Barclays Live. (2016)

Figure 29: Barclays US Long Government/Credit Index Yield to Worst and Yield to Maturity



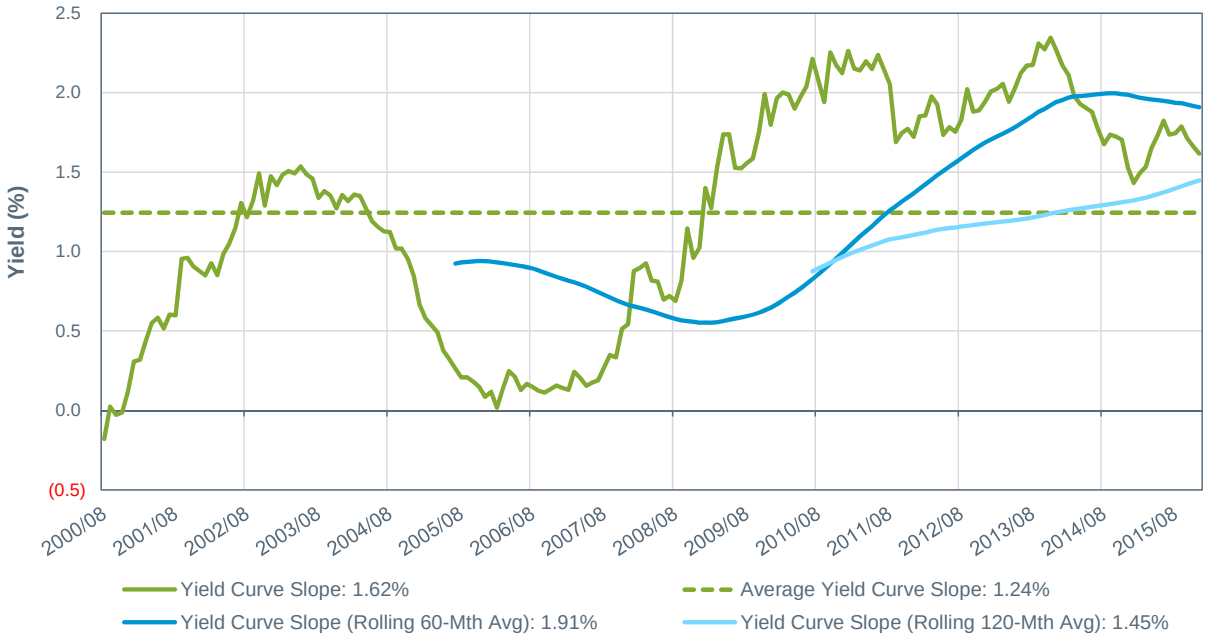
Average Yield to Worst is for the time period Jan-1973 through Dec-2015.
Average Yield to Maturity is for the time period Aug-2000 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

Figure 30: Barclays US Long Gov't/Credit Index Option-Adjusted Spread and Modified Duration



Average Option-Adjusted Spread is for the time period June-1989through Dec-2015.
Average Modified Duration is for the time period Jan-1989 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

Figure 31: Yield Curve Slope Barclays US Long Gov't/Credit Index vs. B US Aggregate Index



The yield curve slope shown is the difference in the YTM between the Barclays US Long Gov't/Credit and Barclays US Aggregate.
Average Yield Curve Slope is for the time period Aug-2000 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

US High Yield Fixed Income

	2016	2015	Change
Expected Return	6.50%	6.00%	+0.50%
Expected Risk	15.00%	15.00%	No Change

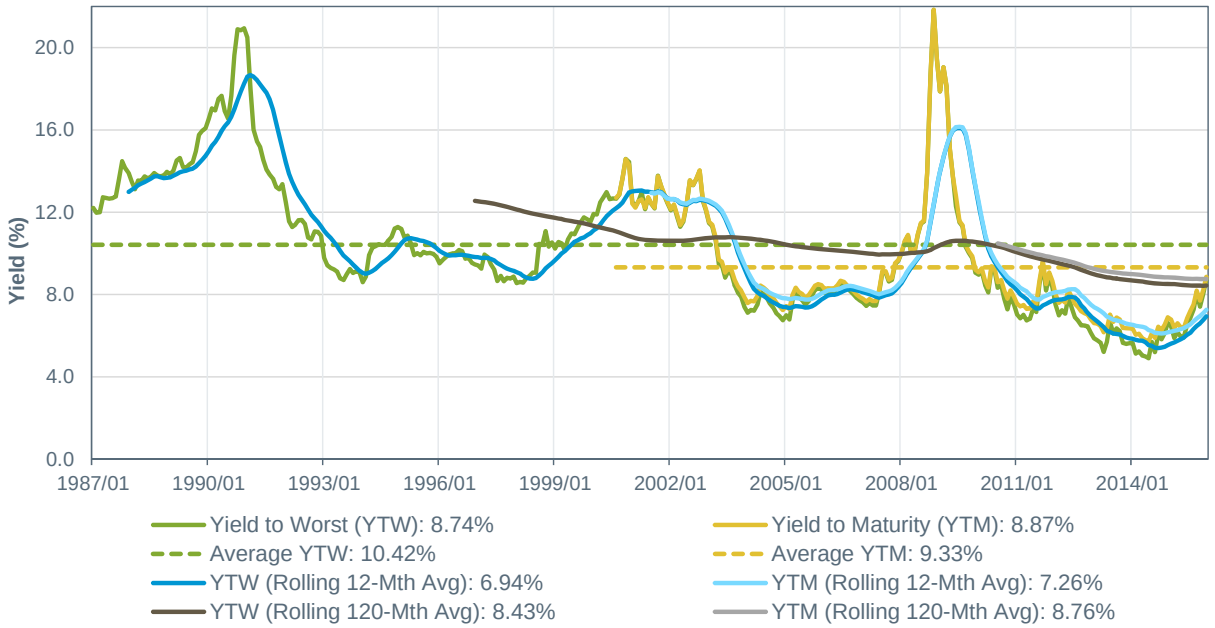
We benchmark high yield fixed income strategies to the Barclays US Corporate High Yield Index.

Given rising yields and widening spreads, we have increased our long-term forecast for return to 6.50%, while maintaining our forecast of the standard deviation at 15.00%.

	12/31/2015	12/31/2014	10 Year Average	20 Year Average
YTW	8.74%	6.61%	8.43%	9.32%
Monthly OAS	6.60%	4.83%	5.83%	5.37%
Modified Duration	4.34 Years	4.34 Years	4.31 Years	4.46 Years

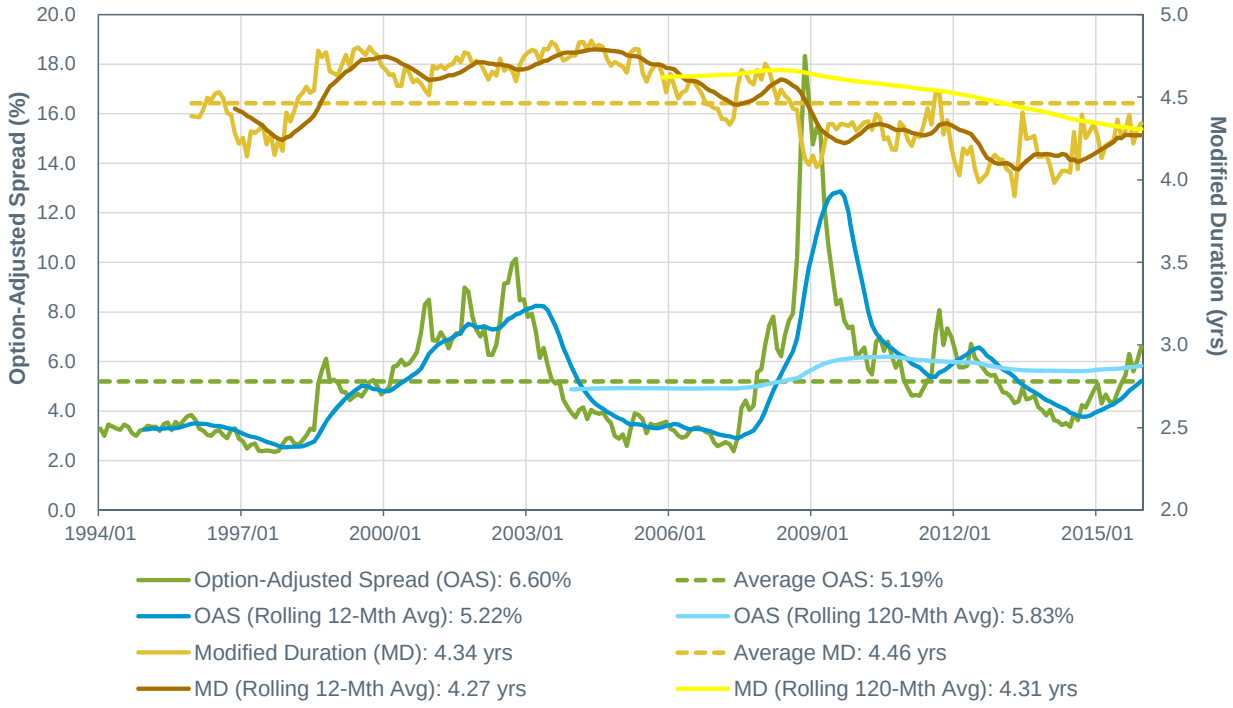
	10 Years	Since Inception (12/31/1984)
Average Annual Arithmetic Return	6.96%	9.85%
Annual Standard Deviation	21.19%	15.46%

Figure 32: Barclays US Corporate High Yield Index Yield to Worst and Yield to Maturity



Average Yield to Worst is for the time period Jan-1987 through Dec-2015.
Average Yield to Maturity is for the time period Aug-2000 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

Figure 33: Barclays US Corporate High Yield Index Option-Adjusted Spread and Modified Duration



Average Option-Adjusted Spread is for the time period Jan-1994 through Dec-2015.
Average Modified Duration is for the time period Dec-1995 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2015)

Emerging Markets Debt (Hard Currency)

	2016	2015	Change
Expected Return	5.75%	N/A	N/A
Expected Risk	12.50%	N/A	N/A

RVK analyzes emerging markets debt investments issued in USD using the JP Morgan Emerging Market Bond Global Diversified Total Return Index ("JPM EMBI Global Diversified TR Index") as a proxy for this asset class. This benchmark measures the performance of international government bonds issued by emerging market countries that are considered sovereign (issued in something other than local currency). The EMBI Global Diversified TR Index consisted of 24.4% quasi-sovereign securities and 75.5% sovereign securities as of 12/31/2015. This is a relatively immature asset class, hence the performance history for the benchmark only goes back to 2000.

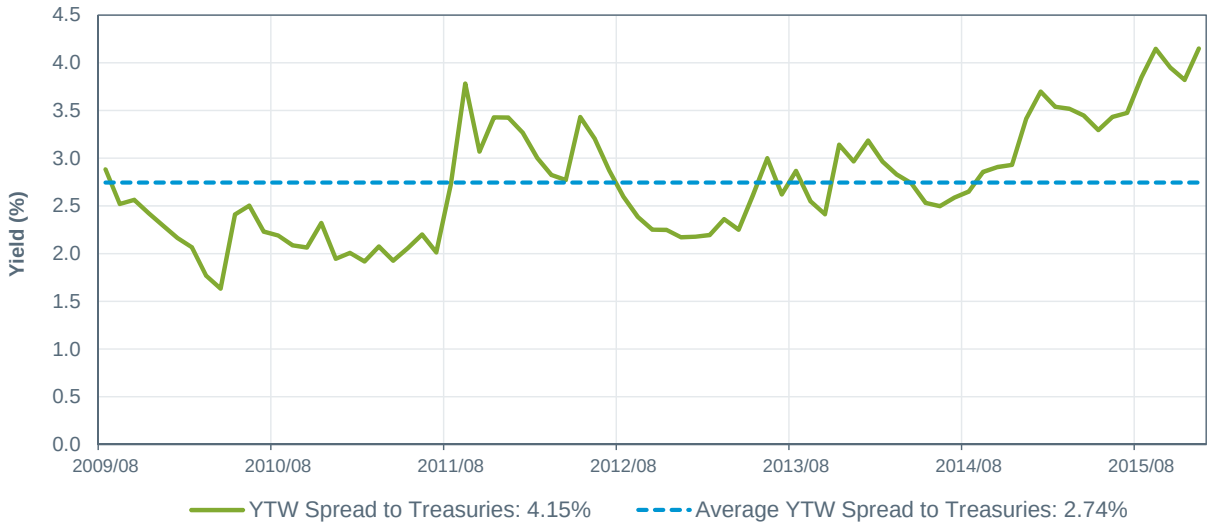
We expect emerging markets to perform well due to higher yields and wider spreads. Our long-term forecast for return is 5.75% and for the standard deviation is 12.50%.

	12/31/2015	12/31/2014	10 Year Average
YTW	6.39%	5.64%	6.30%*
Monthly OAS	4.15%	3.53%	3.27%
Effective Duration	6.57 Years	6.98 Years	6.94 Years

* 10 year average for YTW is not available. 10 year average is for YTM

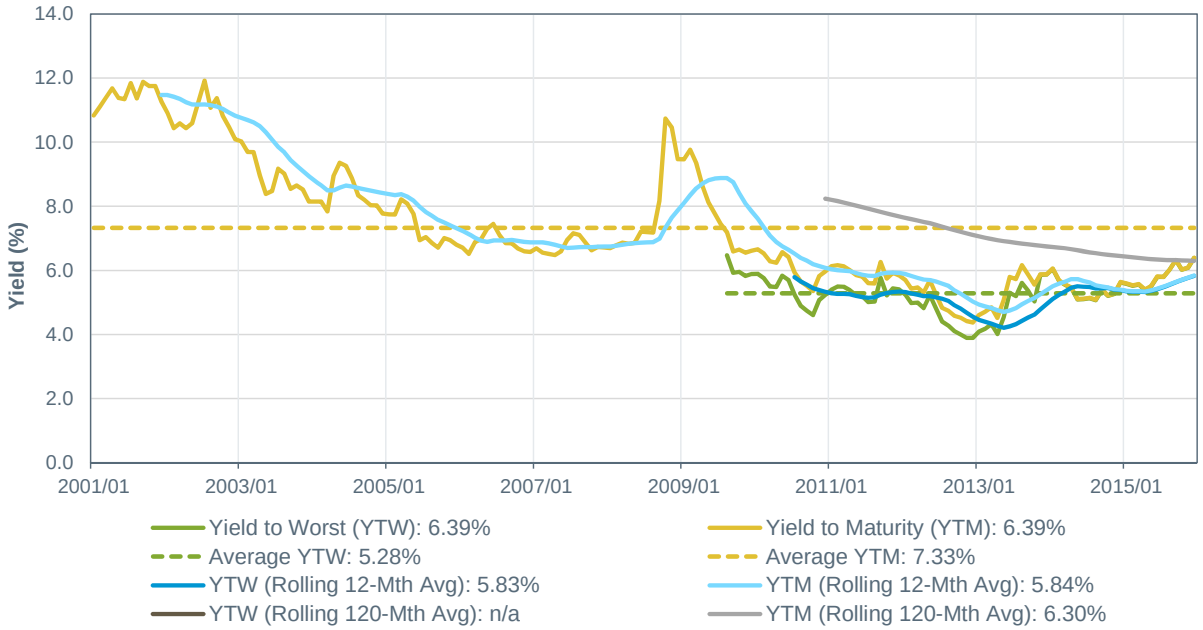
	10 Years	Since Inception (12/31/1994)
Average Annual Return	6.86%	10.11%
Annual Standard Deviation	11.60%	13.45%

Figure 34: JPMorgan EMBI Global Diversified TR Index Yield Spread to Treasuries



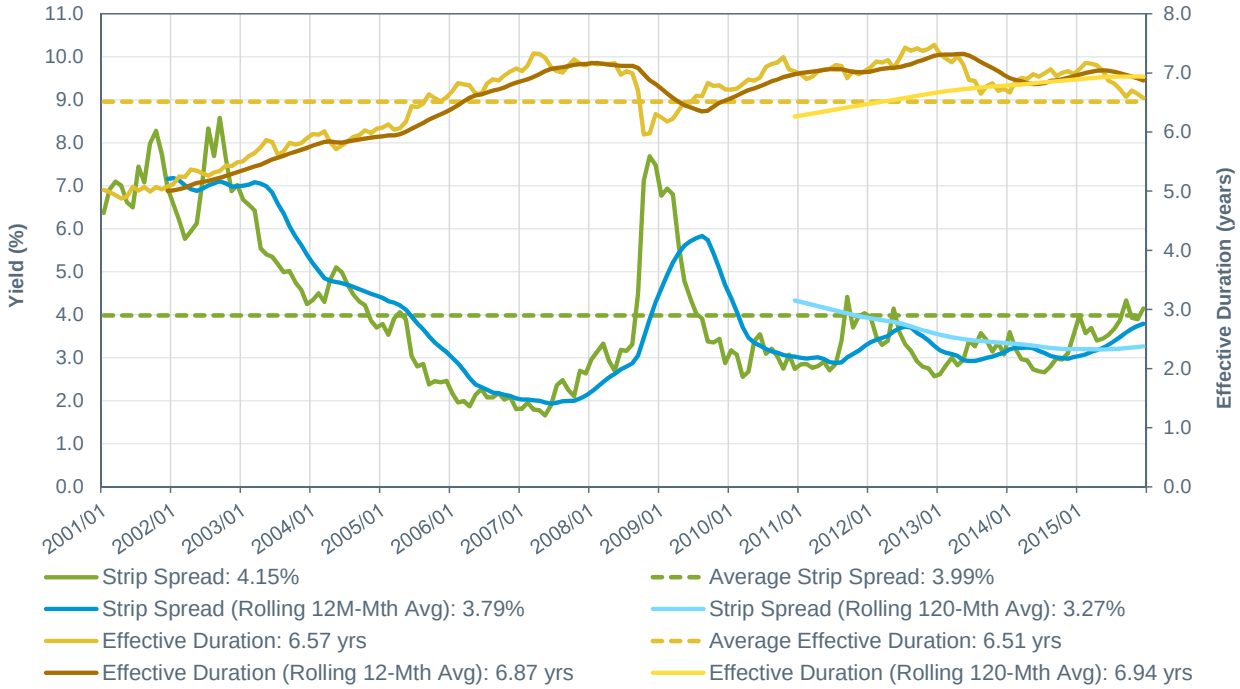
The yield spread shown is the difference in the YTW between the EMBI Global Diversified TR Index and 10-Year Treasuries. Averages are calculated based on monthly frequency.
Source: Barclays Live. (2015)

Figure 35: JP Morgan EMBI Global Diversified TR Index Yield to Worst and Yield to Maturity



Average Yield to Worst is for the time period Aug-2009 through Dec-2015.
Average Yield to Maturity is for the time period Jan-2001 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

Figure 36: JPMorgan EMBI Global Diversified TR Index Strip Spread and Effective Interest Rate Duration



Average Strip Spread is for the time period Jan-2001 through Dec-2015.
Average Effective Interest Rate Duration is for the time period Jan-2001 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

Emerging Markets Debt (Local Currency)

	2016	2015	Change
Expected Return	6.75%	N/A	N/A
Expected Risk	12.50%	N/A	N/A

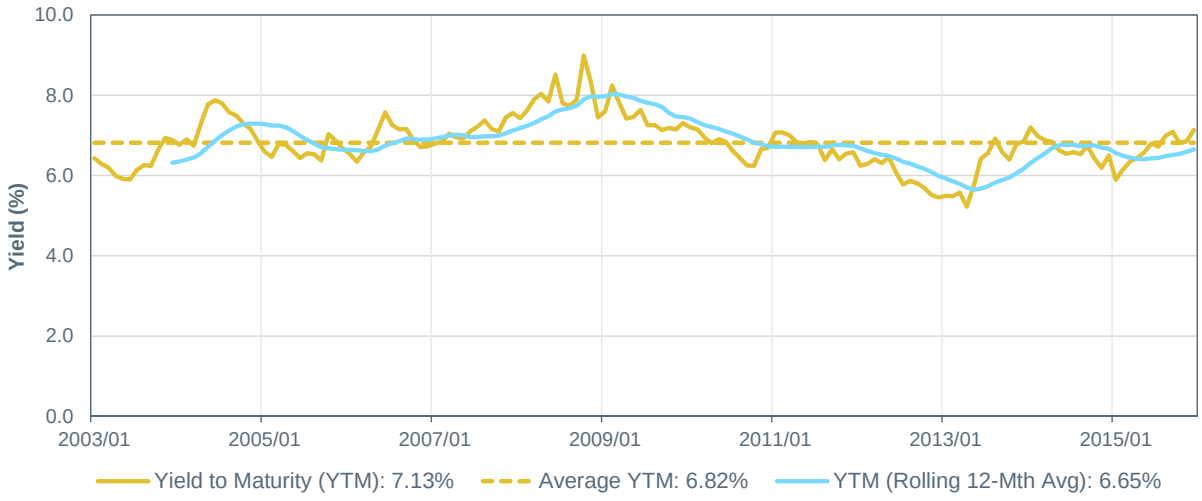
RVK analyzes emerging markets debt investments issued in local currency using the JP Morgan Government Bond Index Emerging Markets Global Diversified Total Return (USD) ("JPMorgan GBI-EM Global Diversified TR Index (USD)") as a proxy for this asset class. This is an investable benchmark that measures the performance of government bonds issued by emerging market countries in local currencies and consists 100% of sovereign securities. This is a relatively immature asset class, hence the performance history for the benchmark only goes back to 2000.

