# Virginia Joint Legislative Audit Review Committee

## Assessment of Virginia529's PrePaid529 Investment Benchmarks

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## EXECUTIVE SUMMARY

The following study, commissioned by the Virginia Joint Legislative Audit & Review Commission (JLARC), reviews the current performance benchmark structure of the Virginia529's Prepaid529 plan (Prepaid 529). The purpose of the study is a third-party assessment of the appropriateness of the investment benchmarks used to measure fund performance of the Prepaid529 fund, given the investment goals, strategies, and risk tolerance that have been adopted for the fund. The analysis will focus on the benchmarking of investments at three separate levels including the Total Fund Level, Asset Class Composite Level, and the Investment Manager Level. The main findings are:

– Prepaid529 employs a monthly pro-rata roll-up of the individual investment manager benchmarks weighted to each manager's end-of-period market value. As a result, the current benchmarking methodology attributes all performance variation to the difference between each investment manager and their respective benchmark; this is commonly referred as Investment Manager Level attribution.

  **Recommendation**: Callan believes that all investment portfolios are best analyzed relative to their benchmarks at three different attribution levels; the Total Fund Level, the Asset Class Level, and the Investment Manager Level. To measure performance in this framework, asset class and investment manager benchmark weights must be held static and not adjusted to the capital value of the individual managers.

– Total Fund Level analysis seeks to answer the question of whether or not the overall implementation of the strategic asset allocation has added value relative to the policy benchmark, and to attribute the sources of relative performance to asset allocation, asset class structure, and manager selection decisions. This is valuable to stakeholders because it provides insight as to what is responsible for the growth or decline in a Total Fund's value.

– At the Total Fund Level, the benchmark should reflect the strategic asset allocation decisions formalized through the asset-liability study process and approved by the investment committee. Accordingly, we recommend fund level attribution relative to the actual policy approved in the 2016 asset-liability study.

  **Recommendation**: Use the portfolio asset classes and their weights modelled in the 2016 asset-liability study to construct the Total Fund Level benchmark.

– At the Total Fund Level, Callan believes that the Investment Policy Statement (IPS) asset class categorization and performance presentation of Equities, Fixed Income, and Alternatives could be enhanced by separating Fixed Income into Core and non-Core categories. Core would generally represent investment grade fixed income and non-Core would represent non-investment grade, convertible bonds, and emerging markets debt.

  **Recommendation**: At the IPS Level of asset class categorization, delineate between Core Fixed Income, which would include cash, stable value, and investment-grade U.S. bonds; and Non-Core Fixed Income, which would include U.S. high yield bonds, convertible bonds, bank loans, and emerging market debt.

– Asset Class Level analysis seeks to answer the question of whether the implementation of the asset class has added value relative to the asset class benchmark, and to decompose the sources of relative performance to 1) structural decisions/style biases and 2) manager performance. This is valuable to stakeholders because it provides insight into how each of the two decisions contributes to asset class performance.

**Recommendation**: At the Asset Class Level, Callan believes that the investment benchmarks weights should be static to preserve the attribution information resulting from investment manager tilts away from their respective benchmarks.

- At the Investment Manager level, Callan agrees with the vast majority of VA529's current benchmarks. There are some recommended benchmark changes to better reflect the investment style and universe of specific managers.

  **Recommendation**: At the Investment Manager Level, Callan believes that the investment benchmarks weights should be static to preserve asset allocation effects arising from investment manager rebalancing or the Asset Allocation Effect.

- Callan believes migrating to a three level relative attribution approach provides relevant insight into performance at both the Total Fund and Asset Class levels and that this additional information adds value to the different levels of engagement by PrePaid529's stakeholders.

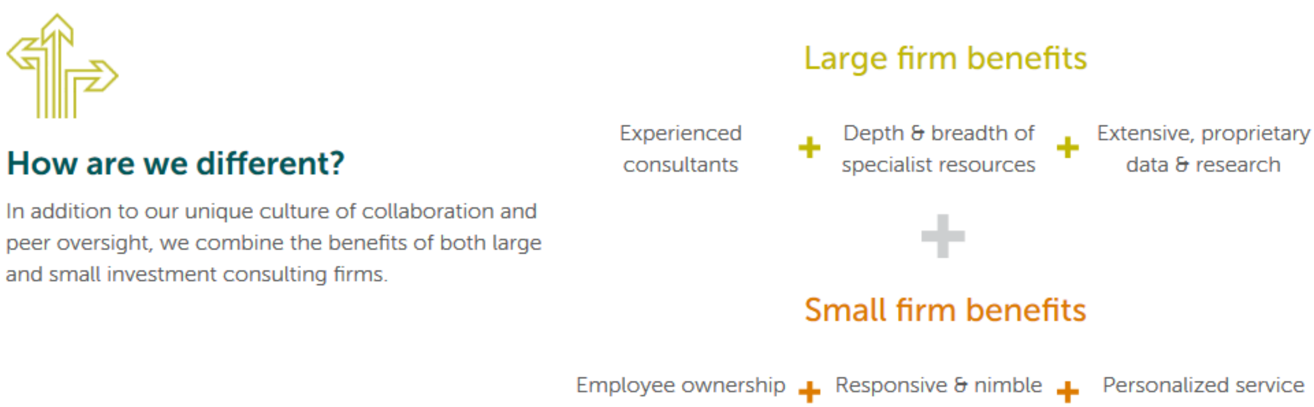
## CALLAN OVERVIEW

Callan was founded as an employee-owned investment consulting firm in 1973. In the 45 years since, we have empowered institutional clients with creative, customized investment solutions uniquely backed by proprietary research and data, ongoing education, and decision support. We use an integrated consulting model to serve 529 plans, public and private pension plan sponsors, endowments, foundations, operating funds, smaller investment consulting firms, investment managers, and financial intermediaries.

Today, more than 90 Callan employees — representing roughly half of our workforce — are shareholders in a company that advises on over $2 trillion in total assets, making us among the largest independently owned investment consulting firms in the U.S. Our ownership is broadly distributed. One owner holds approximately 20% with no other individual owning more than 6%.

All Callan employees consider themselves stewards of a culture that revolves around collaboration to serve our clients' needs. While we have contemplated other structures, we strongly believe the stabilizing influence of independent ownership provides the best foundation for the preservation of this culture, which translates into a valuable sense of continuity for our clients.

Callan's prime differentiators are our singular commitment to consulting and the fact that our firm manages to combine the best attributes of large and small companies. We feel this uncommon blend results in the best possible balance for our clients.




## PURPOSE AND SCOPE OF THE STUDY

This study supports the Virginia Joint Legislative Audit & Review Commission's (JLARC) oversight of Virginia529 on behalf of the Virginia General Assembly. JLARC oversees and evaluates Virginia529, including the Prepaid529 program, on an ongoing basis pursuant to the Virginia College Savings Plan Oversight Act (Title 30, Chapter 51 of the Code of Virginia).

Virginia529 was established by the General Assembly in 1994 to help make college more affordable and accessible to Virginians (Title 23.1, Chapter 7 of the Code of Virginia). Education savings plans are authorized by §529 of the Internal Revenue Code and are sponsored in 49 states and the District of Columbia. The programs offer federal and state income tax advantages on education savings and investment earning. Virginia529 offers three education savings programs, including the Prepaid529 program which allows customers to prepay college tuition and fees. Virginia529 invests Prepaid529 assets in order to generate returns that help pay benefits to program participants.

The Virginia529 board and its investment advisory committee oversee the Prepaid529 fund. The board determines the fund's overall asset allocation. The investment advisory committee determines what investment strategies should be implemented within each asset class and selects and retains private investment management firms to implement those strategies. Virginia529 staff and a consulting firm oversee these external managers, monitor their performance, and make recommendations to the board and investment advisory committee.

The purpose of this study is to assess and report on the appropriateness of the investment performance benchmarks that Virginia529 has adopted for the Prepaid529 fund, specifically focusing on:

– A review of the Total Fund Level investment benchmark and its construction methodology to determine if it clearly communicates the relative investment performance of the Prepaid529 Fund;
– A review of Asset Class Structure Level investment benchmarks and their construction methodology to determine if the individual asset class benchmarks clearly communicate manager structure deviations relative to the strategic asset class benchmarks selected during the asset/liability modelling process; and,
– Finally, a review of the investment benchmarks at the investment manager level, determining if each of the investment managers' benchmarks are reflective of the investment opportunity sets from which they individually select securities or pursue investment opportunities.