We expect emerging markets to perform well due to higher yields and wider spreads. Our long-term forecast for return is 6.75%, for the standard deviation is 12.50%.

	12/31/2015	12/31/2014	10 Year Average
YTM	7.13%	6.50%	6.63%
Strip Spread	5.39%	4.88%	4.58%
Modified Duration	4.79 Years	4.92 Years	4.46 Years

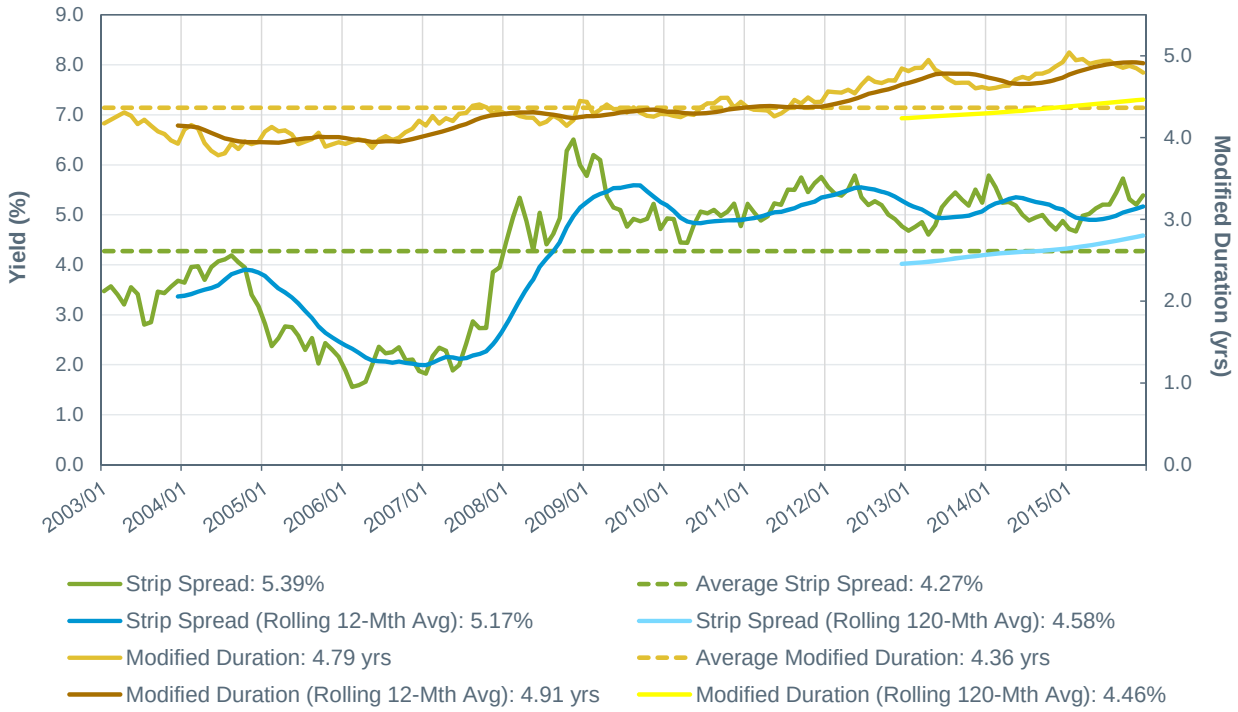
	10 Years	Since Inception (12/31/2003)
Average Annual Arithmetic Return	4.31%	7.49%
Annual Standard Deviation	13.64%	13.10%

Figure 37: JPMorgan GBI-EM Global Diversified Index Yield to Maturity



Average Yield to Maturity is for the time period Jan-2003 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

Figure 38: JPMorgan GBI-EM Global Diversified Index Strip Spread



Average Strip Spread is for the time period Jan-2001 through Dec-2015.
Average Effective Interest Rate Duration is for the time period Jan-2001 through Dec-2015.
Averages are calculated based on monthly frequency.
Source: Barclays Live. (2016)

EQUITY

Asset Class	2015			2016			One Year Adjustment		
	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %
US Equity									
Large/Mid Cap US Equity	7.00	17.75	5.56	7.00	17.75	5.56	0.00	0.00	0.00
Small Cap US Equity	7.50	21.25	5.46	7.75	21.25	5.71	+0.25	0.00	+0.25
Broad US Equity	7.05	17.80	5.60	7.05	17.80	5.60	0.00	0.00	0.00
International Equity									
DevD Large/Mid Cap Int'l Equity	8.00	19.00	6.37	8.25	19.00	6.62	+0.25	0.00	+0.25
DevD Small Cap Int'l Equity	8.50	23.00	6.14	8.50	23.00	6.14	0.00	0.00	-0.00
Emerging Markets Equity	10.50	29.00	6.88	11.00	29.00	7.40	+0.50	0.00	+0.52
Broad International Equity	8.60	20.60	6.70	8.85	20.60	6.95	+0.25	0.00	+0.25
Global Equity	7.80	18.35	6.27	7.90	18.35	6.37	+0.10	0.00	+0.10

US EQUITY

The fundamental methodology we utilize for estimating equity returns is a bottom-up decomposition model, whereby RVK gathers long-term data regarding key equity return drivers, including dividend yield, projected real earnings growth (factoring in both revenue and margins), and projected changes in valuations. Consistent with previous years, we built decomposition models for each equity sub-asset class (except for developed small cap international equity, given the lack of available data). Despite the fact that the data history is more limited for sub-asset classes outside of US large/mid cap equity, we believe that performing distinct decompositions for sub-asset classes still improves the overall accuracy of our assumptions.

Our return decomposition methodology is similar to the Grinold & Kroner model, which is a methodology included in the CFA Institute's Candidate Body of Knowledge ("CBOK"). The method decomposes equity return expectations into the following drivers: *Dividend Yield, Share Repurchase Yield, Earnings Growth, Inflation, and change in Price/Earnings Ratio.* RVK incorporates a few important modifications to the model. First, we factor in the impact of profit margin reversion in our earnings analysis. Second, we exclude share repurchase yield from the model as we believe there is evidence suggesting it is not additive to long-term returns[4]. Factors included in the RVK model are presented in **Figure 39**. Please note that inflation is broadly addressed in our preceding analysis and therefore added as a separate item within each asset class section below. It is also important to note that while the above stated factors generally inform the direction and magnitude of our decisions, we also consider qualitative and triangulation issues, as well as additional factors as needed, when arriving at final assumption values.

[4] Bernstein, William J. and Arnott, Robert D., Earnings Growth: The Two Percent Dilution. Financial Analysts Journal, Vol. 59, No. 5, pp. 47-55, September/October 2003. Available at SSRN: http://ssrn.com/abstract=489602.

Figure 39: RVK Return Decomposition

$$\hat{R}_i = \frac{D}{P} + g + \Delta\left(\frac{P}{E}\right)$$

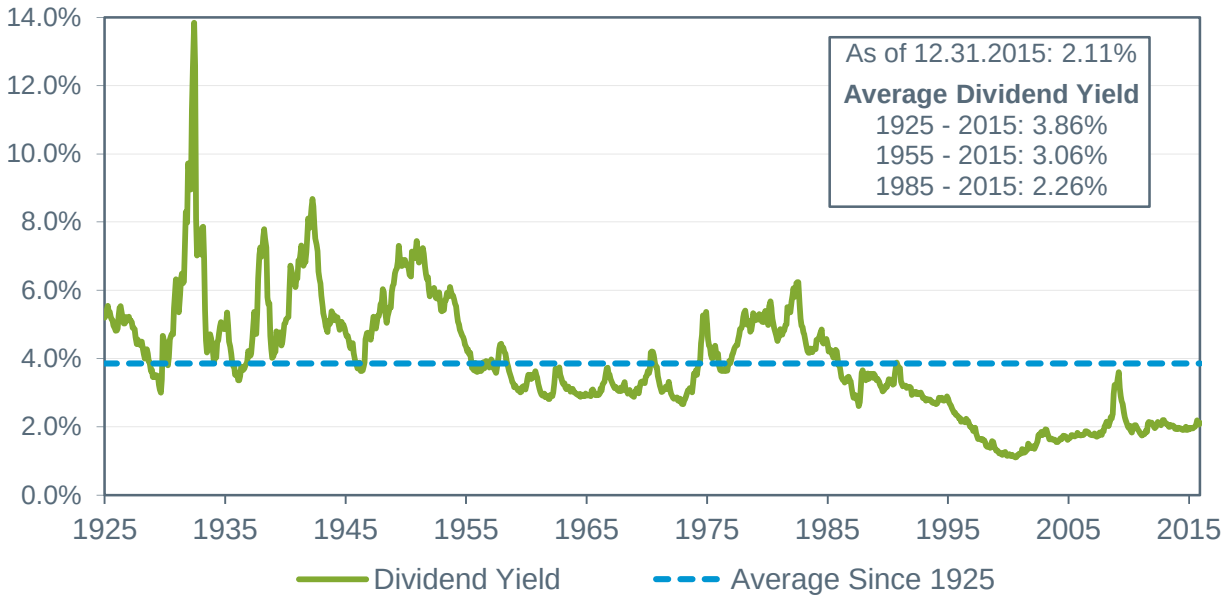
$\hat{R}_i$ = Expected Return
$\frac{D}{P}$ = Dividend Yield
g = Projected Median Earnings Growth
$\Delta\left(\frac{P}{E}\right)$ = Expected Change in Price/Earnings Ratio

Source: CFA Institute Candidate Body of Knowledge. (2012).

Dividend Yield

Dividend yield represents the income that investors earn on their equity investment. While the average dividend yield for the S&P 500 Index has been 3.86% since 1925, in the last 30 years the dividend yield has fallen to an average of 2.26%. Therefore, we use current dividend yield in the return decomposition model to estimate future yields to better reflect the current economic environment and trends.

Figure 40: S&P 500 Index Dividend Yield



Source: RVK, based on data from the Robert Shiller Database (2016).

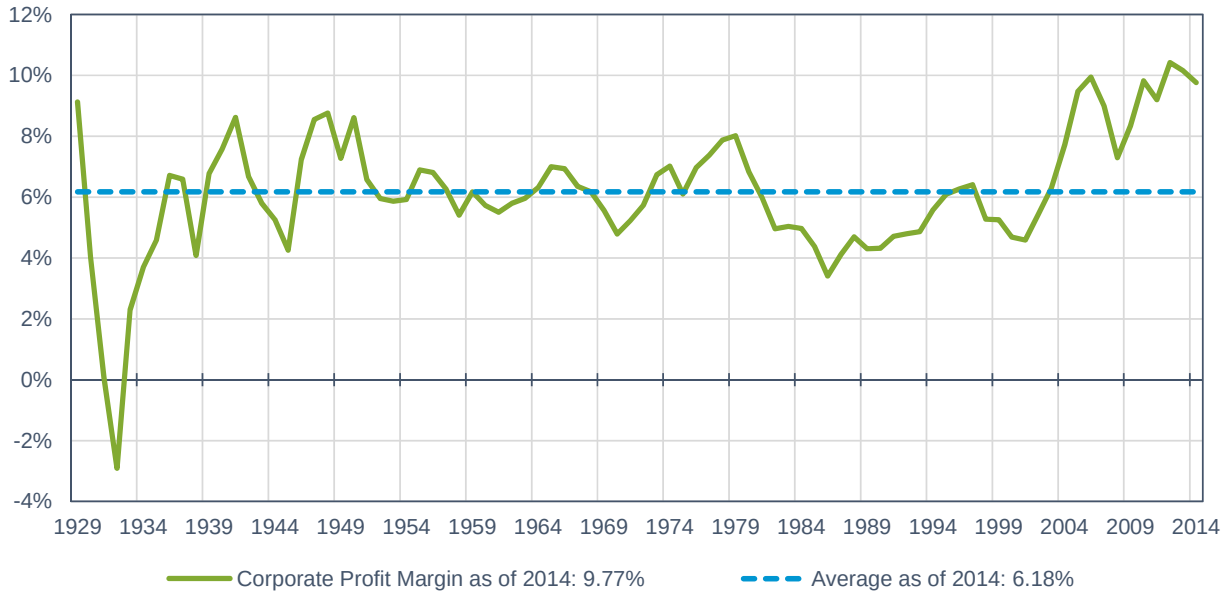
Earnings Growth

We derive earnings growth forecasts based on two components – sales growth and profit margins. Generally, as the economy expands corporations benefit from higher revenue/sales. Therefore, we assume that corporate sales grow at roughly the same pace as the economies from which their sales are derived – with market based regional allocations within each asset class. We also utilize forecasts of future Growth Domestic Product (GDP) growth worldwide to arrive at an estimated future sales growth rate for each equity asset class.

The second component in determining bottom line earnings growth is profit margin levels. For example, over the last decade domestic profit margins have reached historic highs in part due to

reduced financing costs (low global interest rates) and reduced labor costs (high global unemployment). We believe profit margins will mean-revert as high profit margins attract new entrants (thus increasing competition), as rates increase, and as excess labor supply decreases – all putting downward pressure on profit margins. **Figure 41** below shows historical corporate profit margins (corporate profits after tax refers to profits of all corporations resident in the US whether the profit is earned domestically or in a foreign country). The assumptions impact from profit margins is based on both current values as well as adjustments for mean reversion.

Figure 41: Corporate Profits After Tax as a Percent of Nominal GDP



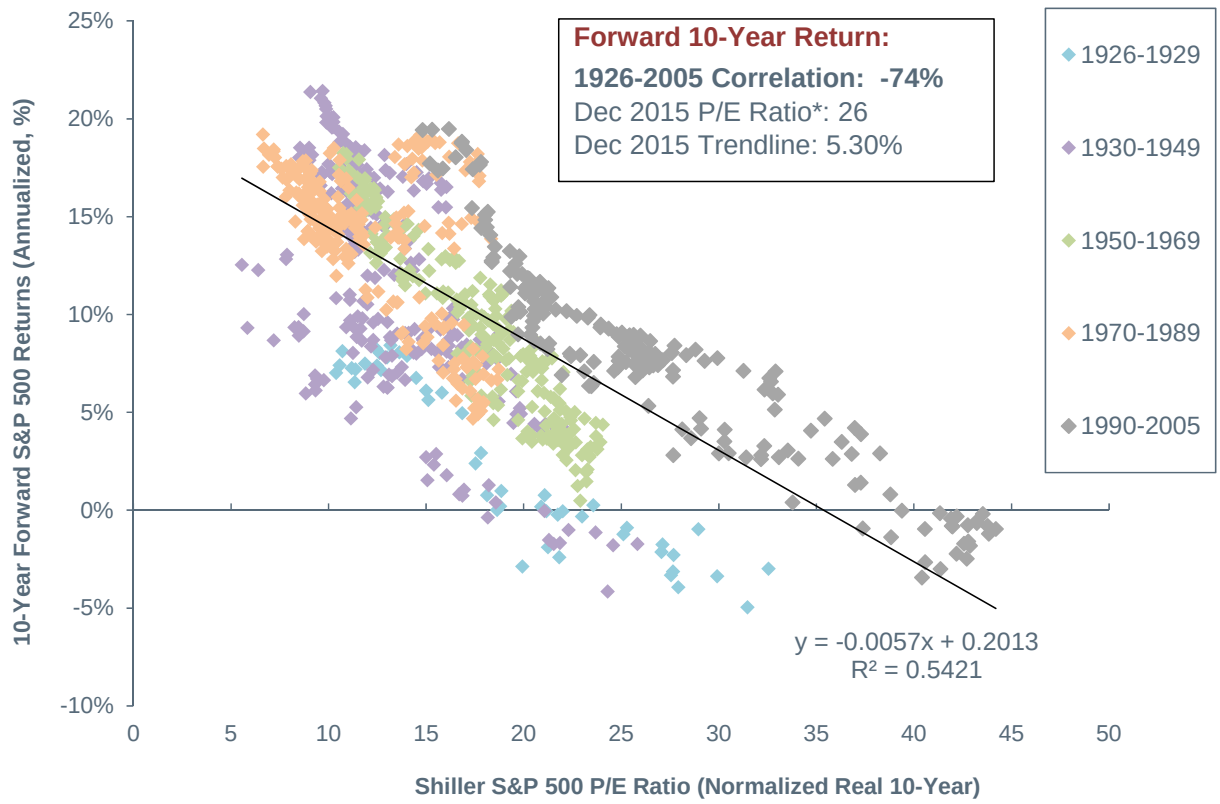
Source: RVK, based on data from the US Department of Commerce, Bureau of Economic Analysis (2016).

Valuation (Change in Cyclically Adjusted Price/Earnings Ratio)

The last driver of future equity returns in our decomposition model is a change in valuation, commonly measured by the cyclically adjusted price-to-earnings (P/E) ratio. Historically P/E ratios have been negatively correlated with subsequent long-term equity returns, as shown in **Figure 42** for the S&P 500 Index (the index with the longest history). Yale professor Robert Shiller argues that one year earnings are highly volatile, affected by short-run considerations, and likely mean-reverting[5]. He proposed using the cyclically adjusted price-to-earnings ratio (i.e. CAPE or Shiller P/E), which averages the prior 10 years of real earnings. Therefore, in our forecast of a valuation impact on future equity returns we assume that current CAPE ratios will mean revert to the historical average for the given index. Valuation tends to be the most volatile decomposition input, given its underlying components, and thus often has the largest influence on year to year changes in return assumptions.

[5] Campbell, John Y., and Robert Shiller, 1998. Valuation Ratios and the Long-Run Stock Market Outlook. The Journal of Portfolio Management 24(2).

Figure 42: S&P 500 CAPE Ratio vs. 10-Year Forward S&P 500 Return



Dec 2015 P/E Ratio uses the latest available S&P 500 Earnings as of September 30, 2015 for the 4th quarter of 2015.
Source: RVK, based on data from the Robert Shiller Database (2016).

In addition to return estimates, we also estimate asset class volatility. Volatility estimation is relatively straightforward as we consider historical volatility analyses, while also adjusting for evolving trends, triangulation, and other considerations.

Our 2016 assumptions for US equities are shown below. Detailed results for each sub-asset class are presented on the following pages.

Asset Class	2015			2016			One Year Adjustment		
	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %
Large/Mid Cap US Equity	7.00	17.75	5.56	7.00	17.75	5.56	0.00	0.00	0.00
Small Cap US Equity	7.50	21.25	5.46	7.75	21.25	5.71	+0.25	0.00	+0.25
Broad US Equity	7.05	17.80	5.60	7.05	17.80	5.60	0.00	0.00	0.00

US Large/Mid Cap Equity

Return

Our decomposition model for US large/mid cap equity estimates a long-run real return of 2.88% as of December 31, 2015. **Figure 43** provides the values for each factor in the decomposition model as well as a brief explanation of the methodology employed to establish the projected value.

Figure 43: US Large/Mid Cap Equity Decomposition

Factor	Value	Methodology Rationale
$\frac{D}{P}$	+2.15%	RVK used the current dividend yield for the S&P 500 Index as of December 31, 2015.
$\Delta\left(\frac{P}{E}\right)$	-0.63%	RVK compared the historical average 10-year cyclically adjusted P/E with the current, 10-year cyclically-adjusted P/E. According to these estimates, the S&P 500 is overvalued, which will have a net negative impact on real returns if valuations return to historical levels.
g	+1.37%	RVK considered current earnings margins and future expected real sales growth to determine an estimate of forward-looking earnings growth. RVK's forward-looking earnings growth estimate is lower than historical growth due largely to high current earnings (profit) margins, which have tended to revert to historical norms over time. This mean reversion is expected to dampen real earnings growth.
$\hat{R}_i$	**2.88%**	

Adding RVK's expected inflation rate of 2.50%, our decomposition model suggests a nominal return for US large/mid cap equity of 5.38%. Based on the model – as well as labor and capital market conditions (suggesting current margins[6] may revert slower than historical experience given higher unemployment and lower rates, or revert to higher levels given smaller manufacturing sector), and triangulation considerations – we are keeping our expected nominal return for US large/mid cap equity at 7.00%.

Volatility

US large/mid cap equity returns have historically exhibited a high degree of volatility. Since 1926 the annual standard deviation of S&P 500 Index returns has been 19.99%. Over a more recent time period (since 1986), it has been 17.23%. However, the heightened volatility associated with the tech bubble and financial crisis markets has caused volatility over the last 20-year period to fall more closely in-line with the long-term average.

Figure *44* shows the historical volatility of the S&P 500 Index during various time periods, and **Figure 45** shows the rolling 10-year volatility of the S&P 500 Index since inception.

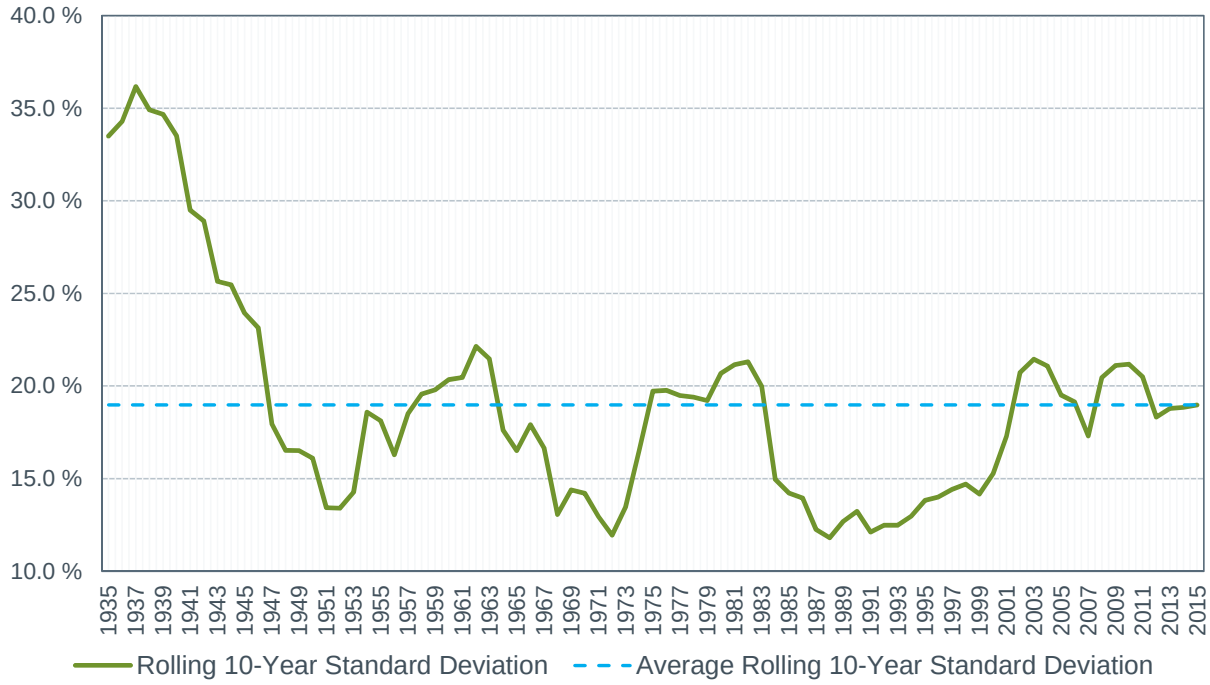
[6] See https://www.lordabbett.com/content/lordabbett/en/perspectives/equityperspectives/are-high-profit-margins-here-to-stay.html.

Figure 44: S&P 500 Index Volatility

Trailing Period	Standard Deviation
1926 - Present	19.99%
30 Years	17.23%
20 Years	18.75%
10 Years	18.97%

Source: Standard & Poor's. (2016)

Figure 45: Rolling 10-Year S&P 500 Index Standard Deviation



Source: Standard & Poor's. (2016)

As indicated in the previous figures, volatility has significantly declined since the first two decades of the inception of the S&P 500 Index, but appears to have risen moderately over recent periods. As a result, we are maintaining our volatility assumption of 17.75%, which is in-between the 30-year average and the increasing 10-year average, and represents no change relative to our 2015 assumption.

US Small Cap Equity

Return

Our decomposition model for US small cap equity estimates a long-run real return of 5.82% as of December 31, 2015. **Figure 46** provides the values for each factor in the decomposition model as well as a brief explanation of the methodology employed to establish the projected value.

Figure 46: US Small Cap Equity Decomposition

Factor	Value	Methodology Rationale
$\frac{D}{P}$	+1.61%	RVK used the current dividend yield for the Russell 2000 Index as of December 31, 2015.
$\Delta\left(\frac{P}{E}\right)$	-0.47%	RVK compared the historical average 10-year cyclically adjusted P/E with the current, 10-year cyclically-adjusted P/E for the Russell 2000 index. According to these estimates, the Russell 2000 is overvalued, which will have a net negative impact on real returns if valuations return to historical levels.
g	+4.68%	RVK's forward-looking earnings growth estimate for US small cap equities is roughly aligned with recent historical growth rates and expected future growth rates – with little impact due to profit margins, unlike US large/mid cap equities.
$\hat{R}_i$	**5.82%**	

Adding RVK's expected inflation rate of 2.50%, our 2016 estimated nominal return for US small cap equity yields a return of 8.32%. Based on the model, as well as qualitative and triangulation considerations, we are increasing our expected nominal return for US small cap equity to 7.75% (from 7.50%).

Volatility

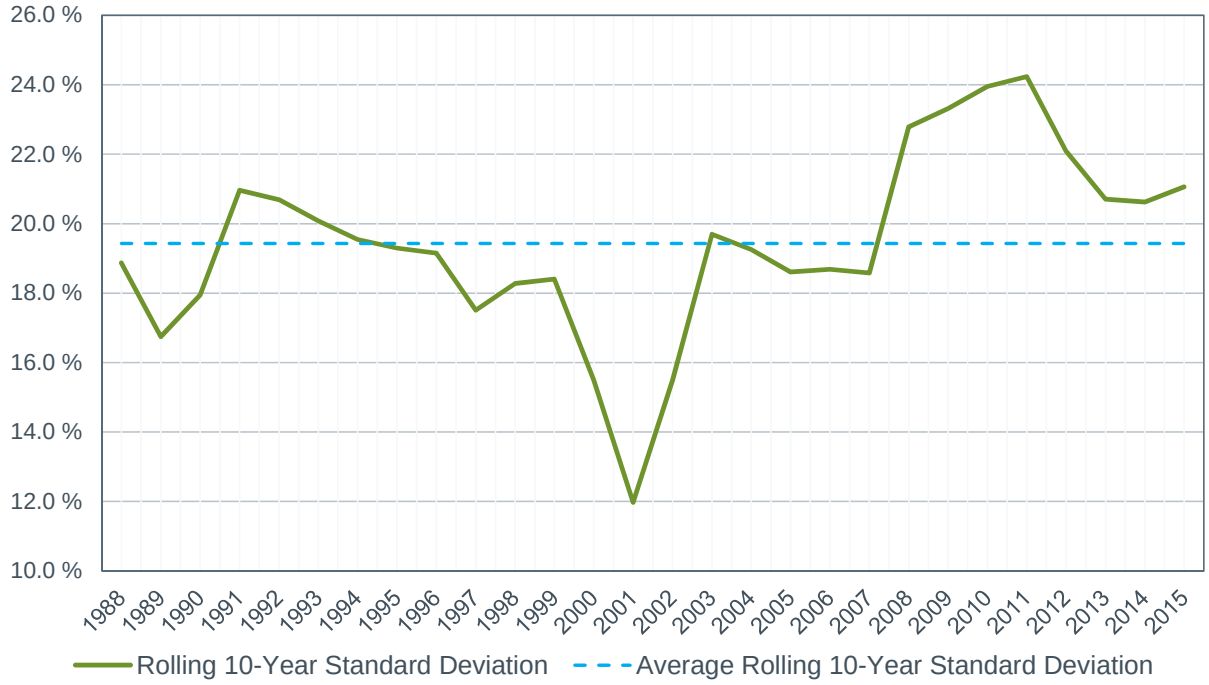
US small cap equity returns have historically exhibited a high degree of volatility. Since 1979 the annual standard deviation of Russell 2000 Index returns has been 19.37%. **Figure 47** below shows the historical volatility of the Russell 2000 during various time periods, and **Figure 48** shows the rolling 10-year volatility of the Russell 2000 Index since inception.

Figure 47: Russell 2000 Index Volatility

Trailing Period	Standard Deviation
1979 - Present	19.37%
30 Years	19.06%
20 Years	19.37%
10 Years	21.06%

Source: Russell Investments. (2016)

Figure 48: Rolling 10-Year Russell 2000 Index Standard Deviation



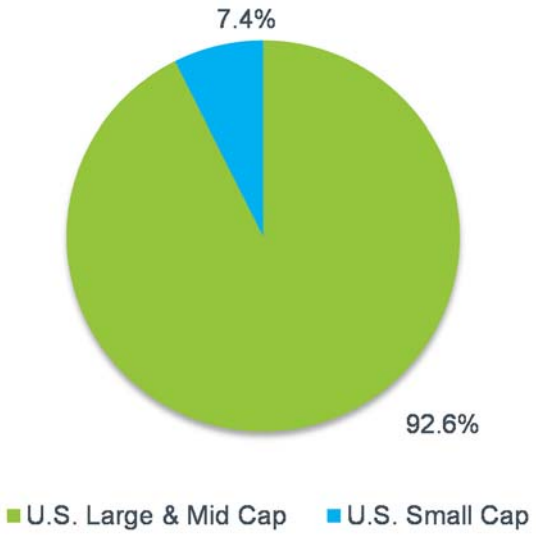
Source: Russell Investments. (2016)

Taking into account the fluctuating volatility levels over different time periods, we believe a conservative approach is warranted. However, we also believe that the drivers of expected future volatility have not changed materially over the past year; therefore we have maintained our 2015 assumption for US small cap equity volatility at 21.25%.

Broad US Equity

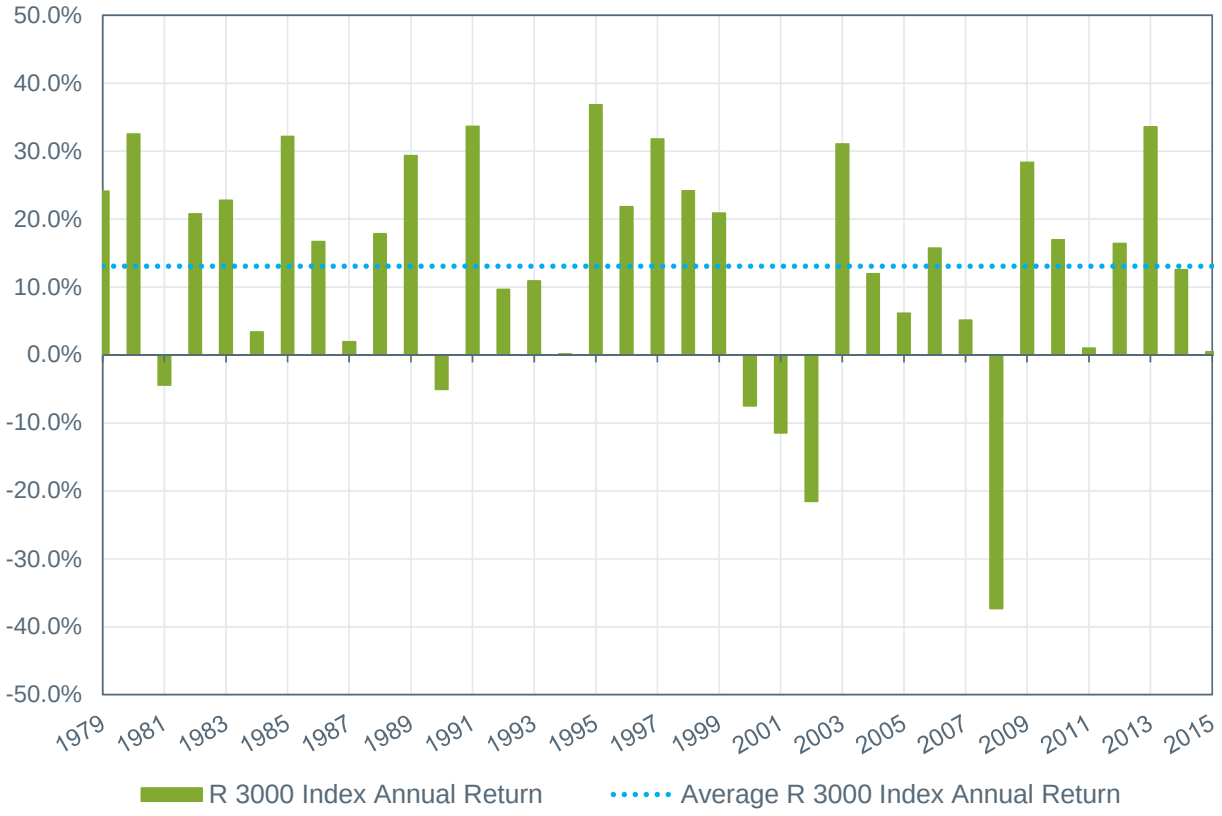
Broad market US equity can be well represented by the Russell 3000 Index. Market capitalization statistics suggest that this index is dominated by the performance of large/mid cap securities (92.6%, as shown in **Figure 49**). Using a weighted average of our large/mid cap and small cap estimates, we estimate that broad market equity exposure will realize an annual return of 7.05% with 17.80% annual volatility. This represents a weighted average of the return expectations for large/mid cap US equity and small cap US equity, and it includes the impact of correlations when calculating volatility. This is consistent with historical observations, which reveal a slight return premium of broad US equities over large/mid cap equities with a slight increase in volatility due to the inclusion of small cap stocks. **Figure 50** shows the annual return of the Russell 3000 Index since 1979 and **Figure 51** shows the rolling 10-year standard deviation of returns for the index over the same time frame.

Figure 49: Russell 3000 Capitalization Breakout



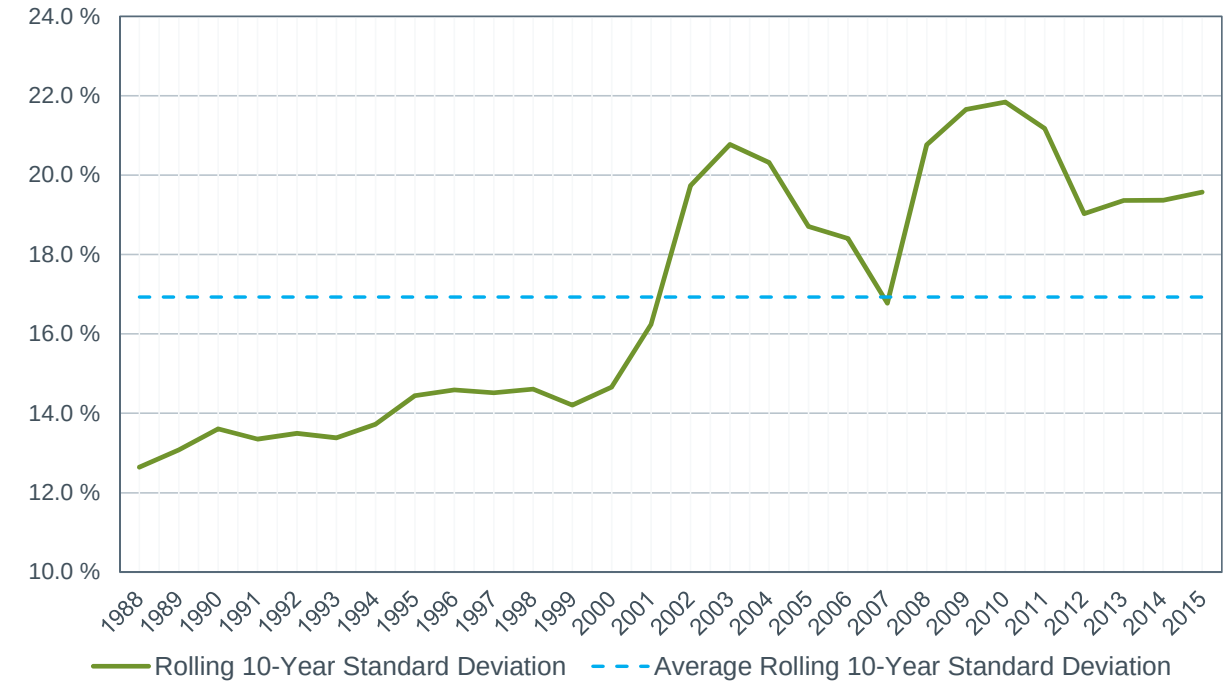
Source: Russell Investments. (2016)

Figure 50: Russell 3000 Index Annual Returns



Source: Russell Investments. (2016)

Figure 51: Rolling 10-Year Russell 3000 Index Standard Deviation



Source: Russell Investments. (2016)

INTERNATIONAL EQUITY

Similar to US equity, the fundamental methodology we employ for estimating international equity returns is a bottom-up decomposition model, whereby RVK gathers long-term data regarding key equity return drivers, including dividend yield, projected real earnings growth, and projected changes in valuations. The exception is international developed small cap equity, which is based on an assumed return premium relative to international developed large/mid cap equity. The return premium method is used as limited data availability prevents us from developing a reliable equity return decomposition model. In addition to return estimates, we also estimate asset class volatility. Similar to US equity, volatility estimates are based on long-term volatility trends with slight adjustments to account for evolving trends.

Our 2016 assumptions for international equity sub-asset classes are shown below. Detailed results for each sub-asset class are presented on the following pages.

Asset Class	2015			2016			One Year Adjustment		
	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %
Dev'd Large/Mid Cap Int'l Equity	8.00	19.00	6.37	8.25	19.00	6.62	+0.25	0.00	+0.25
Dev'd Small Cap Int'l Equity	8.50	23.00	6.14	8.50	23.00	6.14	0.00	0.00	-0.00
Emerging Markets Equity	10.50	29.00	6.88	11.00	29.00	7.40	+0.50	0.00	+0.52
Broad International Equity	8.60	20.60	6.70	8.85	20.60	6.95	+0.25	0.00	+0.25
Global Equity	7.80	18.35	6.27	7.90	18.35	6.37	+0.10	0.00	+0.10

Developed Large/Mid Cap International Equity

Return

Our decomposition model for international developed large/mid cap equity estimates a long-run real return of 4.95% as of December 31, 2015.
Figure *52* provides the values for each factor in the decomposition model as well as a brief explanation of the methodology employed to establish the projected value.

Figure 52: Developed Large/Mid Cap International Equity Decomposition

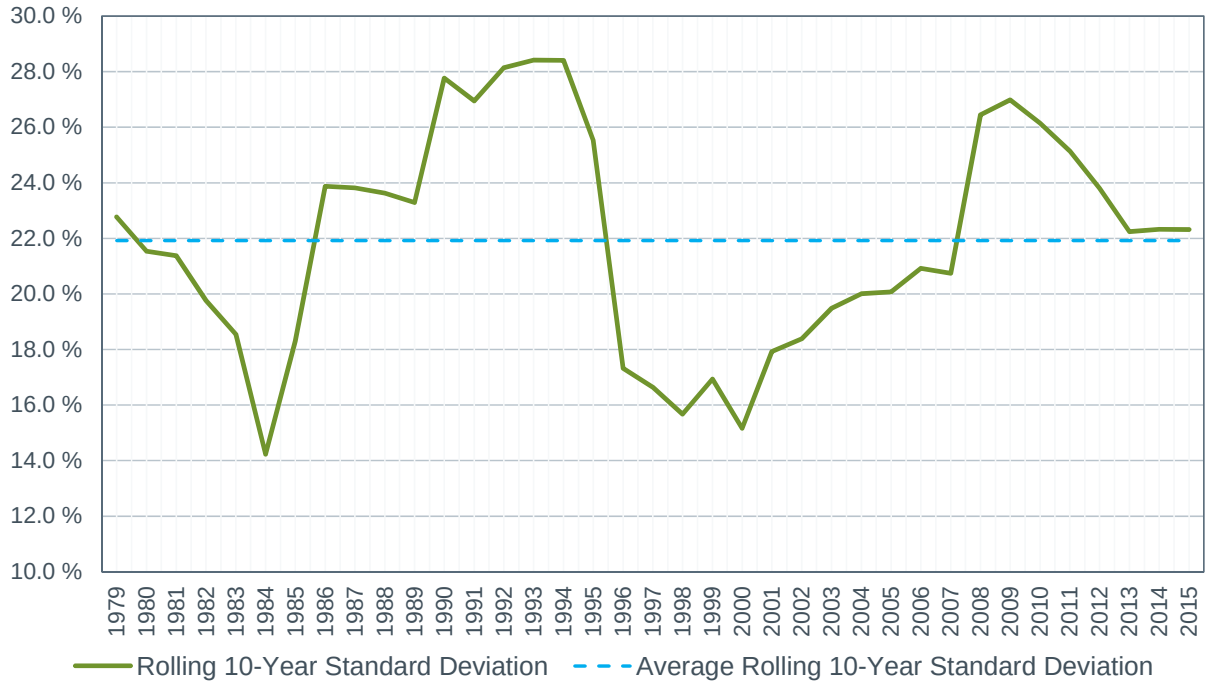
Factor	Value	Methodology Rationale
$\frac{D}{P}$	+3.26%	RVK used the current dividend yield for the MSCI EAFE Index as of December 31, 2015
$\Delta\left(\frac{P}{E}\right)$	+0.51%	RVK compared the historical average 10-year cyclically adjusted P/E with the current, 10-year cyclically-adjusted P/E. According to these estimates, the MSCI EAFE Index is undervalued, which will have a net positive impact on real returns if valuations return to historical levels.
g	+1.17%	RVK considered current earnings margins and future expected real sales growth to determine an estimate of forward-looking earnings growth.
$\hat{R}_i$	**4.95%**	

Adding RVK's expected inflation rate of 2.50%, our raw analysis for international developed large/mid cap equity yields a return of 7.45%. Given improved model output, due to attractive valuations and healthy dividend yields, we increased our 2016 expected return for international developed large/mid cap equity to 8.25%, an increase of 0.25% compared to 2015.