To conduct the aforementioned analysis, Callan collected the following data to review the investment benchmarks at the three different levels:

– Five years of monthly manager asset balances;
– Five years of monthly manager returns;
– Five years of quarterly manager investment holdings;
– Five years of monthly private equity and private real estate cash-flows;
– Investment manager benchmark returns and holdings based characteristics; and,
– Investment manager strategy descriptions and in some cases offering documents

The importance of gathering the data was to independently analyze the characteristics of each of the portfolios, reconcile with summary data provided by VA529, and compute total fund, asset class, and manager return attribution.

## INTRODUCTION

Developing appropriate investment benchmarks for the Total Fund, each Asset Class, and each Investment Manager is critical to the successful management of a Fund. Generally, the first step is to define "What" is to be measured, "How" and "Why"

- "What" is often guided by the decisions that are under a Board's control;
- "How" involves the decision about the standard or benchmark against which performance is measured; and,
- "Why" is often answered by a belief that measurement and review can lead to better results

Once the primary characteristics are established, one must then determine the utility of the measurement to the intended audience. For example, policy makers can change direction; implementers execute strategic plans and can adjust course; but a wider audience might just want information at a high level.

Ideally, benchmarks embody the following criteria:

**Unambiguous and Measurable**

- It is clear what is being measured and how. For example: "The fund's performance objective is to achieve a total annualized return that matches or exceeds the policy index comprised of 70% global equities and 30% investment grade bonds over rolling 5-year periods"

**Appropriate**

- The benchmark reflects the investment opportunity set

**Specified in Advance**

- The benchmark is determined at the beginning of the evaluation period and does not allow for after-the-fact modification

**Actionable and Attainable**

- One can expect to meet or beat the market index or a universe of peer managers

**Reflective of the Governing Body's Risk Tolerance**

- The implicit level expected risk and return in the benchmark is consistent with the decision-making body's risk tolerance and return objectives

Assuming the broad criteria of a robust benchmark are met, they can then be used to serve several significant functions:

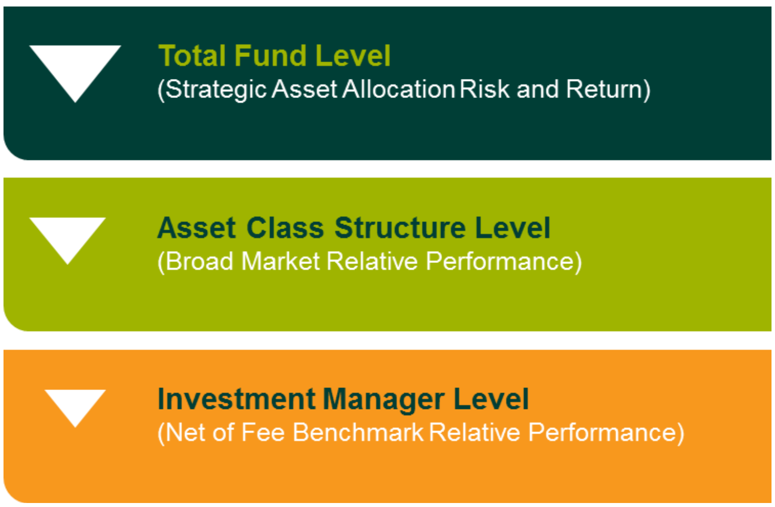
- Aggregate to a policy portfolio to measure Total Fund relative performance;
- Provide appropriate market exposure characteristics for individual asset classes;
- Define investment opportunity sets at the investment manager level; and,
- Guide risk and performance attribution analysis.

## CALLAN'S BENCHMARKING PHILOSOPHY

Similar to corporate financial statement analysis, investment performance benchmarking can be done at several different levels of detail. For example, if asked about annual performance, a firm's Board might reply "top line revenue was $100mm, expenses were $40mm, and profit was $60mm." The CEO's reply on the other hand might include information regarding product lines and market share, while the CFO would likely go into detail regarding profit margin contribution and areas where cost management is effective. Overall, different levels of information have relevance to each stakeholder and in that way investment performance benchmarking is very similar to corporate financial statement analysis.

For investment performance benchmarking to have meaning, institutional fund management requires well-articulated investment objectives that can be monitored and compared relative to rigorously defined measurement criteria. In that context, Callan believes valuable and necessary information is obtained by benchmarking institutional funds at three different levels; the Total Fund Level, the Asset Class Structure Level, and the Investment Manager Level and as graphically depicted below in Exhibit 1.

**Exhibit 1: Total Fund Attribution**




### Total Fund Level

A plan's strategic asset allocation is the primary determinant of portfolio risk and return. The appropriate asset allocation will ultimately satisfy two basic criteria:

1. The asset allocation will be efficient. Given an acceptable level of risk, the asset allocation will generate the maximum level of expected return.
2. The asset allocation will reflect the appropriate level of risk for the plan, based on consideration of plan liabilities and the expected interaction of the liabilities with potential asset performance.

At the Total Fund Level, the Total Fund Benchmark should be based on the asset allocation decision made by each fund's board of trustees or investment committee. This benchmark should be comprised of a blend of indices and monitored for changes in the asset allocation decision. Callan assumes that each broad asset class in an investment fund will perform at least as well as their respective asset allocation benchmark during a full market cycle or a time horizon of five to ten years. This Total Fund Benchmark helps the Fund monitor performance relative to an investable benchmark (or in cases where that is unavailable, a manager peer group) and provides a point of comparison for total fund performance attribution; or, answers which decisions have been responsible for total fund performance and to what degree.

### Asset Class Structure Level

Once the strategic asset allocation has been identified, Asset Class Structure seeks to define the appropriate mix of investment managers, styles, and active/passive implementation that would meet or surpass the Funds' expected return without exceeding the associated risk. At the Asset Class Structure Level, it is expected that within asset class tilts away from the policy benchmarks should also add value over time or at least provide insight into the risks intended or otherwise taken. Callan believes it is critical to analyze and understand the interaction between different types of investment managers in light of the Plan's ultimate financial goal set out by the strategic asset allocation. Equivalent to risk budgeting at the asset class level, asset class structure analysis seeks to refine the total fund expected risk and return results by determining an optimal diversification structure within each of the Plan's individual asset classes. To do so, benchmarks should be selected such that they minimize portfolio exposure to unintended biases by style, capitalization or other attributes while clearly communicating the value-add of intended asset class composite deviations from the asset class benchmark. In thinking about this process graphically, Exhibit 2 below, starts with the definition of the role of the asset class in the Total Fund, then proceeds to the implementation decisions of the asset class, and finally concludes with the definition of the asset class benchmark by which future performance is to be measured.

**Exhibit 2: Asset Class Structure Process**


### Investment Manager Level

At the Investment Manager Level, active managers, regardless of style, should outperform an appropriate market or custom index over a full market cycle; otherwise there is no value in paying active management fees. Over the shorter-term, manager styles of investing will go in and out of favor and during these shorter time periods, managers may be more effectively evaluated against managers of similar style (style groups). Therefore, Callan believes that any active manager should have two benchmarks:

- A market index, which represents the universe of securities the manager could buy (the passive alternative for achieving the same or similar market exposure); and
- A style group of managers who follow a similar investment strategy (the active alternative to achieving the same or similar exposure).

Over a full market cycle, investment managers should add value, net of fees, above what is achievable in a passive alternative or in cases lacking a passive alternative provide above median returns relative to an identified manager universe.

## PREPAID 529 TOTAL FUND LEVEL ANALYSIS

In 2016, Prepaid529 underwent an asset/liability study where the Investment Advisory Committee and the fund's consultant reviewed Prepaid529's tuition liability in effort to find the best strategic asset allocation to fund tuition payments into the future. The result was a policy portfolio summarized by the three broad asset classes of Equities, Fixed Income, and Alternatives, which was then further decomposed into thirteen asset classes as detailed in the Exhibit 3 below. Note that the strategic asset allocation below was a continuation of the strategic asset allocation adopted in 2009 and that this report does not endeavor to comment on the appropriateness of the strategic asset allocation or the tuition liabilities of Prepaid529.