Volatility

The historical volatility of the MSCI EAFE Index is greater than the historical volatility of the S&P 500 Index. Since inception (in 1970), the annual standard deviation of the MSCI EAFE Index has been 22.12% vs. 17.46% for the S&P 500 Index for the same period. However, over the past twenty years volatility for this index was lower than that long run historical average at 20.68%. While volatility spiked during the global financial crisis, and could continue given recent events and ongoing concerns, we expect the long-term trend of declining volatility and a smaller volatility premium to the US to continue. Thus, our 2016 volatility assumption for developed large/mid cap international equity is 19.00%, which represents no change from our 2015 estimate.

Figure 53: Rolling 10-Year MSCI EAFE Index Standard Deviation



Source: MSCI. (2016)

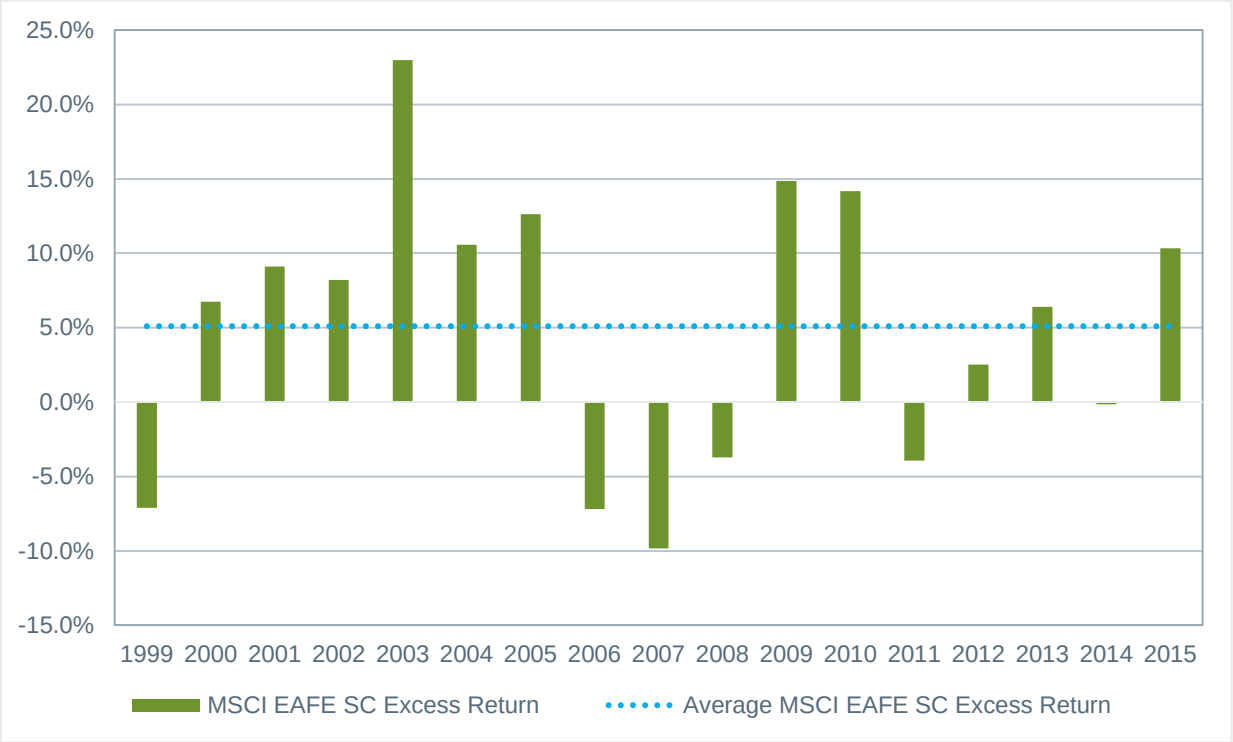
Developed Small Cap International Equity

Return

Developed small cap international equities are modeled using the MSCI EAFE Small Cap Index, which was incepted in 1999. It is important to note that due to the particularly limited data on the underlying drivers of international developed small cap equity returns, we do not attempt to complete a robust return decomposition model for this asset class. Instead, we estimate a reasonable return premium that could be expected relative to developed large/mid cap international equity over time.

For our analysis we analyzed the returns of the MSCI EAFE Small Cap Index relative to the MSCI EAFE Index. Historically, the MSCI EAFE Small Cap Index has provided a return premium relative to the MSCI EAFE Index. Over the past 10 years, there was a nominal premium of 2.35%, but the annual premium since inception (15 years) has averaged 5.09%. **Figure 54** shows the annual premium of the MSCI EAFE Small Cap Index over the MSCI EAFE Index since 1999.

Figure 54: Small/Mid Cap Nominal Premium
1-Year Rolling Excess Return vs. MSCI EAFE Index



Source: MSCI. (2016)

Given the increased integration of international and US equity markets, we believe the small cap premium will more closely resemble the historical premium within US equities markets. Additionally, what limited yield and valuation data we do have available would suggest a reduced premium relative to historic levels. Therefore, we forecast 0.25% return premium over international large/mid cap equity. Accordingly, we assume an expected forward-looking return to developed small cap international equity of 8.50%.

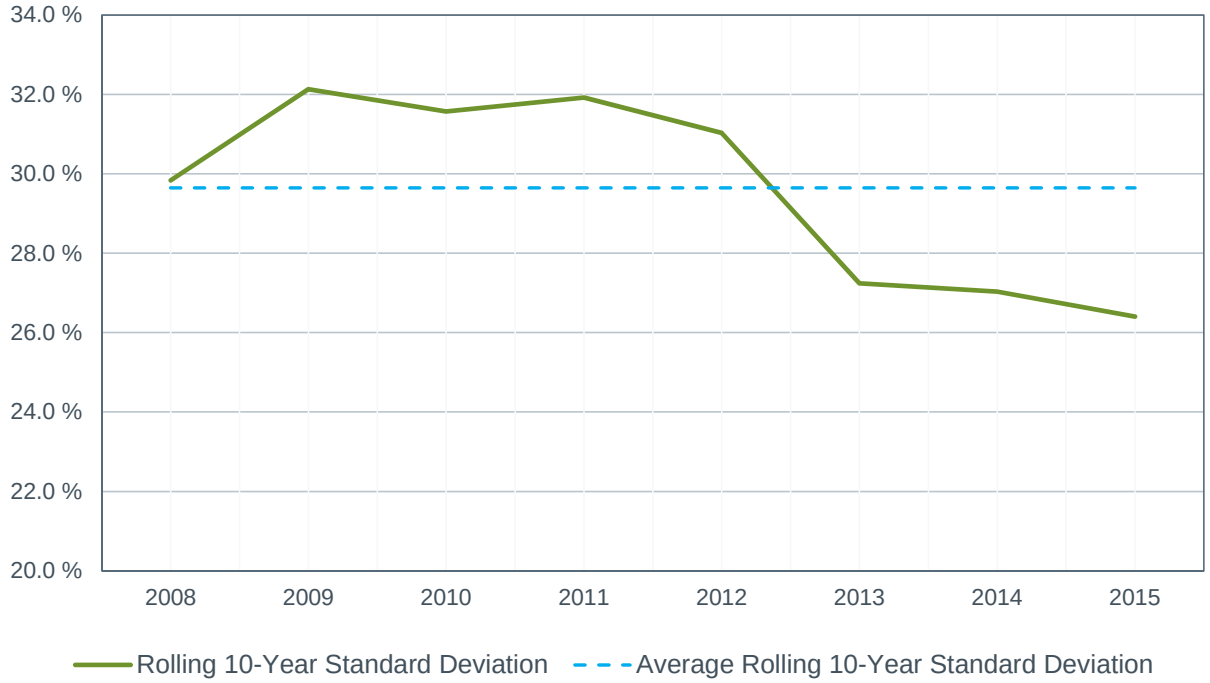
Volatility

The MSCI EAFE Small Cap Index has experienced greater volatility than the MSCI EAFE Index. Volatility for the last 10 years has averaged 26.40%, while volatility since inception (15 years) has

averaged 26.09%. **Figure 55** shows the rolling 10-year standard deviation of returns for the MSCI EAFE Small Cap Index since inception. Given the limited history of the index, we again tempered our estimate by considering the longer term experience of US small cap indices.

Our expected standard deviation of returns for international small cap equities is 23.00%, which is 1.75% higher than US small cap equity volatility assumption and is consistent with our 2015 assumption.

Figure 55: Rolling MSCI Small/Mid Cap Index 10-Year Volatility



Source: MSCI. (2016)

Emerging Market Equity

Return

Our decomposition model for emerging market equity estimates a long-run real return of 9.68% as of December 31, 2015. **Figure 56** provides the values for each factor in the decomposition model as well as a brief explanation of the methodology employed to establish the projected value.

Figure 56: Emerging Markets Equity Decomposition

Factor	Value	Methodology Rationale
$\frac{D}{P}$	+2.92%	RVK used the current dividend yield for the MSCI EM Index as of December 31, 2015.
$\Delta\left(\frac{P}{E}\right)$	+2.56%	RVK compared the historical average 10-year cyclically adjusted P/E with the current, 10-year cyclically-adjusted P/E. According to these estimates, the MSCI Emerging Markets Index is undervalued, which will have a net positive impact on real returns if valuations return to historical levels.
g	+4.20%	RVK considered current earnings margins, which negatively impacted the potential overall growth rate, and future expected real sales growth to determine an estimate of forward-looking earnings growth.
$\hat{R}_i$	**9.68%**	

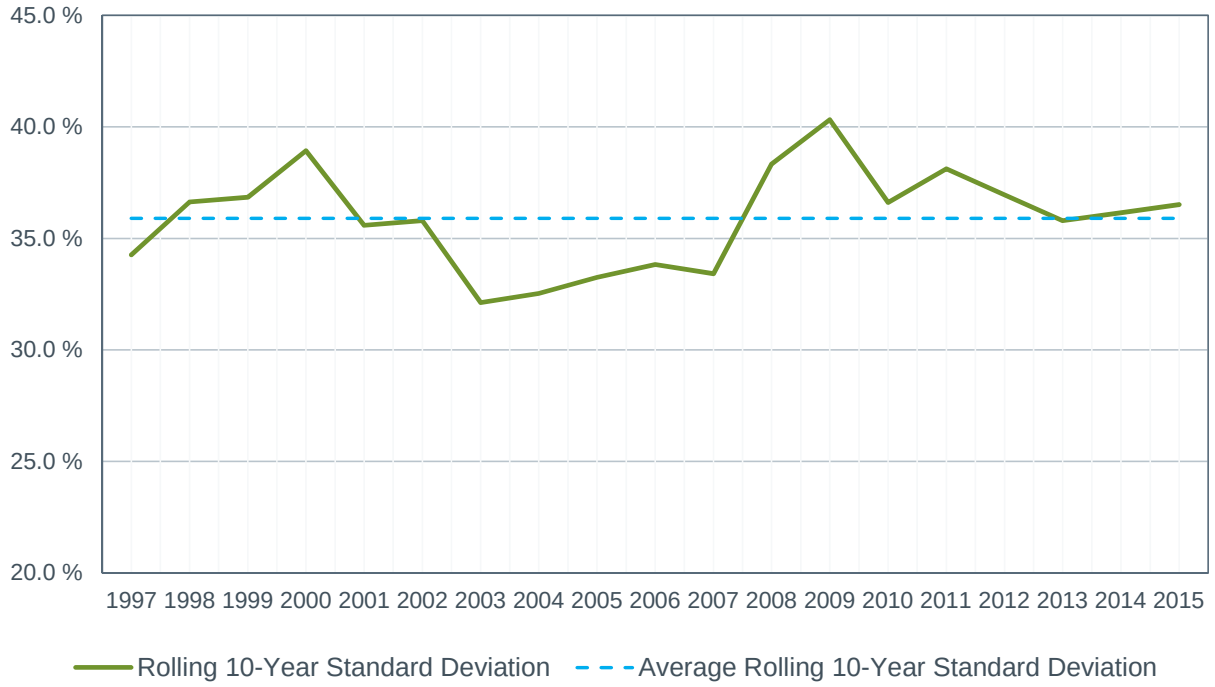
Adding RVK's expected inflation rate of 2.50%, our raw analysis for emerging market equity yields a return of 12.18%. Given the significant valuation improvement, and healthy dividend yield, we have increased our return assumption by 0.50%. Our 2016 expected nominal return for emerging markets equity is 11.00%.

Volatility

Emerging markets equities have historically been one of the most volatile asset classes, particularly over the past several years. The standard deviation of annual returns for the MSCI Emerging Markets Index has been 34.77% since inception (1988) and 34.00% over the last 20 years. **Figure 57** shows the rolling 10-year standard deviations of returns for the MSCI Emerging Markets Index since inception.

Our forward-looking volatility expectations are lower than historical data would suggest, as we believe emerging market equities will move closer to resembling more mature international equities in the future. Despite having a lower estimate than historical experience, we estimate emerging markets volatility to be much greater than all other public equities, with an expected standard deviation of 29.00%, which is equal to our 2015 estimate.

Figure 57*:* Rolling MSCI Emerging Markets Index 10-Year Volatility

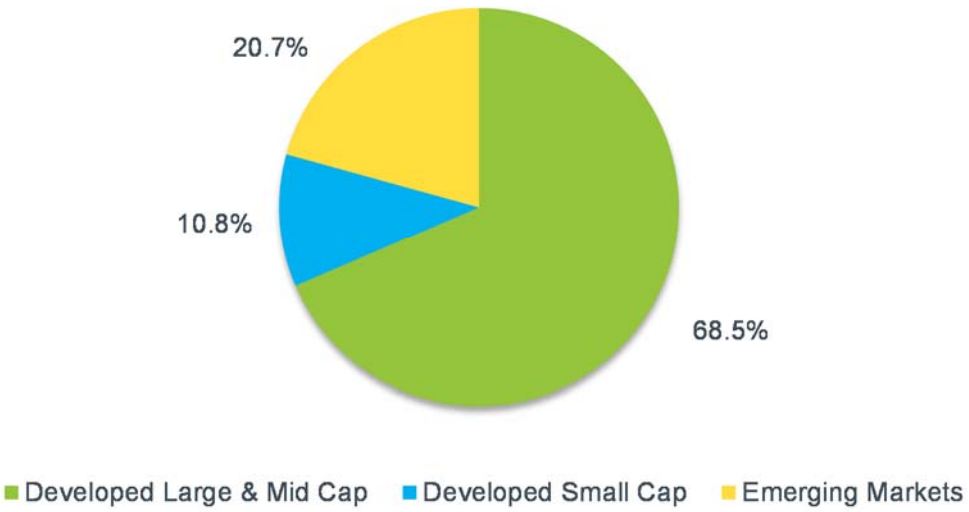


Source: MSCI. (2016)

Broad International Equity

The broad international equity market can be represented by the MSCI All Country World ex-US IMI. Market capitalization statistics suggest that this index is dominated by the performance of developed country securities (accounting for approximately 79.3% of the total capitalization, see **Figure 58**), with the remaining allocated to emerging markets. Using a weighted average methodology of current market capitalizations of developed large/mid cap international equity (68.5%), developed small cap international equity (10.8%), and emerging markets equity (20.7%), we estimate that broad international equity exposure will experience an annual return of 8.85%. Our expected annual volatility, which includes the correlation between developed large/mid cap international equities, developed small cap international equities, and emerging markets equity, is 20.60%.

Figure 58: MSCI All Country World ex-US IMI Breakout

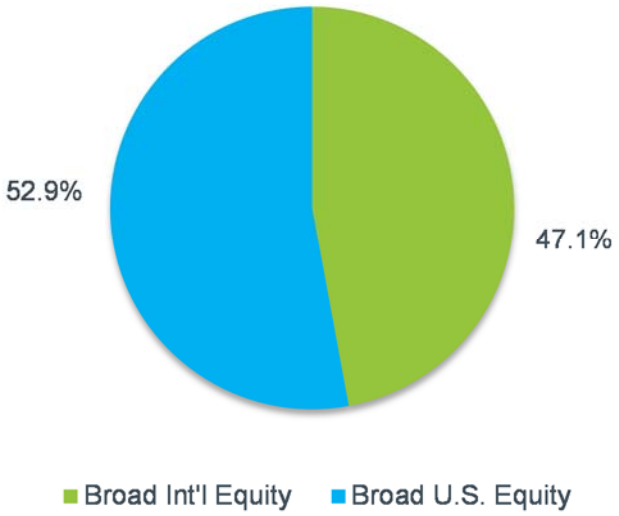


Source: MSCI. (2016)

GLOBAL EQUITY

Global Equity can be represented by the MSCI All Country World IMI. Market capitalization statistics for this index reveal a balanced allocation between US (accounting for approximately 52.9% of the total capitalization as shown in **Figure 59**) and foreign securities. Using a weighted average of current market capitalizations between our broad US equity (52.9%) assumption and broad international equities (47.1%) assumption, we estimate that global equity exposure will experience an annual return of 7.90% with an 18.35% annual volatility.

Figure 59: MSCI All Country World IMI Breakout



Source: MSCI. (2016)

REAL ESTATE

Our 2016 real estate return assumptions are shown below in **Figure 60**. Additionally, we can provide non-core (i.e. value added and opportunistic) assumptions as needed, but we do not publish assumptions for these asset classes in this white paper as the return and risk profile can vary significantly depending on the desired implementation approach.

Figure 60: Real Estate Assumptions

Asset Class	2015			2016			One Year Adjustment		
	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %
Core Real Estate	6.75	12.50	6.03	6.50	12.50	5.77	-0.25	0.00	-0.26
Global REITs	6.50	18.50	4.93	6.50	19.00	4.84	0.00	+0.50	-0.09
MLPs	--	--	--	9.00	22.00	6.85	--	--	--

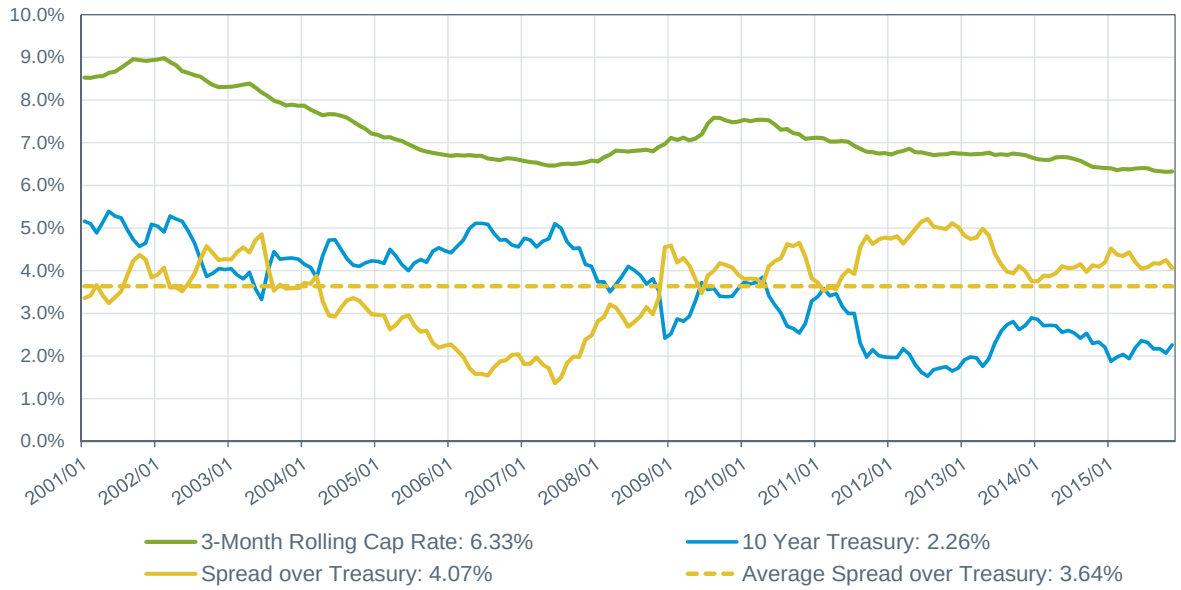
Core Real Estate

We examine core real estate assumptions by looking at both qualitative factors as well as a quantitative return decomposition model. We use both as inputs in determining our final assumptions for this asset class.