**Exhibit 3: Prepaid529 Strategic Asset Allocation (AA)**

| Current | | Recommended Structure | | | | |
|---|---|---|---|---|---|---|
| **Prepaid529 IPS Asset Classes** | **Prepaid529 IPS Weights** | **Prepaid529 IPS Asset Classes** | **Prepaid529 IPS Weights** | **Prepaid529 Strategic AA Level** | **Prepaid529 Strategic AA Weights** | **# of Investment Managers** |
| Equities | 32.5% | Equities | 32.5% | U.S. Equity | 15.0% | 4 |
| | | | | EAFE | 10.0% | 2 |
| | | | | Emerging Markets | 7.5% | 2 |
| Fixed Income | 52.5% | Core Fixed Income | 25.0% | Core Bonds* | 15.0% | 6 |
| | | | | TIPS | 5.0% | 1 |
| | | | | Intermediate Credit | 5.0% | 1 |
| | | Non-Core Fixed Income | 27.5% | U.S. High Yield** | 10.0% | 1 |
| | | | | Convertible Bonds | 7.5% | 2 |
| | | | | Emerging Mkt Debt (LC)*** | 5.0% | 1 |
| | | | | Emerging Mkt Debt (HC) | 5.0% | 1 |
| Alternatives | 15.0% | Alternatives | 15.0% | Core Private Real Estate | 5.0% | 2 |
| | | | | Hedge Funds (moderate) | 5.0% | 2 |
| | | | | Private Equity | 5.0% | 7 |
| | **100.0%** | **Total** | **100.0%** | | **100.0%** | **32** |

* Core Bonds include cash, stable value, Virginia Treasurers pool, and the Credit Suisse transition account.
** Callan recommends reclassifying U.S. Bank Loans from Core Fixed Income to Non-Core Fixed Income and identified as either U.S. High Yield or as a separate asset class.
*** Stone Harbor invests in both Local & Hard Currency Emerging Market Debt. Hard currency refers to bonds issued in developed market currencies such as USD or Euro.

To measure the relative return performance at the Total Fund Level, Prepaid529's current methodology rolls-up the individual manager benchmarks and weights them based on each manager's end-of-month market value weight within the Total Fund.

For example, Prepaid529 has a strategic 5% allocation to U.S. TIPS. At the end of each month, the portfolio's dollar value is calculated as well as its pro-rata weight dollar weight within the Total Fund. Assuming a 5% starting weight for the TIPS portfolio, if at the end of the month the market value of the portfolio has fallen to a 4% weight, the U.S. TIPS benchmark will be adjusted from a 5% to 4% weight in the Total Fund benchmark. This method effectively eliminates return effects attributable to deviations from the strategic policy weight for U.S. TIPS set by the strategic asset allocation. This return effect is called the Asset Allocation Effect.

**Recommendation:** At the Prepaid529 IPS Asset Class level, Callan believes that greater detail in the fixed income allocation would be beneficial to stakeholders when reviewing performance from a high level of abstraction. Breaking down the fixed income allocation into Core and Non-Core components would highlight the expected performance differences between investment grade fixed income and generally, non-investment grade fixed income. As a part of this recategorization of Core vs. Non-Core Fixed Income, Callan would recommend that U.S. Bank Loans be included in the Non-Core Fixed Income allocation.

**Recommendation:** From a Total Fund perspective, Callan would recommend a total fund benchmark that is comprised of broad benchmarks that are investable for public market securities (where passive alternatives exist) and for alternative asset classes, benchmarks that represent the unique characteristics and/or illiquidity premiums of each of the opportunity sets. The weighting methodology of the individual benchmarks would reflect the weights established during the asset/liability study and most importantly remain static. The reason for recommending a static weight to the individual benchmarks is to preserve the ability to decompose the Fund's performance into decisions made at the Total Fund Level, the Asset Class Level, and the Investment Manager Level.

### Total Fund Relative Return Attribution

Decomposing a fund's relative return components helps fund sponsors and stakeholders analyze what is responsible for the growth or decline in a Total Fund's value. The three relative return components made available by holding benchmark weights static are:

> **Asset Allocation Effect**: Measures the return differences attributable to deviations of the Effective Actual Weight vs. Effect Target Weight of the fund asset classes and provides information regarding decisions made at the Total Fund Level.
>
> **Asset Class Structure Effect**: Measures the return differences attributable to manager positioning within their respective asset classes and provides information regarding decisions made at the Asset Class Structure Level.
>
> **Manager Selection Effect**: Measures the return difference attributable to manager selection and provides information regarding decisions made at the Investment Manager Level.

At the Total Fund Level, the Asset Allocation Effect is a critical measure because it shows how closely the actual dollar allocation of the portfolio tracks the strategic asset allocation and calculates the return effects of those deviations are over time. In general, one can view the Asset Allocation Effect as measuring unintended risk related to market value variation and a fund's rebalancing policy and its execution. Asset Class Structure Effect helps to answer the return benefits of manager concentration within and outside their primary investment opportunity set. Finally, Manager Selection Effect helps to determine the success of identifying investment managers who add value over and above their investment management fees.

To get a sense of the importance of the Total Fund Attribution effects, displayed below in Exhibit 4 is what is known as a relative attribution analysis. Relative attribution analysis seeks to decompose the difference between a portfolio's "Actual Return" and its "Benchmark Return" by separating out the components driving the return difference; Asset Allocation Effect, Asset Class Structure Effect, and Manager Selection Effect.

**Exhibit 4: 1 Year Annualized Relative Return Attribution**

| A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|
| **Asset Class** | **Effective Actual Weight** | **Effective Target Weight** | **Actual Return** | **Target Return** | **Asset Allocation Effect** | **Asset Class Structure Effect** | **Manager Selection Effect** | **Total Relative Return** |
| US Equities | 15% | 15% | 14.19% | 14.78% | 0.00% | 0.17% | (0.27%) | (0.10%) |
| EAFE Equities | 10% | 10% | 7.08% | 6.84% | 0.00% | 0.05% | (0.03%) | 0.02% |
| Emerging Equities | 8% | 8% | (0.03%) | 8.59% | 0.00% | 0.02% | (0.68%) | (0.66%) |
| Core Bonds | 17% | 15% | 3.42% | (0.40%) | (0.12%) | 0.60% | 0.06% | 0.54% |
| TIPS | 5% | 5% | 2.06% | 2.11% | 0.00% | 0.00% | 0.00% | 0.00% |
| Intermediate Credit | 3% | 5% | (0.45%) | (0.36%) | 0.13% | 0.01% | (0.01%) | 0.13% |
| High Yield | 10% | 10% | 2.75% | 2.62% | 0.00% | (0.08%) | 0.09% | 0.01% |
| EMD Hard | 9% | 5% | (2.85%) | (1.60%) | (0.28%) | (0.21%) | 0.09% | (0.40%) |
| EMD Local | 2% | 5% | (2.33%) | (2.33%) | 0.24% | 0.00% | 0.00% | 0.24% |
| Convertibles | 7% | 8% | 0.71% | 12.02% | (0.02%) | (1.10%) | 0.28% | (0.84%) |
| Hedge Funds | 5% | 5% | 5.66% | 5.17% | 0.00% | (0.04%) | 0.07% | 0.03% |
| Core Real Estate | 3% | 5% | 6.77% | 7.47% | (0.05%) | (0.01%) | (0.02%) | (0.08%) |
| Private Equity | 7% | 5% | 16.94% | 16.49% | 0.21% | 0.01% | 0.08% | 0.30% |
| **Total** | | | **5.18%** | **= 5.98%** | **+ 0.11%** | **+ (0.57%)** | **+ (0.34%)** | **(0.80%)** |

For orientation, we have labelled the different columns of the relative return attribution to aid analysis;

**Column A**: The asset classes selected during the asset/liability modelling process

**Column B**: The average weight of the asset class over the measurement period

**Column C**: The target weight for each asset class set during the asset/liability modelling process

**Column D**: The actual return of each asset class over the measurement period

**Column E**: The benchmark return of each asset class over the measurement period

**Column F**: The asset allocation effect of each asset class

**Column G**: The asset class structure effect of each asset class

**Column H**: The manager selection effect in each asset class

**Column I**: The sum of the three relative attribution effects

**Total Row**: The total weighted attribution effects

For example, in Exhibit 4: 1 Year Annualized Relative Return above, one can see that the Manager Selection Effect (Column H) at the Total Fund Level detracted -0.34% return at the Total Fund Level. We can verify this in the following table, Exhibit 5, copied from the June 30, 2018 Prepaid 529 Investment Performance Report.

### Exhibit 5: Virginia PrePaid529 Performance Summary as of 06/30/2018

Virginia529℠

**Prepaid529**
**Investment Performance Summary Results**
**as of June 30, 2018**
**Net of Fees**

| Name | Current Market Value | Current Allocation | 1 Month | 3 Month | Calendar YTD | Fiscal YTD | 1 Year | 3 Years | 5 Years | 10 Years | Since Inception | Inception Date |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Fund** | **$2,708,495,503** | **100.0%** | (0.25%) | (0.07%) | 0.27% | 5.18% | 5.18% | 5.23% | 5.68% | 5.42% | 6.24% | *Oct-97* |
| *Prepaid529 Total Fund Index* | | | (0.48%) | (0.18%) | 0.08% | 5.52% | 5.52% | 5.48% | 5.82% | 5.48% | *5.69%* | *Oct-97* |
| **Difference** | | | 0.23% | 0.11% | 0.19% | (0.34%) | (0.34%) | (0.25%) | (0.14%) | (0.06%) | 0.55% | |

Tying out the two reports illustrates a very important point, while total fund attribution does not change the return of the Total Fund for the period of 5.18%, it provides further detail of the total return as Asset Class and Asset Allocation Effects become part of the measured elements of relative performance.

For example, in the One Year Annualized Relative Return Exhibit 4 above, one can see that market value deviations from the “Effective Target Weight” (column C) at the Total Fund Level added 0.11% of return, circled in green, of extra return at the Total Fund Level. If the individual benchmark weights were re-weighted at the end of each month, the total Asset Allocation Effect would be very close to if not zero and thus exclude the performance effects attributable to the difference between the Effective Actual Weight (column B) versus the Effective Target Weight (column C).

When viewing the Asset Allocation Effect of each of the asset classes for example, one can see that EMD Local (highlighted in yellow) is the largest positive contributor at 0.24% while EMD Hard (highlighted in yellow) is the largest negative contributor at -0.28%. By following a monthly pro-rata roll-up of the individual manager benchmarks weighted to each manager’s end-of-period market weight, this level of data would also be unavailable.

Finally, when viewing the Asset Class Structure Effect, we see that deviations attributable to out of benchmark bets and tilts of the managers within each of the 13 modelled asset classes detracted -0.57% of return.

Therefore, while in sum the return numbers attributable to the three attribution effects are relatively small in an absolute value sense, less than 0.60% for any individual attribution effect and 0.80% at the Total Fund, they do highlight the level of detail that is obscured by the current benchmarking roll-up methodology. It is Callan’s belief that this level of data is critical to the effective management of the total fund and allows both high level stakeholders as well as more granular implementers valuable information to understand and increase the effectiveness of fund management.

## ASSET CLASS LEVEL ANALYSIS

At the asset class level, the benchmark should establish the opportunity set, which is the beta ("the market") exposure, to be gained by the Fund. The sum of the investment mandates within each asset class should be evaluated against an asset class benchmark to gauge appropriate exposure to the desired asset class risk, return, and diversification characteristics. The purpose of the asset class benchmark is to measure the collective success of implementation by the managers selected. In the case of Prepaid529, Callan reviewed the asset class structures that were modeled in the asset/liability study to determine the objective of each of the asset classes. Generally, the asset class structure should reflect the objectives of that asset class within the plan's overall asset allocation framework.

### Exhibit 6: Virginia PrePaid529 Benchmarks and Weighting Methodology

| Asset Class | Current Benchmark[1] | Current Weighting Methodology[1] | Recommended Benchmark | Recommended Weighting Methodology[2] |
|---|---|---|---|---|
| U.S. Equity | S&P 500, Russell 2500 Growth, Russell 2500 Value, Russell 2000 | Dynamic Mkt Value | Russell 3000 | Static |
| EAFE | MSCI ACWI ex US | Dynamic Mkt Value | 57% MSCI EAFE / 43% MSCI EM | Static |
| Emerging Markets | MSCI Emerging Markets | Dynamic Mkt Value | MSCI Emerging Markets | Static |
| Core Bonds* | BB CMBS, Credit Suisse Leveraged Loans, Stable Value Custom, Citigroup 3-Month T-Bill | Dynamic Mkt Value | BB Aggregate | Static |
| TIPS | BB U.S. TIPS | Dynamic Mkt Value | BB U.S. TIPS | Static |
| Intermediate Credit | BB U.S. Int. Credit | Dynamic Mkt Value | BB U.S. Int. Credit | Static |
| U.S. High Yield | US High Yield Ba/B 1% Issuer Capped | Dynamic Mkt Value | BB U.S. High Yield | Static |
| Convertible Bonds | TR Defensive Investment Grade USDH | Dynamic Mkt Value | Merrill Lynch Global 300 Convertibles | Static |
| Emerging Mkt Debt (LC) | 50% JPMorgan EMBI Global Diversified Index/50% JPMorgan GBI-EM Global Diversified | Dynamic Mkt Value | JPMorgan GBI-EM Global Diversified | Static |
| Emerging Mkt Debt (HC) | JPMorgan EMBI Plus | Dynamic Mkt Value | JPMorgan EMBI Global Diversified | Static |
| Core Private Real Estate | NCREIF NPI/ODCE Blend | Dynamic Mkt Value | NCREIF ODCE Value Weight | Static |
| Hedge Funds (moderate) | HFRI FOF Conservative | Dynamic Mkt Value | HFRI FOF Conservative | Static |
| Private Equity | MSCI ACWI IMI + 300bps | Dynamic Mkt Value | MSCI ACWI IMI + 300bps | Static |

[1]Only the primary indexes are represented as the secondary benchmarks are not weighted in the Total Fund Benchmark roll-up
[2] Dynamic Mkt Value refers to the current method of re-weighting the benchmarks within the Total Fund based on the end of period market values of the investment managers
[3] Static refers to the recommended methodology of holding the benchmark weights static as determined by the 2016 A/L study