Cap Rates and Interest Rates

Capitalization rates ("cap rates") represent the estimated return on a real estate investment property and are calculated by dividing a property's net income by the total value of the property. As shown in **Figure 61** below, cap rates for core properties declined during 2015 as yield-hungry investors continued to target core assets that are paying attractive spreads over Treasury rates. And while core cap rates are lower than historical averages, and close to historic lows, they may continue to gradually decline as long as spreads to 10-year Treasury yields remain healthy (above the historical average spread, per **Figure 61**). Additionally, asset prices may continue to rise as cheap credit remains available, potentially putting additional downward pressure on cap rates.

Figure 61: Cap Rates and Spread to Treasuries



Figures shown in the legend are as of November 30, 2015.
Source: Real Capital Analytics, Inc. (2016)

Low interest rates and falling cap rates have had a positive impact on real estate valuations and returns in recent periods, and these low borrowing rates may continue to drive transaction activity going forward. However, given that core real estate pricing is largely influenced by interest rates available from competing fixed-income securities, there is the risk that a future increase in interest rates could drive cap rates up for core real estate assets from their current levels, leading to a subsequent decline in valuations. Again, a potential mitigating factor is that spreads between core real estate yields and US Treasury yields remain above their 10 year average, as seen in **Figure 61** above.

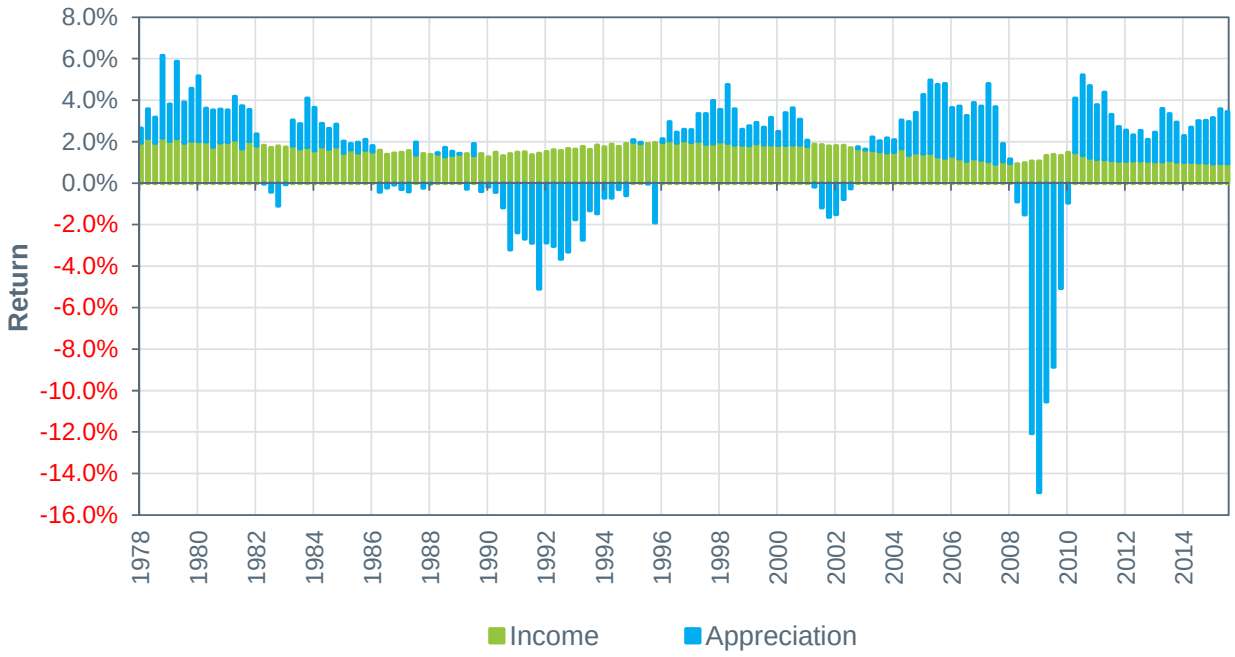
Entry Queues

Open-ended core fund exit queues that formed during the economic downturn have completely dissipated and have to some existent been replaced by entry queues, as risk-averse investors rescinded their redemption requests and sought greater exposure to core real estate assets. These entry queues have continued into 2016 for the top-performing core managers, as yield-driven investors continue to push yields lower and prices higher.

Yields

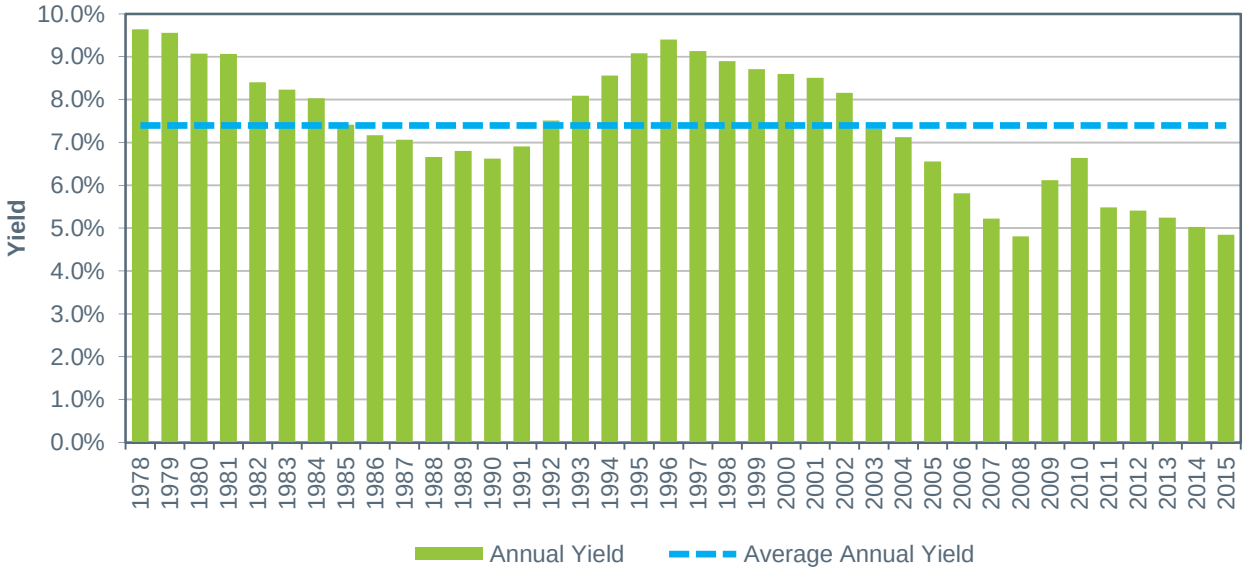
Core real estate is a yield-driven investment asset class. Since 1978 the vast majority of returns in core real estate have come from income, not capital appreciation. During the 2003-2007 period this fundamental flipped and capital appreciation provided the majority of returns. We anticipate the historical trend to reassert itself in the future with moderate capital appreciation over the long-term compared to income. **Figure 62** shows quarterly returns of the NCREIF Open-Ended Core Equity Index ("NCREIF ODCE Index") since inception and illustrates the large variations in the returns stemming from appreciation and income in core real estate.

Figure 62: NCREIF ODCE Quarterly Returns (Net)



Data as of September 30, 2015
Source: NCREIF (2016).

Figure 63: NCREIF ODCE Annual Yields (Gross)



Source: NCREIF. (2016)

Return Decomposition Model

We believe a reasonable expectation for future core real estate returns can be ascertained by using a simple fundamental decomposition model. Future returns should reflect expected inflation plus net yield, with additional consideration given to valuations. **Figure 63** above shows historical yields of the NCREIF ODCE Index. The annual yield as of December 31, 2015 was 4.84%, while the average annual yield since inception (1978) has been 7.39%. Adding the current annual yield to our assumed annual inflation of 2.50% and assuming annual fees of 1.00%, we approximate an expected return of 6.34%. With cap rates below historical averages but spreads above, we assume no valuation adjustment.

Given the discussion above, we are decreasing our long-term core real estate return assumption to 6.50% from 6.75%. We are maintaining our volatility estimate of 12.50%.

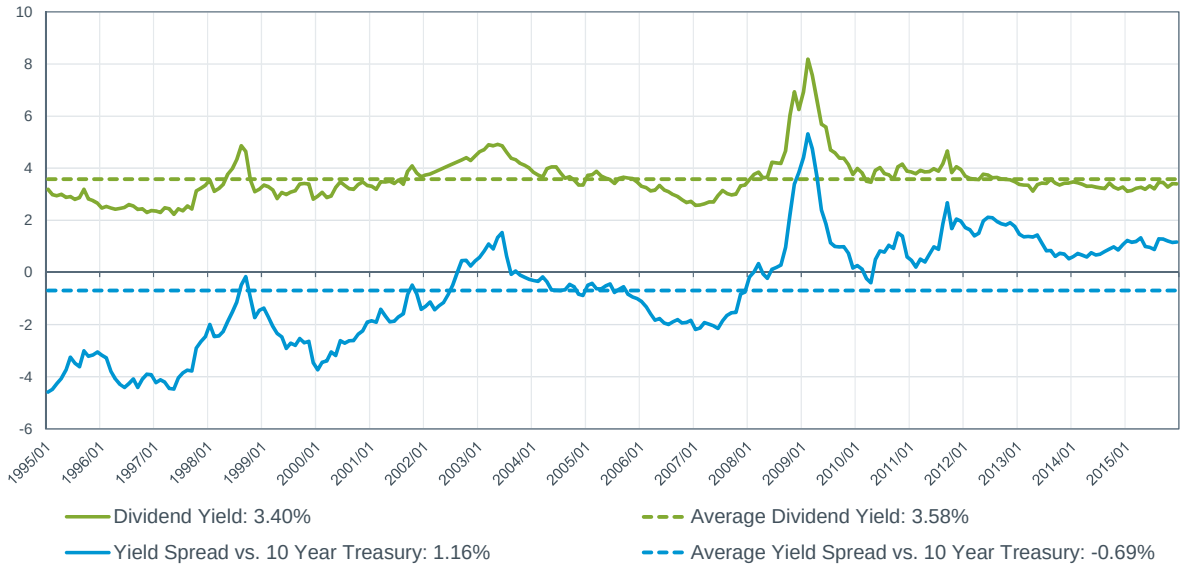
Global REITs

Return

Global REITs are modeled using the MSCI World Real Estate Index (Gross) that consists of exposures across developed markets. Similar to core real estate we utilize a simple fundamental decomposition model, whereby RVK gathers long-term data regarding the key return drivers of global REITs. The methodology we utilize decomposes global REITs return expectations into the following drivers: Yield, Inflation, and Valuation.

Dividend yield represents the income that investors earn on their equity investment. The average dividend yield for the MSCI World Real Estate Index has been 3.47% since 1995. We use current dividend yield in the return decomposition model to estimate future yields to better reflect the current economic environment and trends.

Figure 64: MSCI World Real Estate Index Dividend Yield and Yield Spread



Source: MSCI. (2016)

Adding RVK's expected inflation rate of 2.50%, to the 3.58% dividend yield, our decomposition model suggests a nominal return for global REITs of 6.08%. However, yield spreads are above historical averages, which would suggest valuations are relatively attractive. Considering the above discussion, we are maintaining our return assumption for global REITs at 6.50%.

Volatility

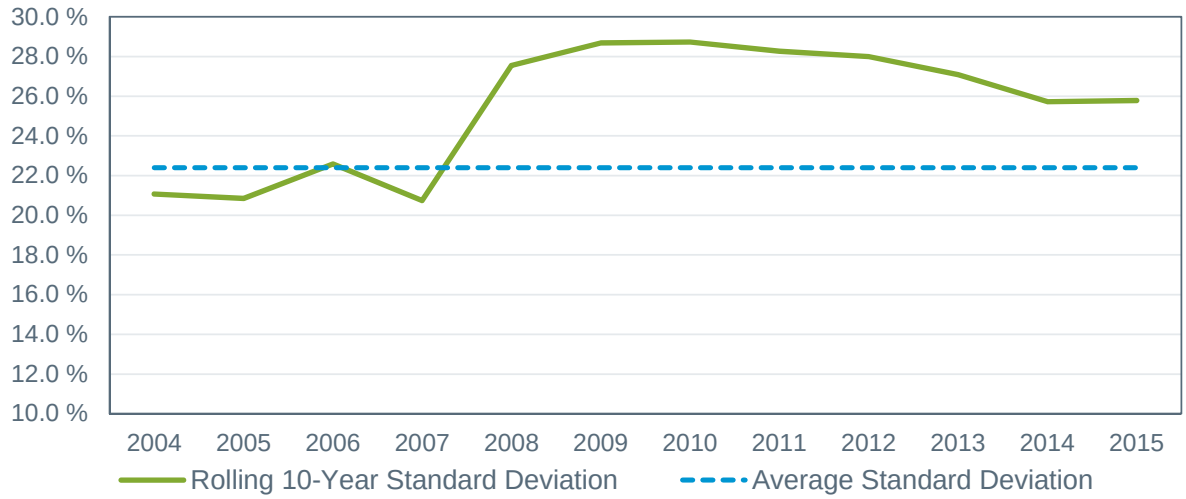
Global REITs have historically exhibited a high degree of volatility. **Figure 65** shows the historical volatility of the MSCI World Real Estate Index (Gross) during various time periods, and **Figure 66** shows the rolling 10-year volatility since inception.

Figure 65: MSCI World Real Estate Index (Gross) Volatility

Trailing Period (as of 12/31/2015)	**Standard Deviation**
1996 - Present	22.39%
10 Years	25.78%

Source: MSCI. (2016)

Figure 66: Rolling 10-Year MSCI World Real Estate Index (Gross) Standard Deviation



Source: MSCI. (2016)

Based on this information we are increasing our volatility assumption to 19.00% from 18.50%. While this is below the long-term averages displayed above, we are tempering our assumption based on the limited history of the selected index.

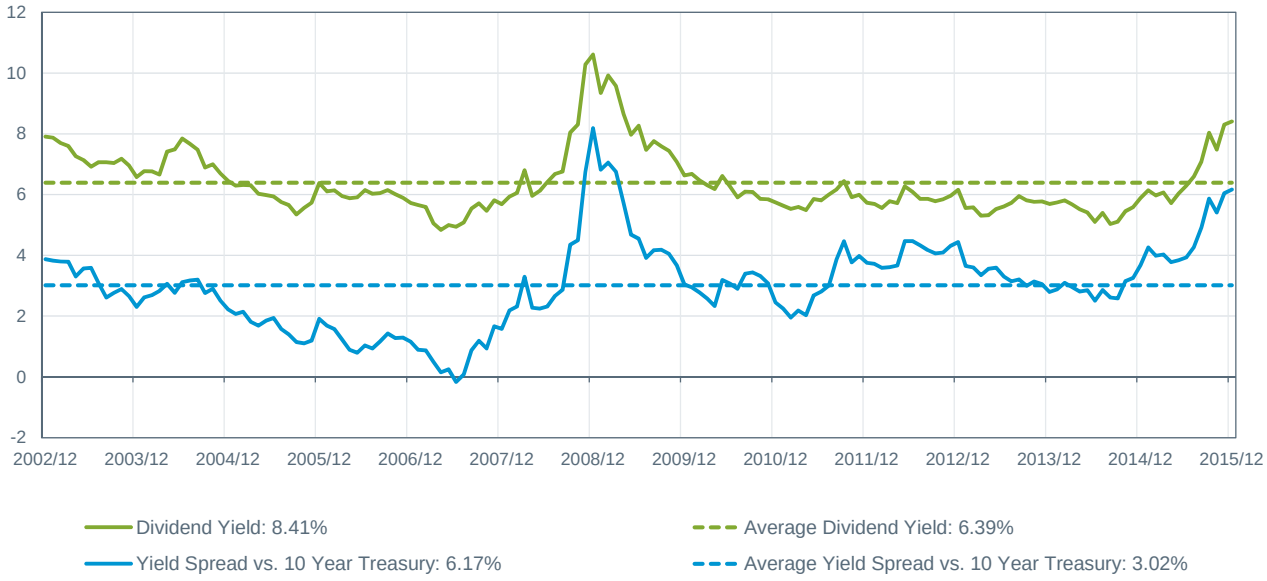
Master Limited Partnerships (MLPs)

Master Limited Partnerships ("MLPs") are typically companies that own energy infrastructure, such as pipelines, storage tanks, etc., and are generally structured to be publicly traded on an exchange. MLPs usually pay out most of their profit (~90%) to investors via dividends (distributions).

For assumption modeling purposes we utilize the Alerian MLP Index, which was incepted in June of 2006 and became the industry standard benchmark. It's a float-adjusted, capitalization-weighted index and includes 50 energy MLPs. It is worth noting that MLPs are a relatively immature asset class, and hence the performance history is limited.

Since MLPs are publicly traded securities, we utilize a simple fundamental decomposition model similar to REITs (and equities), whereby RVK gathers long-term data regarding the key return drivers of MLPs. The methodology we utilize decomposes MLPs return expectations into the following drivers: Yield(Net), Growth/Inflation, and Valuation.

Figure 67: Alerian MLP Index Dividend Yield



Source: Alerian. (2016)

Adding RVK's expected inflation rate of 2.50% (dividends have historically grown by more, but we believe inflation is a reasonable long-term assumption for future growth), to the dividend yield of 8.41%, and then conservatively netting out fees of 1.50% (associated with tax and related management), our decomposition model suggests a nominal return for MLPs of 9.41%. Yield spreads would suggest valuations look attractive relative to historical levels, perhaps resulting in additional tailwinds for future returns. However, a variety of energy industry concerns and uncertainties should temper expectations. Considering the above discussion, we set our return assumption for MLPs at 9.00%.

Volatility

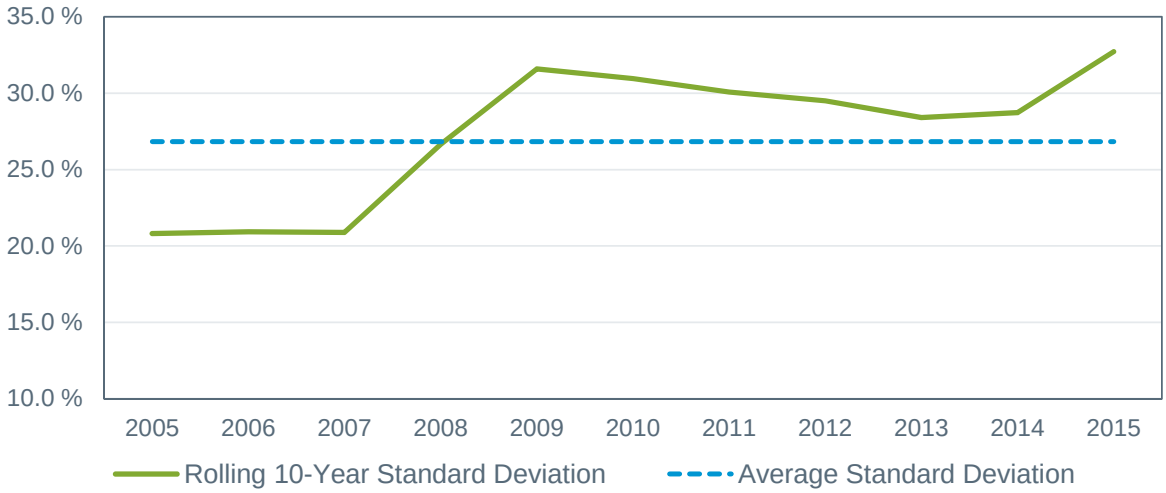
MLPs returns have historically exhibited a high degree of volatility. **Figure 68** shows the historical volatility of the Alerian MLP Index during various time periods, and **Figure 69** shows the rolling 10-year volatility since inception.

Figure 68: Alerian MLP Index Volatility

Trailing Period (as of 12/31/2015)	**Standard Deviation**
2005 - Present	26.83%
10 Years	32.71%

Source: Alerian. (2016)

Figure 69: Rolling 10-Year Alerian MLP Index Standard Deviation



Source: Alerian (2016)

MLPs are a relatively immature asset class that is still developing and have not gone through multiple market cycles, therefore we also heavily consider qualitative and triangulation factors when deriving our assumptions. We estimate the volatility assumption to be 22.00%.

Diversified Hedge Funds

A diversified hedge fund investment may include such exposures as long/short equity, macro and arbitrage strategies, which could be obtained via fund of funds or direct multi-strategies. These diversified approaches can help to dampen cyclicality and diversify return and risk sources, while also tactically allocating among a range of underlying strategies and assets.

Figure 70 summarizes the long-term forward-looking assumption set based on this analysis.

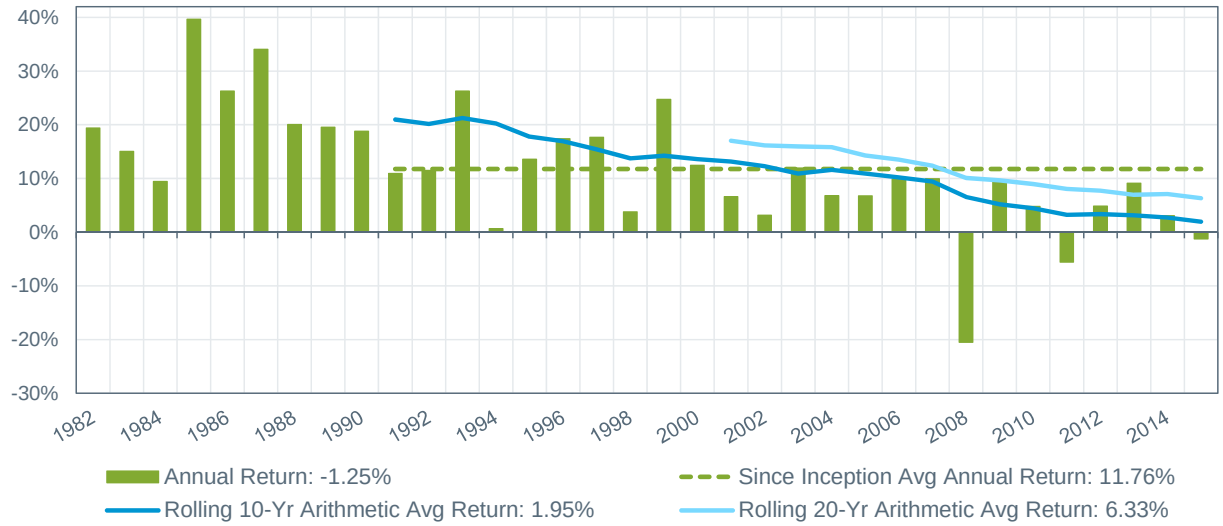
Figure 70: Diversified Hedge Funds Assumptions

Asset Class	2015			2016			One Year Adjustment		
	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %
Diversified Hedge Funds	6.50	9.50	6.08	6.50	9.50	6.08	0.00	0.00	0.00

The Hedge Fund.Net (HFN) indices provide a peer group average of funds pursuing diversified strategies. Like other manager-reported indices, these indices have their shortcomings but they provide a guideline for benchmarking diversified hedge fund strategies in terms of long-term return and risk characteristics.

As of December 31, 2015, the annual return of the HFN FOF Multi-Strategy Index since its inception (1982) has averaged 11.76%, arithmetically, and the annual standard deviation has been 11.31%. However, it should be noted that there appears to be a trend of decreasing returns relative to the historical average over time (and as capital inflows increase). **Figure 71: Returns for HFN FOF Multi-Strat Index** illustrates this trend.

Figure 71: Returns for HFN FOF Multi-Strat Index



Source: Hedge Fund.Net (2016)

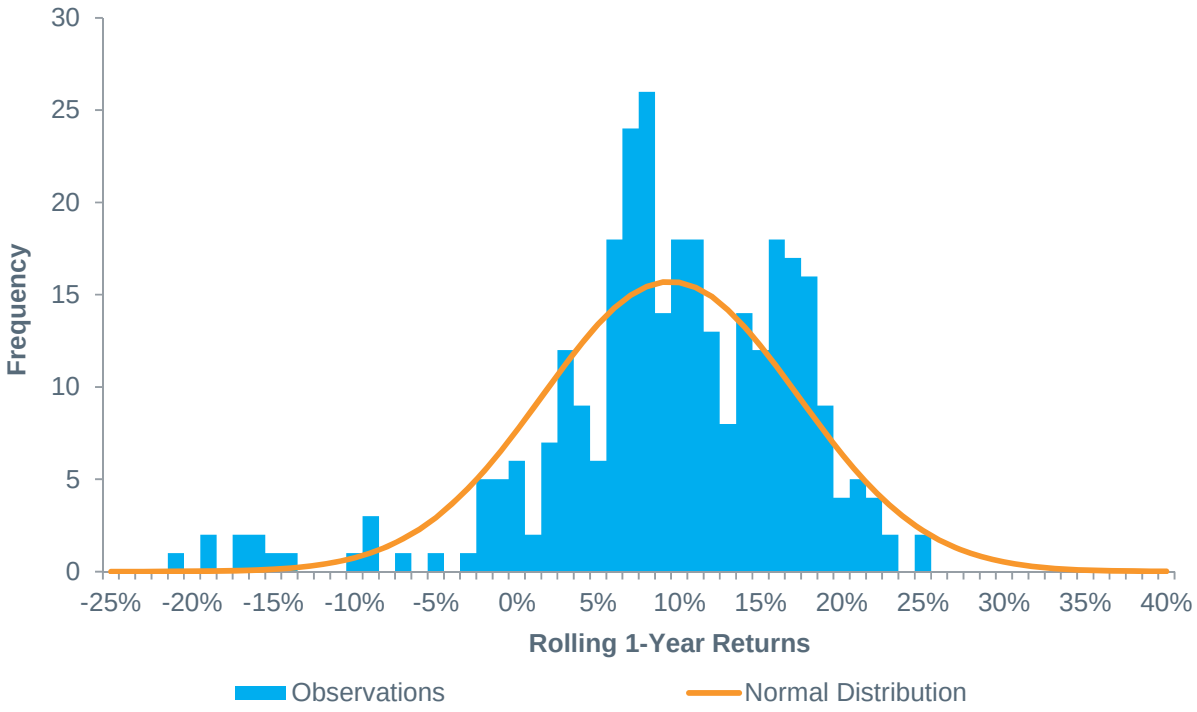
Recognizing the challenges (survivorship bias, etc.) of benchmarking this “asset class”, we also analyzed the subset of multi-strategy fund-of-funds managers (21 managers with return data starting from 1988) most commonly utilized by RVK’s clients, as well as the broader available universe of managers monitored by RVK. This exercise is necessary to validate the consistency between the datasets. The return and volatility results from this comparison are shown in

Figure 72. However, as outlined in **Figure 73** the actual distribution of rolling 1-year manager returns from this exercise exhibits a fat left tail (downside risk), which does not represent a normal distribution.

Figure 72: Diversified Hedge Fund Historical Returns

	Date Range	Arithmetic Average Return	Annual Standard Deviation
HFN FOF Multi-Strategy Index	1982-2015	11.76%	11.31%
RVK Subset of 21 Managers (Average)	1988-2015 (9/30/2015)	8.72%	7.80%

Figure 73: Manager Rolling 1-Year Average Performance (21 Managers: 1988-2015)



Over the longest time period we can measure with actual managers, the return experience has averaged 8.72%, more than 200 basis points higher than our assumption. We believe in a lower return expectation going forward for two main reasons. First, the 8.72% historical return delivered by the RVK subset of managers is likely still inflated by survivorship bias. Because of our asset class proxy return series construction methodology, the managers with the longest return histories comprise more of the return stream. It stands to reason that the managers with the longest return series have enjoyed the most successful returns. Second, because of the growing size, crowding, and maturity of the asset class, we believe some decrease in returns over time (at least for some of the underlying strategies) can be expected (again, index performance seems to suggest this is already happening).

Historically, the annualized month-over-month volatility of absolute return strategies has been low (below 6%), but the volatility using annual data has been much higher (above 10%). As noted above, the distribution of returns has been wider than a normal distribution would imply. Moreover, we have witnessed a marked increase in volatility since the beginning of the recent financial crisis in mid-2007. These issues would suggest that a higher risk value than annualized monthly index returns produce is warranted, and to make the performance of 2008 a statistical possibility.

We also consider yield, beta, and alpha as “building blocks” to model potential hedge fund returns. For example, the historical beta of the HFN FOF Multi-Strategy Index since inception has been 0.33 to the S&P 500 Index. Combining this beta value with the above assumptions for Cash and Large Cap US Equities would suggest a return of 4.56%, without any alpha. However, alpha over Cash has averaged 4.80% over the last 20 years – suggesting a return of 7.05% given our current Cash assumption.

Based on the above analysis our return forecast remains 6.50%, and our assumed volatility remains 9.50%.

Global Tactical Asset Allocation ("GTAA")

GTAA strategies seek to exploit inefficiencies in equilibrium values among different asset classes. GTAA strategies vary widely, ranging from more traditional strategies that deviate from a blended 60/40 portfolio to those with an absolute return orientation. Sources of return in GTAA products typically include market (or "beta") exposure across a variety of asset classes, top-down tactical asset allocation decisions, as well as the potential for outperformance (or "alpha") from active bottom-up management of the underlying exposures.

Figure 74: GTAA Assumptions

Asset Class	2015			2016			One Year Adjustment		
	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %
GTAA	6.50	10.00	6.03	6.50	10.00	6.03	0.00	0.00	0.00

Recognizing the challenges of benchmarking this "asset class", we applied a triangulation approach to derive our long-term assumptions utilizing four comparisons: (1) a simple blended index of 60% MSCI AC World IMI/40% Barclays US Aggregate Bond Index, (2) a more complex "representative portfolio" approach across a variety of asset classes, (3) a universe of potential managers, and (4) manager return objectives. The results of these analyses are provided in **Figure 75**.

Figure 75: Historical and Forward Looking Return and Risk for GTAA Asset Class

	Historical Results (2004 – 2015)[1]		Forward Looking Results[2]	
	Arithmetic Return	Standard Deviation	Arithmetic Return	Standard Deviation
(1) Simple Blend (60/40)	6.54%	12.33%	6.14%	11.25%
(2) Representative Portfolio[3]	5.28%	10.77%	5.68%	9.51%
(3) Manager Universe[4]	6.37%	8.78%	N/A	N/A
(4) Manager Objectives	N/A	N/A	CPI + 5% = 7.50%	

[1] The timeframe is set to 12 years to align with the available historical manager returns.
[2] Based on 2016 RVK Capital Markets Assumptions.
[3] More information on the representative portfolio is provided in the write-up below.
[4] Universe average return (net) and risk for the 12 year time period.

(1) Although there is no perfect benchmark for GTAA, a simple comparison (or reasonable benchmark to expect them to outperform) is a continuously rebalanced portfolio consisting of 60% stocks (MSCI All Country World IMI) and 40% bonds (Barclays US Aggregate Bond Index). Since GTAA managers have more flexibility than traditional balanced managers, we would expect long-run outperformance of this blended index.

(2) Given that GTAA managers utilize a wide array of asset classes, we believe it is prudent to also consider a broader more complex asset mix as another comparison point. This broader asset mix does not align with any particular manager, as allocation variations are wide, but rather attempts to encompass common asset class allocations utilized by those GTAA managers that are most frequently used by our clients. Due to divergent allocations, our representative portfolio (outlined in **Figure 76**) is merely an attempt to show the differences that arise from a moderate diversification away from "traditional" stocks and bonds and into other asset classes.

Figure 76: Representative GTAA Asset Portfolio Allocations

Asset Class	Benchmark	Allocation
Global Equities	MSCI All Country World IMI	30%
Intermediate Duration Fixed Income	Barclays US Aggregate Bond Index	25%
Int'l Developed Fixed Income	Citi Non-US World Government Bond Index	5%
Emerging Markets Debt Local	JP Morgan EMBI Global Diversified Index	10%
TIPS	Barclays US TIPS Index	10%
High Yield Fixed Income	Barclays US Corporate High Yield Index	10%
Commodities	DJ-UBS Commodities Index	10%

GTAA managers are typically hired to produce excess return (alpha) by making dynamic top-down and bottom-up decisions. Conservatively, we would expect GTAA managers to produce at least 50 basis points of net alpha over all static, passive portfolios (such as the simple blend (1) and the representative portfolio (2)).

(3) We analyzed an 11-year period (the longest available common timeframe for the managers used) of returns for a sub-group of GTAA products utilized by RVK clients. These products and managers have successfully passed our due diligence screens, have proven track records, and historically produced alpha via dynamic movements in their portfolios. The GTAA products in the sub-group utilize a broad array of asset classes, the most common of which are listed in **Figure 76**. In addition, the managers can, and historically have, tactically utilized cash (or other assets) to defensively position their portfolios.

(4) We also considered the performance objectives of the managers. A typical long-term performance objective is CPI + 5%.

Given our forward looking expectations for underlying asset classes, and our desire to employ a conservative approach in view of the relatively small universe of sample managers, we are maintaining our return assumption of 6.50%. This return assumption builds in a premium over approach (1) and (2) to account for tactical and dynamic management of these strategies. However, it is more conservative than approach (4) and roughly aligned with approach (3).

We are also maintaining our volatility assumption of 10.00%. Although the risk profile of these strategies varies significantly, this figure is consistent with general product volatility experience (and targets), as well as historical results and forward looking estimates.

Private Equity

Private equity[7] is a long-term investment for which market participants expect a premium return over public equity investments to account for illiquidity and other risks. We assume a private equity return premium of 325 basis points over US large/mid cap equity and a volatility rate consistent with private equity's position on the capital markets line. This represents a premium decrease of 25 basis points relative to our 2015 assumed premium, given heightened valuations. We also reduced our risk assumption 50 basis points, given reduced levels of leverage. Our expected return and volatility assumptions for private equity are shown in **Figure 77**.

Figure 77: Private Equity Assumptions

Asset Class	2015			2016			One Year Adjustment		
	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %
Private Equity	10.50	26.00	7.56	10.25	25.50	7.41	-0.25	-0.50	-0.15

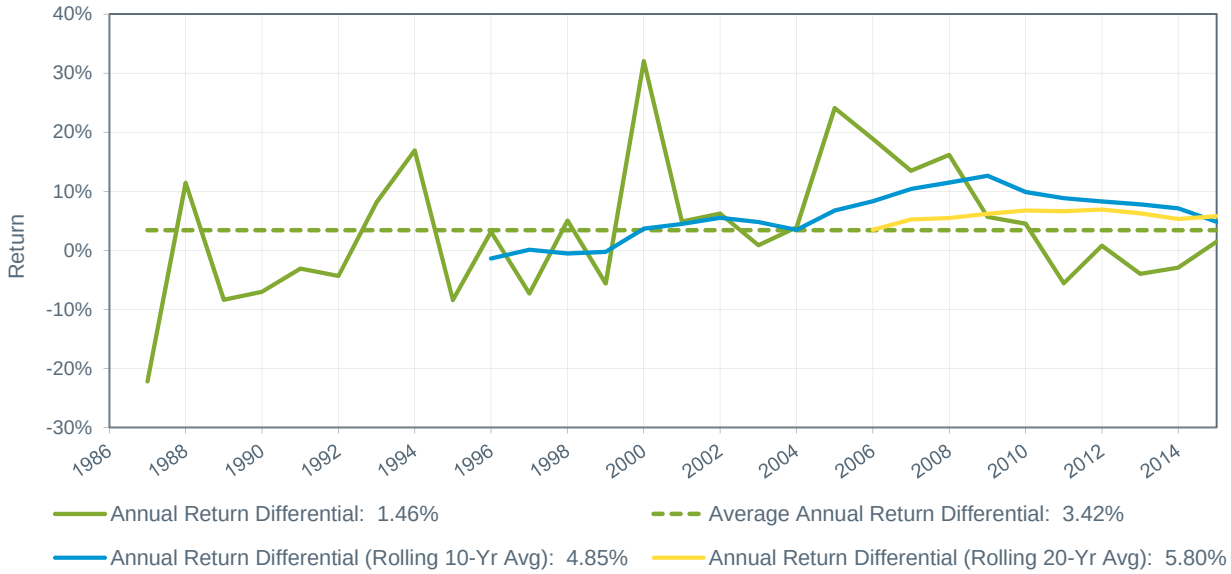
We analyzed and compared over 30 years of quarterly, time-weighted private equity returns with the returns of the S&P 500 Index for the same period and found that pooled private equity returns have experienced an average annualized premium over the S&P 500 of approximately 342 basis points. The figures below detail these observations.

Figure 78: Return Comparison of Private Equity vs. the S&P 500 Index

	All PE	S&P 500	Difference
Annualized Arithmetic Return	14.60%	11.17%	3.42%
Annualized Standard Deviation	14.51%	15.57%	-1.06%

Statistics are calculated using data from 06/30/1987 through 6/30/2015.
Sources: Cambridge and S&P. (2016)

Figure 79: Annual Return Differential
Cambridge US Private Equity Index vs. S&P 500 Index



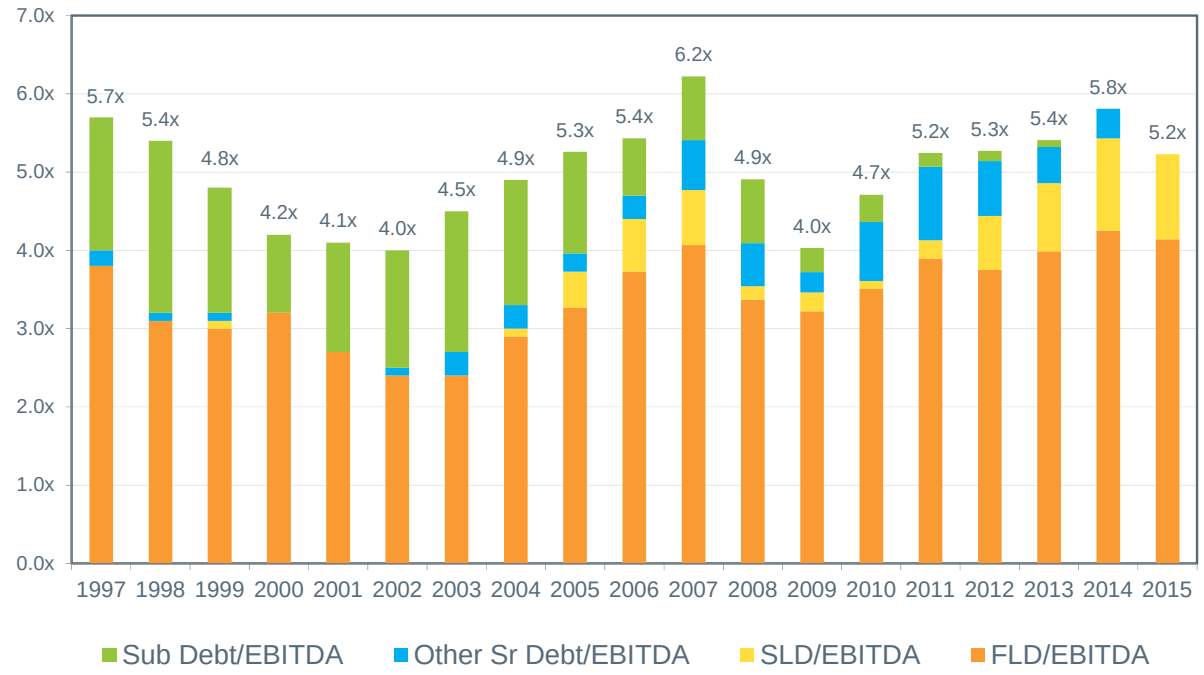
The annual return differential shown is the difference between the Cambridge PE Index and S&P 500 Index.
Average Annual Return Differential is for the time period July 1, 1987 through June 30, 2015.
Averages are calculated based on annual frequency.
Source: Cambridge. (2016)

[7] Private equity includes leveraged buyouts, venture capital and special situations funds.

Our current assumption calls for a 325 basis point premium over our arithmetic US large/mid cap equity return assumption. We believe a return premium in private assets should hold true (align with capital markets line), but we'll note that our return assumption of 10.25% is fairly conservative relative to the historically observed average arithmetic return of 14.60%.

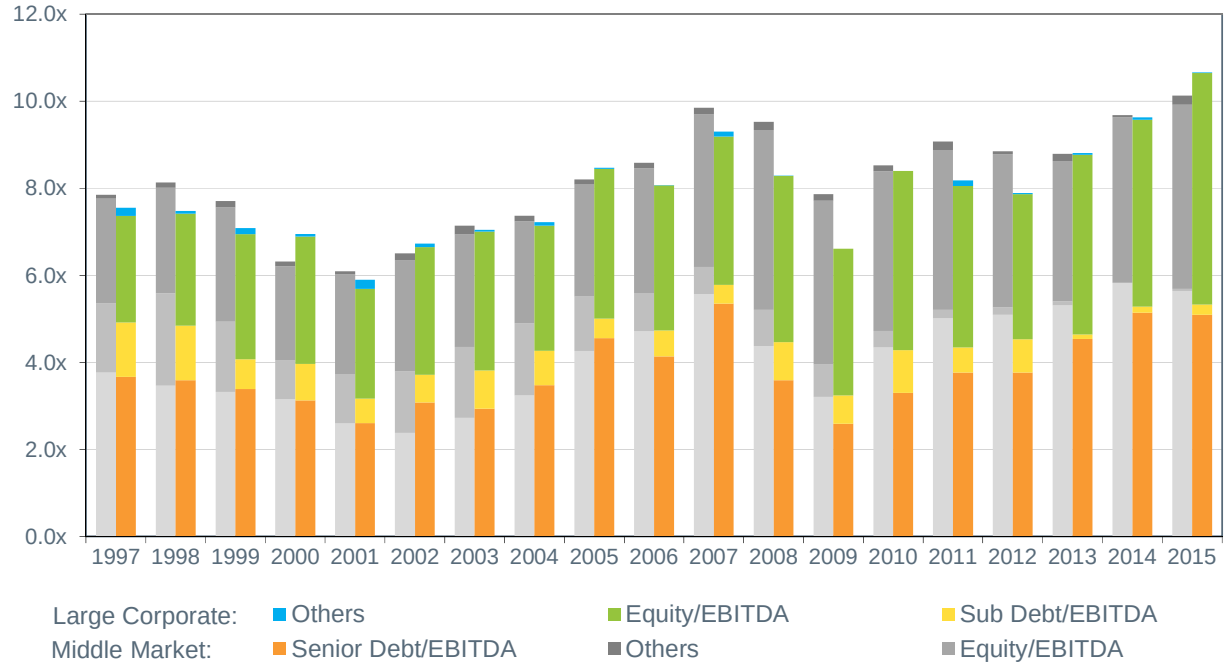
When addressing the current and expected investment environment for private equity, we focused on the following major themes in our analysis: current deal pricing relative to long-term averages, debt market conditions and credit availability, and fundraising and commitment pace.
Figure *80* and **Figure 81** below illustrate the historical and current debt and purchase price multiples for large LBO transactions.