## Public Equity

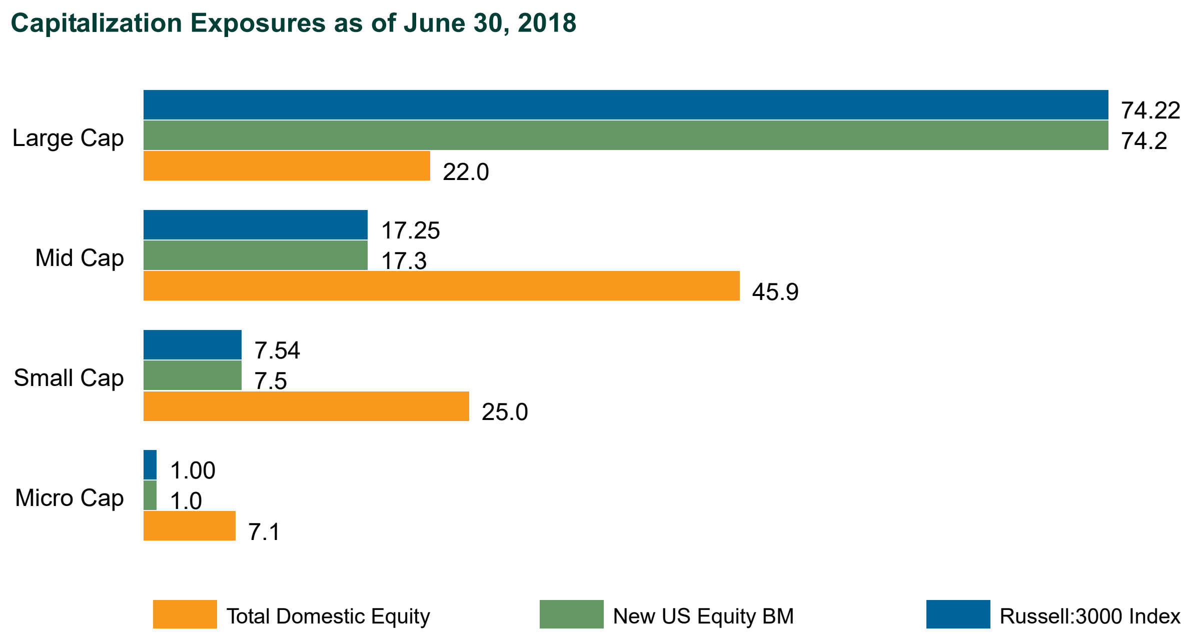
### *U.S. Equity*

**Current benchmark:** Roll up of the individual manager benchmarks which effectively results in a benchmark of: 23.3% S&P 500 Index/37.3% Russell 2500 Growth Index/22.7% Russell 2500 Value Index and 16.7% Russell 2000 Index. Please note that the weights are adjusted on a monthly basis to reflect the actual weight of the manager's account in the overall asset class portfolio. These weights reflect the asset value weights as of 06/30/2018.

**Analysis:** The weighted sum of the mandate benchmarks can equal the policy benchmark, but they may differ, reflecting the desire of the investor to impose tilts in implementation away from the broad policy benchmark in an effort to add value. Based on the premise that markets are efficient, any intended deviations from the broad market benchmark should add value over the long-term to justify these "bets". Differences in performance between the actual asset class portfolio and the broad asset class benchmark should help the investors understand whether: 1) the active manager decision in the asset class portfolio is adding value over full market cycles and 2) whether any intended bets such as style and/or market capitalization are adding value over full market cycles. The plan's current benchmarking process of rolling up the managers' individual benchmarks into the asset class benchmark only captures the active management part of the implementation decision.

Based on the US Equity asset class modeled in the 2016 asset/liability study, the benchmark is presumably a broad US equity benchmark such as the Russell 3000 Index. The Russell 3000 index captures roughly 98% of the US equity market with large cap stocks representing roughly 80% of the investable universe and small/mid cap stocks representing 20% of the investable universe. When looking at the actual implementation of the domestic equity portfolio as shown in Exhibit 7 below, it can be seen that there is a noticeable overweight to mid, small and micro-cap securities and a significant underweight to large cap securities. This results in a different risk/return profile for the asset class than what was modeled in the asset/liability study. The difference between the modeled benchmark and the actual benchmark used is captured in Exhibit 4 above in the "Asset Class Structure" column.

**Exhibit 7: Capitalization Exposure**




Callan believes that a broad based benchmark such as the Russell 3000 Index would allow the Plan to determine the attribution of all the implementation decisions including the intentional style/market cap tilts.

**Benchmark Recommendation:** Change to Russell 3000 Index

### *International Equity (Developed Non-U.S. & Emerging Markets)*

**Current benchmark:** Roll up of the individual manager benchmarks which effectively results in a benchmark of: 57% MSCI ACWI ex-US and 43% MSCI EM. Please note that the weights are adjusted on a monthly basis to reflect the actual weight of the manager's account in the overall asset class portfolio. These weights reflect the asset value weights as of 06/30/2018.

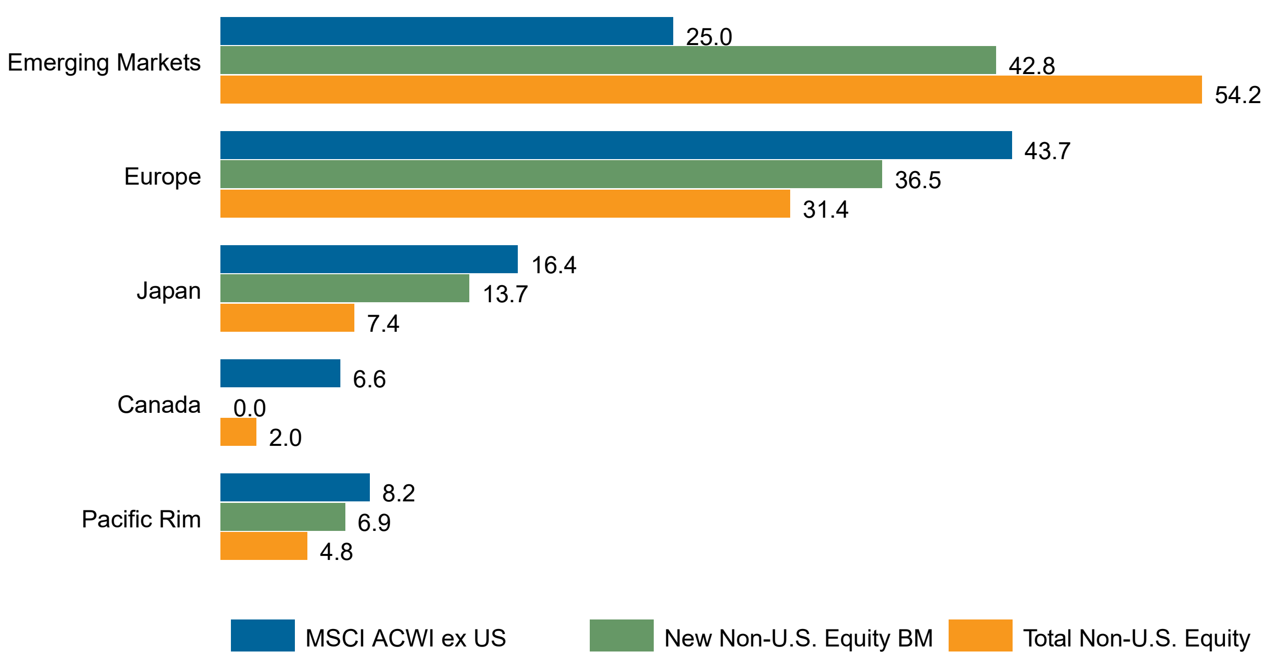
**Analysis:** The weighted sum of the mandate benchmarks can equal the policy benchmark, but they may differ, reflecting the desire of the investor to impose tilts in implementation away from the broad policy benchmark in an effort to add value. Based on the premise that markets are efficient, any intended deviations from the broad market benchmark should add value over the long-term to justify these "bets". Differences in performance between the actual asset class portfolio and the broad asset class benchmark should help the investors understand whether: 1) the active manager decision in the asset class portfolio is adding value over full market cycles and 2) whether any intended bets such as region, style and/or market capitalization are adding value over full market cycles. The plan's current benchmarking process of rolling up the managers' individual benchmarks into the asset class benchmark only captures the active management part of the implementation decision.

Based on the international equity asset classes modeled in the 2016 asset/liability study, the recommended benchmark is a combination of the MSCI EAFE index and the MSCI Emerging Markets index reflecting their policy allocation weights in the study (~57% EAFE and ~43% EM). The MSCI EAFE

Index captures stocks in developed market countries while the MSCI Emerging Markets Index captures stocks in emerging markets countries. When looking at the actual implementation of the international equity portfolio as shown in Exhibit 8. below, it demonstrates a noticeable overweight to emerging markets securities (54.2% vs. 42.8%). This results in a different risk/return profile for the asset class than what was modeled in the asset/liability study. The difference between the modeled benchmark and the actual benchmark used is captured in Exhibit 4 above in the “Asset Class Structure Effect” column. The international equity portfolio is split into dedicated developed markets (EAFE Index) and emerging markets (EM Index) and the benchmark mismatch is noticeable for developed markets. While the objective of that portfolio is developed international equity markets, the investment managers in the portfolio have significant allocations to emerging markets equity which puts their portfolios more in line with the MSCI ACWI ex-US Index. The MSCI ACWI ex-US index captures both developed markets and emerging markets.  Ideally, the asset class structure effect should be close to zero, which is not the case for the developed international equity portfolio.

**Exhibit 8: Regional Exposure**

**Regional Exposures as of June 30, 2018**




Callan believes that a benchmark composed of the asset class structure modeled in the asset/liability study would allow the Plan to determine the attribution of all implementation decisions, including intentional style and regional tilts.

**Benchmark Recommendation:** Change to custom benchmark of 57% MSCI EAFE Index and 43% MSCI Emerging Markets Index.

## Core Fixed Income

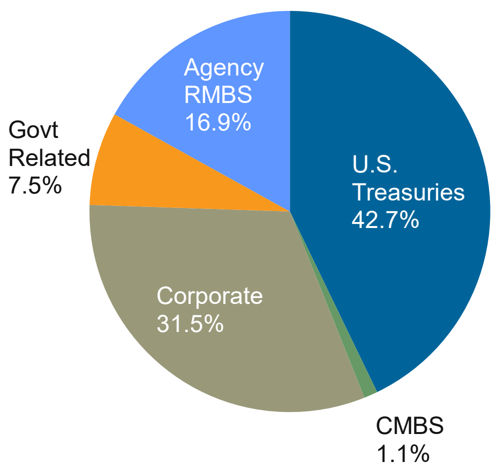
**Current benchmark:** Roll up of the individual manager benchmarks which effectively results in a benchmark of: 12.2% Bloomberg Barclays Intermediate Credit/ 25.4% Bloomberg Barclays US TIPS Index/12.2% Bloomberg Barclays CMBS Index/35.5% Credit Suisse Leveraged Loans Index and 20.1% 3-month T-bill + 1%. Please note that the weights are adjusted on a monthly basis to reflect the actual weight of the manager's account in the overall asset class portfolio. These weights reflect the asset value weights as of 06/30/2018.

**Analysis:** The weighted sum of the mandate benchmarks can equal the policy benchmark, but they may differ, reflecting the desire of the investor to impose tilts in implementation away from the broad policy benchmark in an effort to add value. Based on the premise that markets are efficient, any intended deviations from the broad market benchmark should add value over the long-term to justify these "bets". For core fixed income the asset class benchmark should reflect the effective yield, effective duration and average quality of the broader market. Differences in performance between the actual asset class portfolio and the broad asset class benchmark should help the investors understand whether: 1) the active manager decision in the asset class portfolio is adding value over full market cycles and 2) whether any intended bets such as sector, duration and/or quality are adding value on a risk-adjusted basis over full market cycles. The plan's current benchmarking process of rolling up the managers' individual benchmarks into the asset class benchmark does not capture the implementation decision.

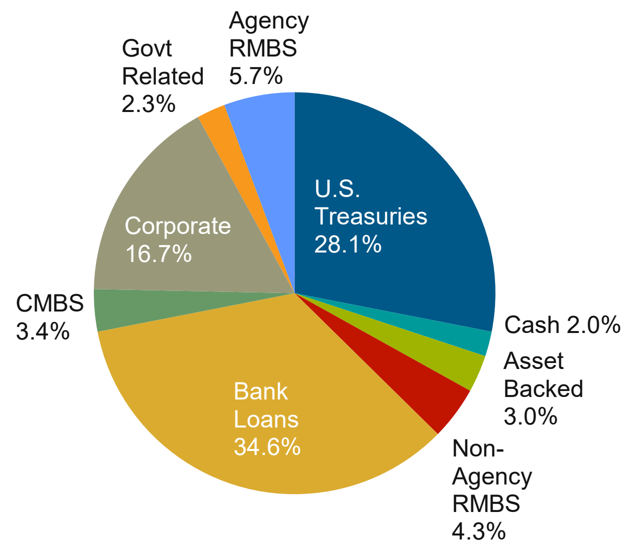
Based on the core fixed income asset class modeled in the 2016 asset/liability study, the recommended benchmark is comprised of 60% Bloomberg Barclays Aggregate Index, 20% Bloomberg Barclays Intermediate Credit Index and 20% Bloomberg Barclays TIPS Index. When looking at the actual implementation of the core fixed income portfolio as shown in Exhibit 9. below, it shows that there is a significant allocation to bank loans, which is not a benchmark sector, and a noticeable underweight to treasuries and corporates. This results in a different risk/return profile for the asset class than what was modeled in the asset/liability study. The difference between the modeled benchmark and the actual benchmark used is captured in Exhibit 4 above in the "Asset Class Structure" column under Core Fixed Income. It shows the difference between the core fixed income that was modeled (Bloomberg Barclays Aggregate Index, Bloomberg Barclays U.S. TIPS, Bloomberg Barclays Intermediate Credit) and the core-fixed income portfolio which also includes Mortgage Backed Securities, Bank Loans and Stable Value. The resulting asset class structure effect shown in Exhibit 4 is meaningful as the portfolio implementation is very different from the policy mandate.

**Exhibit 9: Fixed Income Sector Exposure**

**New Core Fixed Income BM as of June 30, 2018**




**Core Fixed Income as of June 30, 2018**




Callan believes that a benchmark composed of the asset class structure modeled in the asset/liability study would allow the Plan to determine the attribution of all implementation decisions, including intentional sector and quality tilts.

**Benchmark Recommendation:** Custom benchmark of 60% Bloomberg Barclays Aggregate Index, 20% Bloomberg Barclays Intermediate Credit Index and 20% Bloomberg Barclays US TIPS Index.

## Non-Core Fixed Income

**Current benchmark:** Roll up of the individual manager benchmarks which effectively results in a benchmark of: 36.5% Bloomberg Barclays US High Yield Ba/B 1% Issuer Capped Index/ 27.2% TR Defensive Investment Grade USDH Index/24.6% JPMorgan EMBI Plus Index/5.3% JPMorgan EMBI Global Diversified Index/5.3% JPMorgan GBI-EM Diversified Index. Please note that the weights are adjusted on a monthly basis to reflect the actual weight of the manager's account in the overall asset class portfolio. These weights reflect the asset value weights as of 06/30/2018.

**Analysis:** The weighted sum of the mandate benchmarks can equal the policy benchmark, but they may differ, reflecting the desire of the investor to impose tilts in implementation away from the broad policy benchmark in an effort to add value. Based on the premise that markets are efficient, any intended deviations from the broad market benchmark should add value over the long-term to justify these "bets". Since there is no single benchmark that captures the objective of non-core fixed income, a custom benchmark that captures each of the distinct strategies at their target policy weight is appropriate. The four distinct strategies that make up the non-core fixed income bucket are high yield, convertibles, emerging markets debt hard currency and emerging markets debt local currency. Each of these strategies has a unique risk/return profile that is captured in commonly used broad asset class benchmarks.  Differences in performance between the actual asset class portfolio and a custom asset class benchmark should help the investors understand whether: 1) the active manager decision in the asset class portfolio is adding value over full market cycles and 2) whether any intended bets such as currency or quality is adding value on a risk-adjusted basis over full market cycles. The plan’s current benchmarking process of rolling up the managers’ individual benchmarks into the asset class benchmark captures the active management decision but not the implementation decision.

When looking at the actual implementation of the non-core fixed income portfolio as shown in Exhibit 4 under “Asset Class Structure Effect”, the differences between the implementation of each sub-asset class versus the modeled asset class results in large differences. This is most notable in emerging markets debt where the asset/liability study called for a 50/50 split between emerging markets debt hard currency and emerging markets debt local currency and the implementation is roughly 80% emerging markets debt hard currency and 20% emerging markets local currency. For high yield and convertibles the differences in the asset class modeled and the conservative implementation approach also results in significant differences. The effect is especially sizeable for convertibles (see Exhibit 4). The table below in Exhibit 10 shows characteristics for the conservative indices (top 2) used by the convertibles managers and the broad convertibles indices (bottom 2). The asset/liability study models a 9% volatility and 0.81 correlation for convertibles.