Figure 80: Average Debt Multiples of Large* Corporate LBO Loans
EBITDA Adjusted for Prospective Cost Savings or Synergies



*Defined as Issuers with EBITDA of more than $50M.
Source: S&P Capital IQ. (2016)

Figure 81: Average Purchase Price and Equity Contribution by Sponsors of Large* & Middle* Market LBO Loans – Purchase Price Breakdown

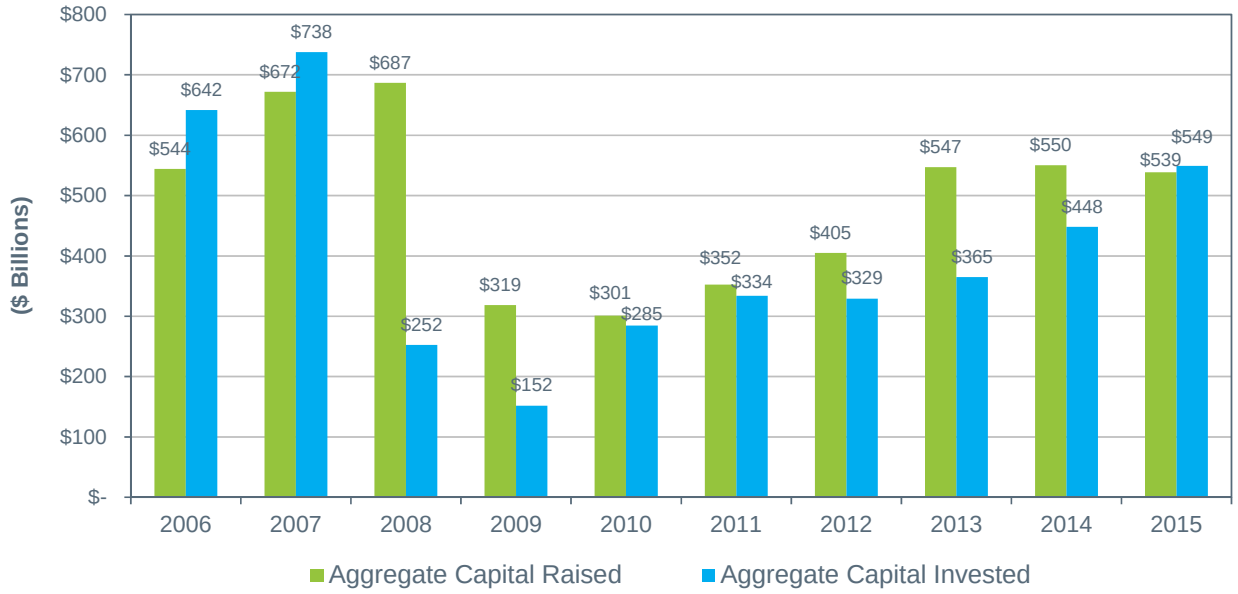


*Defined as Issuers with EBITDA of more and less than $50M, respectively.
Source: S&P Capital IQ. (2016)

The charts highlight that while the use of credit in buyout transactions have decreased from 2007 highs, the current levels are now still above historical norms – while valuations have surpassed the 2007 historical highs. The return prospects may be marginally enhanced by improved credit conditions and availability, but we believe that higher equity requirements are here to stay for these transactions. Consequently, we do not believe that the current credit climate will have a strong negative or positive effect on the investment environment or expected future returns.

Figure 82 below shows historical fundraising versus invested capital for all private equity funds over the last eight years. Private equity dollars raised compared with dollars invested has aligned more closely during the past several years than during 2008. While an overhang of capital (dollars raised minus dollars invested) remains, the total overhang has narrowed. We expect fundraising to continue to increase along with investment pace, but we do not expect total levels will reach the levels witnessed in 2006-2008 in the near future.

Figure 82: Historical Fundraising versus Invested Capital



Source: Preqin. (2016)

We believe the combined effects of the above comments suggest that a decrease in our return premium is appropriate. We expect that increased deal valuation multiples and higher equity requirements will put some pressure on forward looking returns. Traditional leverage-heavy deals will likely suffer in an environment of more equity and less leverage. We believe an arithmetic return assumption of 10.25%, or 325 basis points of premium above our arithmetic US large/mid cap equity return assumption, is appropriate.

With regard to our volatility assumption, we continue to face the challenge that observed volatility perhaps does not reflect underlying risks and therefore causes potential triangulation issues with more liquid asset classes. Additionally, our model stress testing efforts suggest some output insensitivity to material increases in the volatility assumption given the return level. Therefore, our conclusion is that the volatility assumption should place private equity in close proximity to the capital markets line.

Based triangulation with other asset classes and the capital markets line, we assume an expected standard deviation of 25.50%. This represents a reduction of 0.50% in the volatility relative to 2015. We believe this reduction better triangulates with current implementation and the reduced return level, as well as the reduced leverage levels.

Commodities

Exposure to commodities can be captured in three primary ways: (1) physical investment, (2) buying, or building a portfolio of stocks that generate the majority of their operating cash flow from commodity extraction or production; or (3) commodity futures which often require the hiring of a CTA or buying an active or passive broad based commodity index.

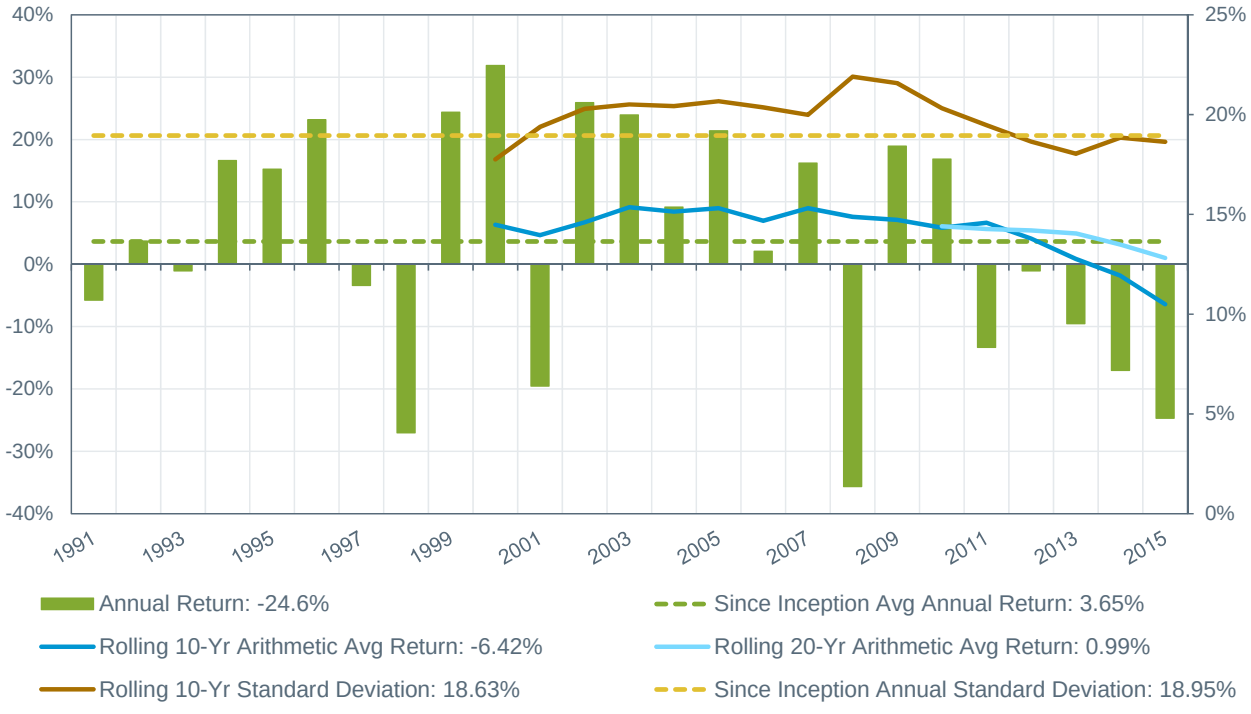
Our process focuses on a broad-based index, the Bloomberg Commodity Index, as a basis for assumption building, which restricts the composition to no more than 33% in one sector (e.g. energy). We consider the constituent return components of the index in developing our long-term total return and risk assumptions. Spot price, roll yield, and collateral return are taken into account when developing our commodities assumption. **Figure 83** summarizes the long-term forward-looking assumption set based on this analysis.

Figure 83: Commodity Assumptions

Asset Class	2015			2016			One Year Adjustment		
	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %
Commodities	6.50	19.75	4.71	6.00	19.75	4.21	-0.50	0.00	-0.50

As of December 31, 2015, the arithmetic mean of annual returns of the Bloomberg Commodity Index since its inception (January 1991) is 3.65% and the standard deviation of annual returns has been 18.95%. **Figure 84** plots these since inception averages against the rolling one-year return and risk, highlighting returns that are below their historic norms, as represented by the index's historic arithmetic mean.

Figure 84: Bloomberg Commodity Index Return

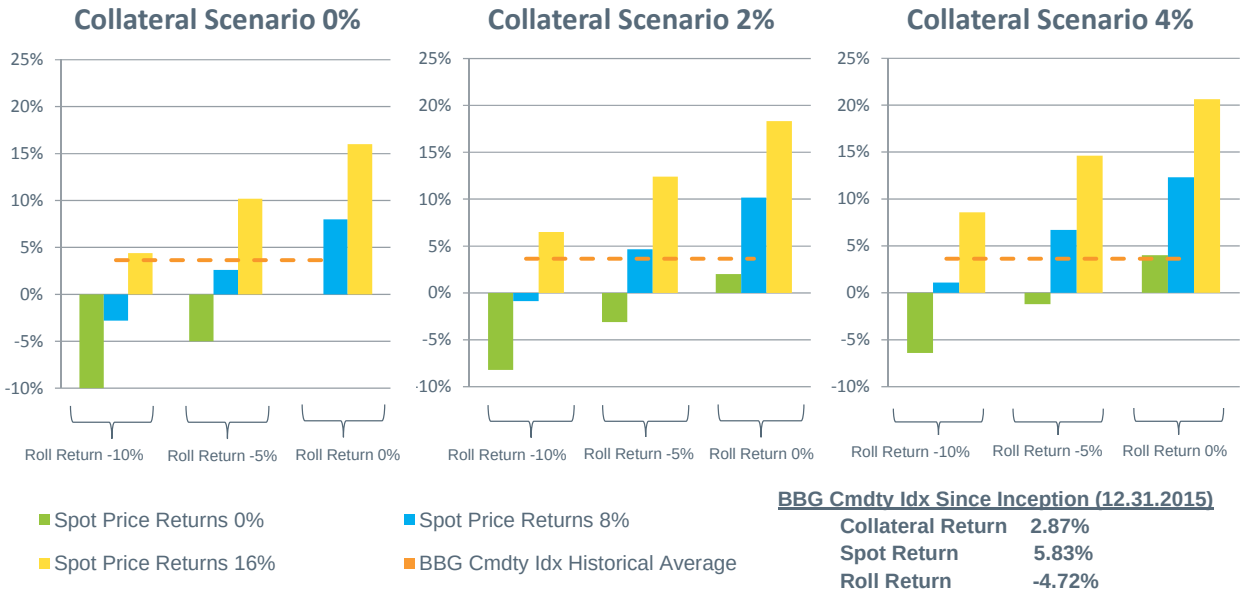


Source: Bloomberg. (2016)

Return Decomposition

Figure 85 illustrates the since inception average return of the underlying commodity components, as well as analyzes potential total return outcomes using multiple spot prices and roll returns under three different collateral return scenarios (0%, 2%, and 4%). The below building blocks scenario analysis provides a simple method for reviewing potential return outcomes.

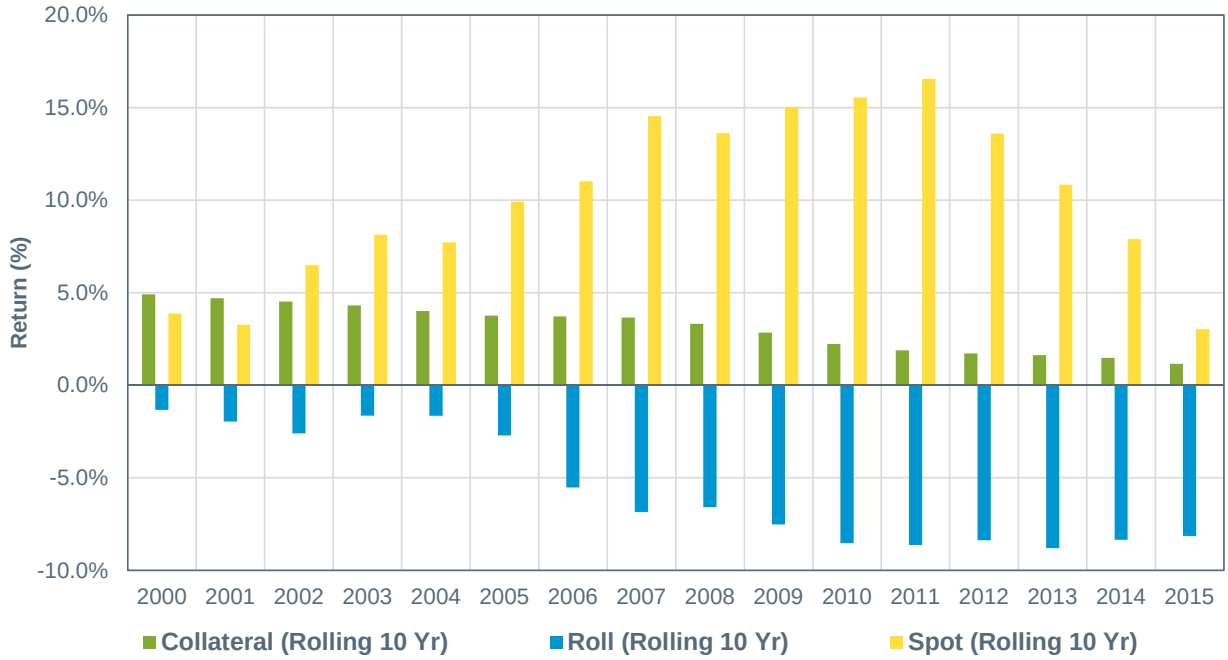
Figure 85: Bloomberg Commodity Index – "Building Block" Analysis



Source: Bloomberg. (2016)

Historically spot return has been the largest driver of commodity total return (5.83% average annual return since inception). We see this trend continuing going forward as other return components (roll yield and collateral return) appear weak. Collateral return is likely to be a small contributor to overall commodity returns as yields on most collateral accounts are low given the current interest rate and economic environment (please see the Inflation and Cash Equivalents sections for further related discussion). The roll return component has been a significant negative contributor to commodity returns over the last several years (though flat-ish of late), and we do not anticipate it becoming a positive contributor without seeing a reversal in the continued trend of large net inflows into this asset class. However, such inflow/outflow changes could result in inverse outcomes for roll and spot returns. **Figure 86** highlights the dispersion of the individual return components over rolling 10-year periods.

Figure 86: Commodity Return Components



Source: Bloomberg. (2016)

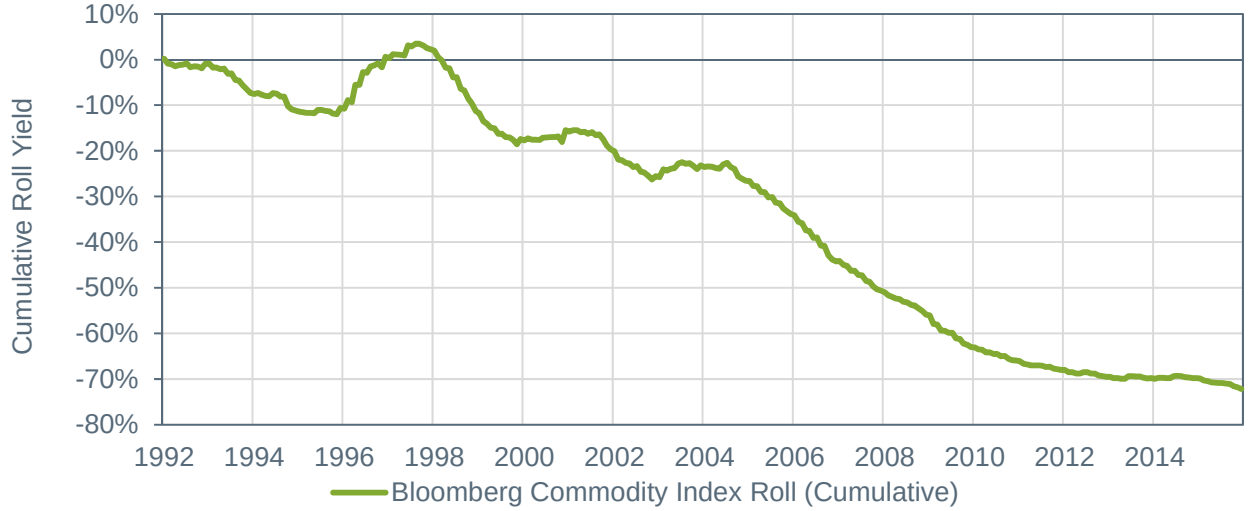
Other Commodity Dynamics

Capital Flows

Historically strong capital inflows into commodity vehicles and corresponding derivatives issuance put negative pressure on roll yields (i.e., contango), which presents a significant challenge to the return potential of futures-based commodity investment strategies.

Figure 87 shows the since inception cumulative roll yield moves from positive to negative, and thus detracts from the total return of a passive investment approach. The negative contribution from roll yield return has coincided with a significant increase in assets invested in passive strategies and the proliferation of exchange traded and index-based commodity products.

Figure 87: Bloomberg Commodity Index – Cumulative Roll Yield

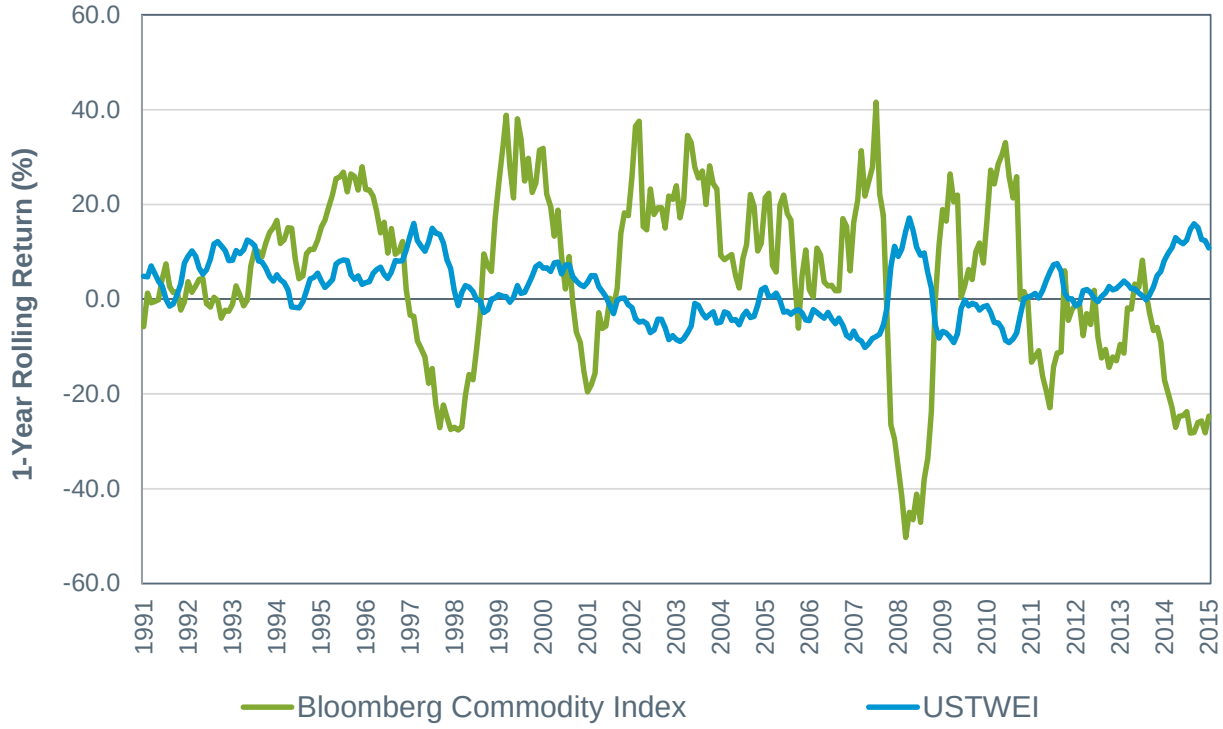


Source: Bloomberg. (2016)

US Dollar Exchange Rates

Government debt levels and the trade deficit in the US may pose a long-term risk to US dollar strength, though the US is by no means the only country facing these issues – in fact the dollar seems to be benefiting from *relatively* better economic conditions compared to other developed economies (i.e. Europe, Japan). The dollar's reserve currency status should also continue to serve as resistance to such weakening factors and the correspondingly higher commodity prices within a more volatile capital markets environment. Commodity prices are often quoted in US dollars and past periods of material dollar appreciation/depreciation have exhibited an inverse relationship with commodity pricing. In periods where the relative strength of the dollar index has materially fluctuated, commodities have experienced large performance swings, both above and below 20%, coinciding with shifts in relative currency strength. **Figure 88** highlights those periods where currency strength deviated and commodities experienced a corresponding performance shift. The dollar strength indicator used in our analysis is the Federal Reserve created Trade Weighted US Dollar Index ("USTWEI").