**Exhibit 10: Standard Deviation and Correlation Statistics**

**Statistics for 4 1/2 Years ended June 30, 2018**

| Index | Standard Deviation | Correlation |
|---|---|---|
| TR Defensive Investment Grade USDH Index | 3.68 | 0.52 |
| Bloomberg Global Defensive Convertibles Investment Grade | 4.75 | 0.53 |
| ML Global 300 Convertibles Index | 6.14 | 0.82 |
| Bloomberg Global Convertibles | 6.85 | 0.82 |
| **Statistics for 7 Years ended June 30, 2018** | | |
| TR Defensive Investment Grade USDH Index | -- | -- |
| Bloomberg Global Defensive Convertibles Investment Grade | 5.19 | 0.65 |
| ML Global 300 Convertibles Index | 7.36 | 0.86 |
| Bloomberg Global Convertibles | 8.1 | 0.87 |

Callan believes that a custom benchmark made up of the four broad strategies modeled in the asset/liability study that comprise the non-core fixed income allocation would allow the Plan to determine the attribution effect of both active management and implementation.

**Benchmark Recommendation:** Change to custom benchmark comprised of 36.3% Bloomberg Barclays US High Yield, 27.3% ML Global 300 Convertibles Index, 18.2% JPMorgan EMBI Global Diversified Index, 18.2% JPMorgan GBI-EM Global Diversified Index.

## Alternatives

Prepaid529's Alternatives asset class is composed of three investment opportunity sets; Hedge Fund of Funds, Private Equity, and Real Estate. Defining such a disparate group of investment opportunity sets as an asset class severely challenges the benchmarking process because the economic drivers of return, their persistence, and magnitude are vastly different across each of the investment opportunity sets. Therefore, Callan's benchmarking preference separates each of the distinct investment market exposures into their own asset class composites.

### *Hedge Funds of Funds*

Hedge Fund of Funds seek to provide a one-vehicle solution to gaining exposure to a diversified portfolio of individual hedge funds. Individual hedge funds expected returns generally fall between those of stocks and bonds and with an expected risk less than a long-only stock portfolio. Optimally, the investor is seeking a return path that displays a low correlation to stocks and bonds. By seeking a low correlation to stocks and bonds the investor is hoping to minimize the length of drawdown and recovery exhibited by portfolios of traditional assets.

**Current benchmark:** The HFRI FOF Conservative Index. The HFRI FOF Conservative Index is composed of 35 Hedge Fund of Funds (FOF) that seek consistent returns by primarily investing in funds that generally engage in more 'conservative' strategies such as Equity Market Neutral, Fixed Income

Arbitrage, and Convertible Arbitrage. Additionally the return streams of the constituent FOFs display a lower historical annual standard deviation than the broad universe of Hedge Fund of Funds.

**Analysis:** PrePaid529 has two fund exposures, Aurora Offshore Ltd. II and Blackstone Partners Offshore. Aurora Offshore is currently in liquidation with a carrying value below $350,000 and thus represents a de minimis impact on the Hedge Fund of Fund asset class composite. With Blackstone being the sole hedge fund of fund exposure, its benchmark fit against the HFRI FOF Conservative Index is detailed in the Investment Manager Level section below.

**Benchmark Recommendation:** No change, retain the HFRI FOF Conservative Index

### *Private Equity*

Private equity is generally described as an investment in the equity or debt of firms that are not listed on a public exchange. Private equity investors access private equity investments as limited partners directly in general partner directed funds or Fund of Fund structures that are composed of many general partners. Private equity funds invest across the firm development spectrum from venture capital, to growth equity, to leveraged buyouts. The time frame for most investments last 10 to 15 years and have very low to no liquidity. The return expectations for private equity are driven by exposure to a firm’s debt or equity. Central to the return expectations are a belief in the general partner to add value to the company, a belief that a control premium in the underlying investments is valuable, and given the inherent illiquidity of the equity or debt positions that a discount in the purchase price will translate into a return premium over the investment life.

**Current benchmark:** Actual performance of the fund for the first four years of performance to account for the investment period and then the MSCI ACWI IMI + 300bps thereafter. MSCI ACWI IMI is a global public equity market index including small, mid, and large capitalization companies. The “+300bps” represents the aggregate return premium to global public markets that an investor might expect for bearing the illiquidity of private markets

**Analysis:** Due to the non-publicly traded nature of the private equity investment opportunity set, an understanding of the objectives of the benchmark have to be defined. Common investment objectives for private equity benchmarks include:

1. A measure of opportunity cost or what could have been achieved in public markets over a similar time period; hence the use of a public market equity index.
2. A measure of “true” market risk as private equity valuations are appraisal based and thus smooth experienced returns. Throughout the life of a private equity fund, asset sales or realizations occur sporadically and thus understate the true volatility of the investments versus what would be experience if they were continuously priced in a public market.
3. An implied return premium for bearing the inherent illiquidity of the underlying investments, the belief that a controlling equity position is more valuable than a minority stake as in public equity, and the ability to access the skill of the general partner; hence the addition of “+300bps”

Since the only link between public equity markets and private equity markets are the periodic realizations of private equity sales to public companies and initial public offerings, the most direct comparison of a diversified private equity portfolio and a public market index is based on the geography of the underlying firms and their economic sectors. Below in Exhibit 11 is a comparison between Prepaid529's aggregate private equity portfolio's geographies and sectors and that of the MSCI ACWI IMI and a mathematically optimized portfolio of U.S. and Non-U.S public market indices.

**Exhibit 11: Private Equity and Public Market Index Regional and GICS Sector Exposures**

**Regional Allocation**

| | Total PE Portfolio | MSCI ACWI IMI | Difference | 60% Russell 3000 / 40% MSCI World ex U.S. IMI | Difference |
|---|---|---|---|---|---|
| North America | 61.6 | 54.7 | 6.9 | 63.5 | -1.9 |
| Europe/Middle East | 22.4 | 20.8 | 1.6 | 22.9 | -0.5 |
| Asia/Pacific | 8.8 | 12.3 | -3.5 | 13.6 | -4.8 |
| Emerging Markets | 1.4 | 12.1 | -10.7 | 0.0 | 1.4 |
| Other | 5.9 | 0.0 | 5.9 | 0.0 | 5.9 |
| Communication Services | 0.1 | 2.8 | -2.7 | 2.6 | -2.5 |

**GICS Sector Weights**

| | | | | | |
|---|---|---|---|---|---|
| Consumer Discretionary | 5.0 | 12.3 | -7.3 | 12.6 | -7.6 |
| Consumer Staples | 14.3 | 7.9 | 6.4 | 8.0 | 6.3 |
| Energy | 15.6 | 5.8 | 9.8 | 5.7 | 9.9 |
| Financials | 13.4 | 18.0 | -4.6 | 17.4 | -4.0 |
| Health Care | 11.7 | 10.5 | 1.2 | 11.6 | -0.1 |
| Industrials | 8.0 | 12.0 | -4.0 | 12.6 | -4.6 |
| Information Technology | 22.5 | 18.0 | 4.5 | 17.2 | 5.3 |
| Materials | 7.5 | 5.8 | 1.7 | 5.4 | 2.1 |
| Real Estate | 0.1 | 4.0 | -3.9 | 4.0 | -3.9 |
| Utilities | 0.0 | 2.9 | -2.9) | 2.9 | -2.9 |
| Other | 1.9 | 0.0 | 1.9 | 0.0 | 1.9 |

Relative to the primary private equity portfolio benchmark of MSCI ACWI IMI + 300bps, 1-quarter lag, the regional difference are largest relative to North America and Emerging Markets. These outcomes are expected as North America and specifically the United States is the most developed private equity market globally and emerging markets, the least.

On a GICS sector basis, the largest deviations are an underweight to consumer discretionary and an overweight to energy. Because private equity markets tend to be capital suppliers to sectors that lack adequate public market investment and vice versa, these deviations are expected as well.

However to see if a better benchmark could be constructed to minimize the regional and sector weights of the existing benchmark, an optimization was run whereby the historical quarterly time weighted returns of the Total

Private Equity Portfolio from December 2010 to March 2018 were compared to the following broad and more narrow public market indexes.