Figure 88: Bloomberg Commodity Index vs. Trade Weighted US Dollar Index

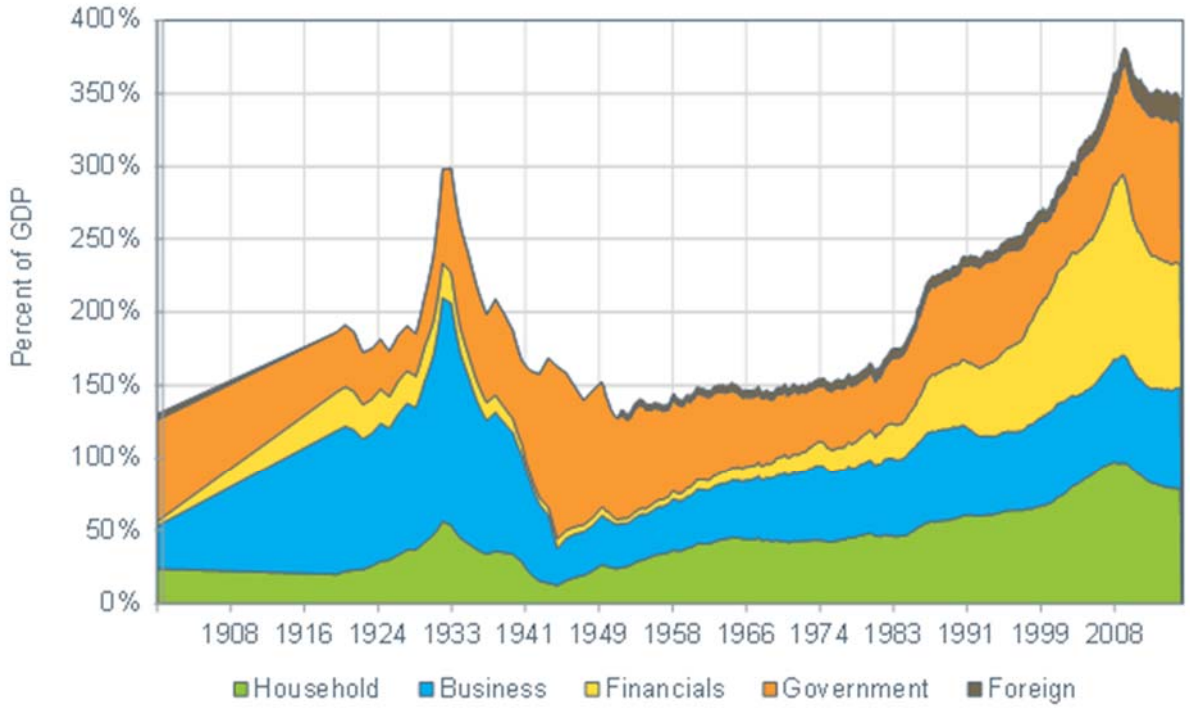


Source: Bloomberg. (2016)

Debt, Growth, and Supply Challenges

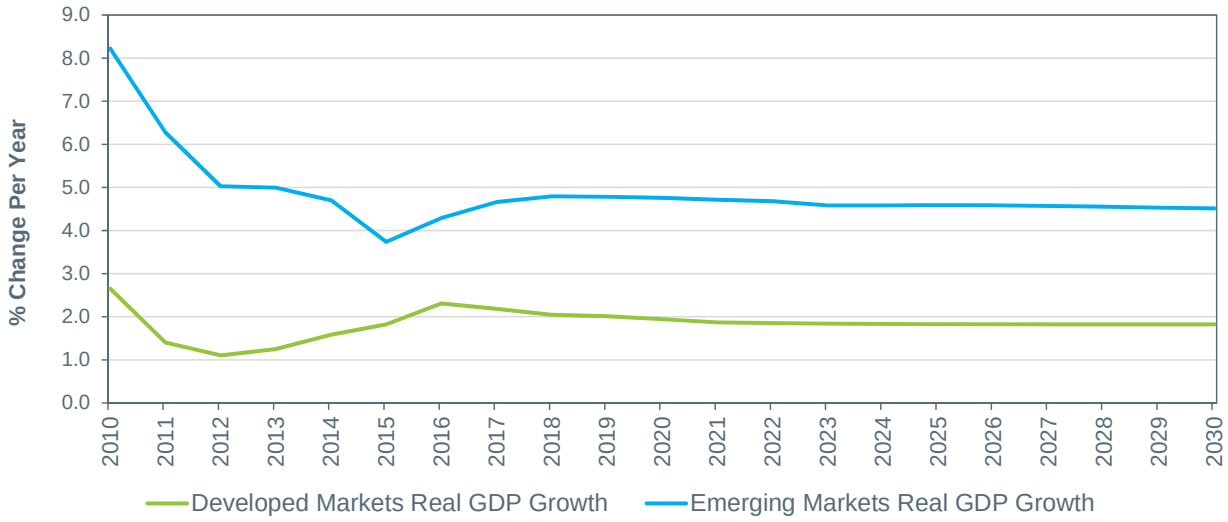
Further headwinds to the future expected return on commodity prices can be seen in **Figure 89**, **Figure 90** and **Figure 91**. Debt as a percentage of GDP remains elevated (global problem), generally a negative indicator of financial health. Additionally, growth rates in developed markets and some emerging markets have flattened and many are predicting relatively tepid growth rates for the near to medium term, which may suggest lower demand. In addition to potential demand constraints, current supply levels are elevated. Combined, higher debt loads, slower growth rates, and excess supply levels generally do not suggest a sharply rising commodity spot price environment.

Figure 89: US Credit Market Debt as % of GDP



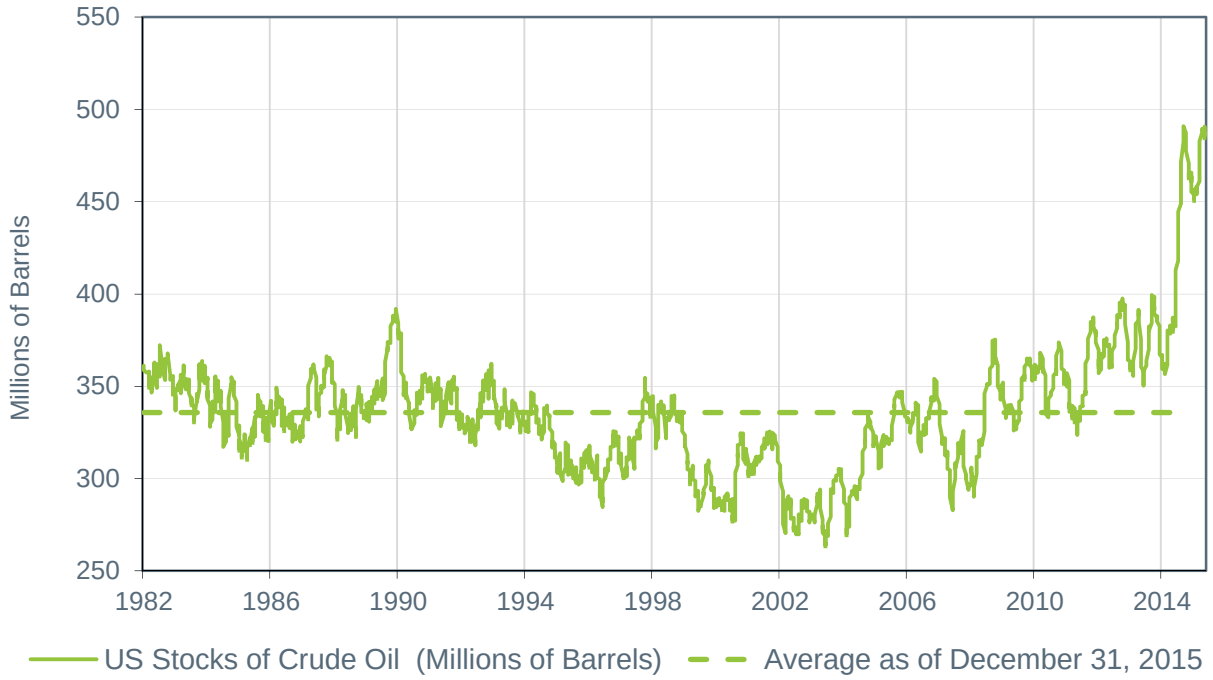
Data is as of September 30, 2015
Source: Bloomberg. (2015)

Figure 90: Historical and Projected GDP Growth in Developed and Emerging Economies



Source: USDA Economic Research. (2016)

Figure 91: US Stocks of Crude Oil (Excluding SPR)



Source: US Energy Information Administration. (2016)

In summary, lower projected economic growth, higher commodity supply, and higher debt levels suggest limited upward pressure on commodity spot prices in the near term. Additionally, depressed collateral yields also present a headwind for future returns. If we assume spot prices grow with inflation (assumed above to be 2.50%), approximate collateral returns with the above cash assumption (2.25%), and assume roll yields will be flat (rather than negative), then we arrive at a suggested return assumption of 4.75%. However, some inflows have slowed, and very long-term supply constraints suggest the potential to overwhelm near term issues over longer horizons[8]. Given the above discussion we have significantly decreased our return assumption to 6.00% (from 6.50%). Our risk assumption remains conservatively above the long-term index average volatility at 19.75%.

[8] Jeremy Grantham, "*Time to Wake Up: Days of Abundant Resources and Falling Prices are Over Forever*". (April 2011).

Diversified Inflation Strategies

Diversified inflation strategies include investments expected to perform well in inflationary environments that typically target a return that exceeds inflation by a premium (e.g. CPI + X%). There are a number of diversified inflation implementation strategies. RVK's diversified inflation strategies assumption set is intended for those clients seeking implementation via a broadly diversified, pre-packaged approach (as opposed to implementation via direct investments in relevant sub-asset classes, which can typically be modeled separately).

Figure 92 summarizes our long-term forward-looking assumption set.

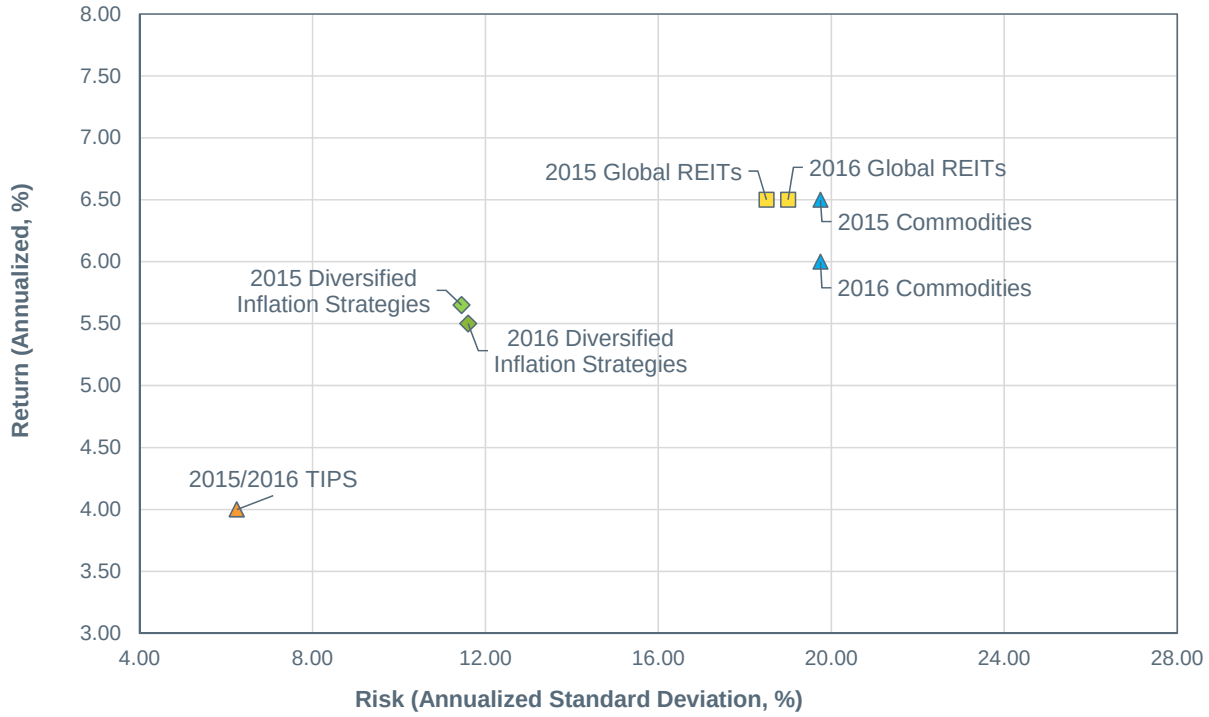
Figure 92: Diversified Inflation Strategies Assumptions

Asset Class	2015			2016			One Year Adjustment		
	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %	Nominal Return (Arithmetic) %	Risk (Standard Deviation) %	Nominal Return (Compound) %
Diversified Inflation Strategies	5.65	11.45	5.03	5.50	11.60	4.87	-0.15	+0.15	-0.16

When benchmarking diversified inflation strategies, it is important to note that, similar to GDP growth, inflation seldom changes dramatically from quarter to quarter, but instead follows secular cycles that result from structural changes in the economy and/or government policy. Because inflationary periods are expected to have a long duration, the price impact on inflation hedging assets should be expected to occur principally in response to changes in *expected* inflation. As a result, we believe diversified inflation strategies will provide a return premium above inflation when measured over a long time period; however, the quarter to quarter and sometimes year to year returns may deviate significantly from measured changes in CPI.

Our assumptions for diversified inflation strategies are based on a representative portfolio consisting of equal allocations to TIPS, broad commodities, and global REITs. **Figure 93** details RVK's 2016 assumptions for the three underlying asset classes as well as the representative portfolio for the diversified inflation strategies asset class. Our 2015 assumptions have also been included in **Figure 93** for year-over-year comparative purposes.

Figure 93: 2016 RVK Diversified Inflation Strategies Return and Risk Assumptions



Our methodology results in a long-term expected return for diversified inflation strategies of 5.50% and a risk assumption of 11.60%. The return assumption represents a decrease of 15 basis points from our 2015 estimate, as our return assumption for commodities was reduced. The risk revision is based on our increase in the expected standard deviation of global REITs and changes in correlations between the underlying asset classes.

CORRELATIONS

Our overall process for establishing correlation assumptions is consistent with practices we have applied in past years. In general, long-term historical index values and interrelationships constitute the foundation, while more recent trends function as a forecasting tool. Specifically, a 90% weight is placed on since inception data and a 10% weight is applied to the last 5-year period. This methodology yields a complex but manageable matrix of assumptions that incorporates both long-term and recent trends.

We employ a modified methodology for less liquid asset classes – such as private equity and real estate – attempting to account for the lags between periodic accounting reporting and underlying true economic values, as well as to more accurately incorporate trends observed over the last decade that are reasonably likely to endure.

For private equity we employed a 50/50 weighting to periodic correlations observed since inception and during the last ten-year period. We believe that this methodology more accurately reflects the nature of the private equity markets over the last 10 years (specifically its maturation as an asset class), while also incorporating its long-term history. As shown in **Figure 94**, the correlations between private and public equities have increased over the last 10-15 years. Some of the following factors may be driving this trend:

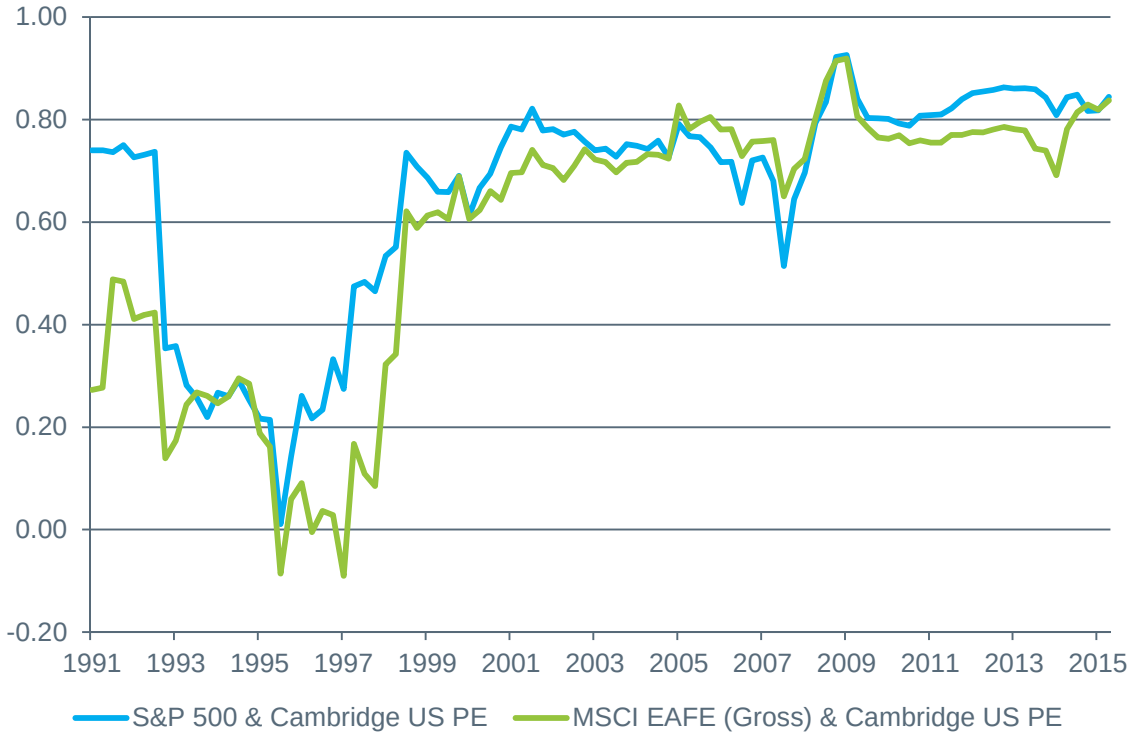
- **Public Market Exits** – Private equity firms frequently exit investments and generate value for investors via mergers and acquisitions ("M&A") and initial public offerings ("IPOs"). Both the success and frequency of these transactions is closely correlated with conditions in public equity markets.

- **Increasing Supply of Capital** – As the private equity marketplace has matured significantly more players have entered the private equity space resulting in more firms fighting for a limited pool of opportunities.

- **Diminished Role of Venture Capital** – The increasing average size of buyouts on a weighted basis and relatively smaller venture capital deal volume illustrate a diminished role of venture capital in the private equity universe. This represents a departure from the past in which venture capital constituted a larger percentage of overall deal volume.

- **Increasing Valuation Frequency Due to New Accounting Requirements** – Fair value accounting and compliance with revised auditing standards encourages a more frequent revaluation of portfolio companies (away from a generally cost- or exit-based approach). A more frequent valuation approach (especially one that emphasizes public market comparables) is likely to increase observed correlations.

Figure 94: 5-Year Rolling Correlations



Sources: Cambridge, S&P and MSCI. (2016)

For core real estate we also use a 90/10 methodology but apply a two-quarter lag to the return streams. We believe that a lagged methodology better reflects the long-term relationships and economic realities of the private real estate asset class given current appraisal smoothing/lag and partial portfolio revaluations. However, we note that recently appraisers have been more proactive in marking assets to market, and fund managers have adopted new policies to appraise underlying assets more frequently and with greater rigor. Consequently, we continue to revisit this methodology on an annual basis to ensure it does not need adjusting based on new developments in the asset class.

A copy of the RVK 2016 correlation matrix is provided in Appendix A.

PORTLAND CHICAGO NEW YORK