Broad Benchmark Approach:

**Russell 3000:** Capture private equity portfolio's U.S. exposure in one broad index

**MSCI World ex U.S. IMI:** Capture private equity portfolio's developed non-U.S. exposure in one broad index

**MSCI EM IMI:** Capture private equity portfolio's emerging markets exposure in one broad index

Narrow Benchmark Approach:

**Russell Top 200:** Represents mega cap U.S. equity portion of private equity portfolio

**Russell Midcap:** Represents mid cap U.S. equity portion of private equity portfolio

**Russell 2000:** Represents small cap U.S. equity portion of private equity portfolio

**MSCI World ex U.S.:** Represents large and mid cap developed non-U.S. equity portion of private equity portfolio

**MSCI EM:** Represents large and mid cap emerging markets equity portion of private equity portfolio

**MSCI World ex U.S. Small Cap:** Represents small cap developed non-U.S. equity portion of private equity portfolio

**MSCI EM Small Cap:** Represents small cap emerging markets equity portion of private equity portfolio

The Total Private Equity Portfolio was compared to the various index returns using the following measures:

– Returns and standard deviation
– Correlation of quarterly returns and rolling 2-year returns
– Tracking error

In pursuit of the best-fit custom benchmark we used various statistical techniques including:

– Correlation analysis
– Regression
– Returns-based style analysis
– Optimization
– Time lags

Given the risk of over-engineering a model to fit historical data, these analyses were used as a guide, not as a definitive answer. Looking at the potential custom benchmarks through various analytical lenses we were able to identify the indices that were routinely "chosen" by the models. As a result, in using quantitative measurement to inform reasonable judgement, the "optimal benchmark" was custom blend of 60% Russell 3000 / 40% MSCI World ex U.S. IMI.

The custom blend reflects the earlier observation that the U.S. is the largest and most developed private equity market globally and also selects the MSCI World ex U.S. IMI index due to its exclusion of emerging markets. Of course this analysis assumes a static weight to the existing portfolio's regions and sectors. In total, the optimal benchmark corrects for an approximately 11% underweight to emerging markets a 12% overweight to North America. On a sector basis, the optimal portfolio's largest correction is to the relative 1.2% overweight of the current portfolio to the Healthcare sector relative to the MSCI ACWI IMI.

**Benchmark recommendation:** No change, retain MSCI ACWI IMI + 300bps, 1-quarter lag, after the first four years of actual manager performance has been reported as the benchmark

### *Real Estate*

**Current benchmark:** Roll up of the individual manager benchmarks which effectively results in a benchmark of: 88% NCREIF NFI Value Weighted ODCE Net (1Q in Arrears) and 12% NCREIF Property Index (1Q in Arrears).

**Analysis:** The weighted sum of the mandate benchmarks will not equal the policy benchmark since we have defined Real Estate as a broad asset class. The components of the asset class are Aventura Holdings which houses the office building from which Virginia529 operates and UBS Trumbull Property Fund, a core open-end private real estate fund. At $64.0 million, Virginia Prepaid plan's exposure to the UBS Fund is approximately eight times that of the value of the Aventura Building and thus the return path at the asset class level is dominated by the UBS Fund

**Benchmark recommendation:** No change, retain ODCE Value Weighted Index

## INVESTMENT MANAGER BENCHMARK ANALYSIS

Establishing appropriate benchmark for active public markets managers is an important part of the evaluation process. For active public market managers, the benchmark should be a market index that best represents the manager's style and approach and is the bogey for measuring a manager's long-term performance. The market index should represent the opportunity set and strategy for the manager's mandate and be the passive alternative for achieving similar market exposure.

For private markets the use of informed judgement when both selecting benchmarks and using them to determine relative performance is necessary. Where such judgement is involved, the analysis will clearly identify the private market dynamics and the short-comings of the benchmark methods evaluated and the required assumptions.

Manager benchmarks are the basis for determining whether or not the plan is achieving value for the active management fees it is paying. Benchmarking is the tool that helps the IAC in making decisions around manager retention, watch list and termination.

### Public Equity Managers

The Prepaid529 has eight public equity managers of which one is a passively managed fund. Each manager's mandate and current benchmark, along with Callan's recommended benchmark, is shown in Exhibit 12 below.

**Exhibit 12: Public Equity Manager Benchmarks and Callan Benchmark Recommendations**

| | Mandate | Current benchmark | Proposed benchmark |
|---|---|---|---|
| Vanguard Institutional Index | Large cap core | S&P 500 | S&P 500 |
| Westfield | Small/mid cap growth | Russell 2500 Growth | Russell 2500 Growth |
| Thompson, Siegel & Walmsley | Small/mid cap value | Russell 2500 Value | Russell 2500 Value |
| Donald Smith and Company | Small cap value | Russell 2000 Value | Russell 2000 Value |
| Cap Group - Europacific Growth Fund | International equity | MSCI ACWI ex-US | MSCI ACWI ex-US |
| Templeton | International equity | MSCI ACWI ex-US | MSCI ACWI ex-US |
| Aberdeen | Emerging markets equity | MSCI EM | MSCI EM |
| DFA | Emerging markets equity | MSCI EM | MSCI EM |

With the exception of the Capital Group's Europacific Growth Fund, it is Callan's opinion that the current public equity manager benchmarks are appropriate. We recommend that the VA529 Plan consider switching the primary benchmark for this fund from MSCI ACWI ex-US index to the MSCI ACWI ex-US Growth Index for evaluation purposes.

For all of the public equity managers, Callan analyzed each manager's benchmark for its appropriateness. The analysis focused on holdings-based style analysis, holdings-based sector allocations, historical portfolio characteristics, 3-year rolling tracking error and R-squared and holdings-based region and country allocations for the international equity strategies. The analysis for each of the managers is included in the Public Equity section of the appendix, pg. 15. A brief summary for each manager is as follows:

**Vanguard**

**Strategy description:** This is a passively managed strategy that tracks the S&P 500 Index. The S&P 500 Index consists of 500 stocks chosen for market size, liquidity, and industry group representation. It is a market-value-weighted index with each stock's weight in the index proportionate to its market value.

**Current benchmark:** S&P 500 Index

**Analysis:** The strategy mimics the index using a full replication approach and tracks the index with an acceptable level of tracking error.

**Benchmark recommendation:** No change, retain S&P 500 Index

**Westfield Capital Management**

**Strategy description:** The Small/Mid Cap Growth strategy is a diversified portfolios consisting of 50 to 65 names typically with a market capitalization of less than $6 billion at the time of initial purchase. The investment process is fundamental, bottom-up stock selection and therefore sector weightings are a result of, and secondary to, individual stock selections. The portfolio invests in earnings growth stocks based on the conviction that stock prices follow earnings progress and that they offer the best opportunity for superior real rates of return.

**Current benchmark:** The Russell 2500 Growth Index. The Russell 2500 Growth Index measures the performance of those Russell 2500 companies (Russell 2500 are the 2500 smallest companies in the Russell 3000 index) that have a higher price/book ratios and higher forecasted growth values.

**Analysis:** Based on the holdings-based style analysis the portfolio clearly plots in the growth quadrant between small cap and mid cap. Sector allocations and portfolio characteristics are within a reasonable range of the Russell 2500 Growth Index. While the weighted median market cap is consistently higher than that of the benchmark it is well within the ranges of the small/mid cap peer group. This is consistent with active managers who tend to have a high quality bias which leads to holding larger cap names.

**Benchmark recommendation:** No change, retain the Russell 2500 Growth Index

**Thompson, Siegel & Walmsley**

**Strategy description:** The strategy employs an investment philosophy based on the concepts of fundamental value. Portfolios hold approximately 85 stocks and are constructed using bottom-up, fundamental research on individual companies. The portfolio is designed to outperform the Russell 2500 Value Index and the universe includes U.S. stocks with a market cap of less than $10 billion.

**Current benchmark:** The Russell 2500 Value Index. The Russell 2500 Value Index measures the performance of those Russell 2500 companies (Russell 2500 are the smallest 2500 companies in the Russell 3000 Index) with lower price/book ratios and lower forecasted growth values

**Analysis:** Based on the holdings-based style analysis the portfolio plots clearly in the value quadrant between small cap and mid cap. Sector allocations, weighted median market cap and portfolio characteristics are within a reasonable range of the Russell 2500 Value Index.

**Benchmark recommendation:** No change, retain the Russell 2500 Value Index

**Donald Smith and Company**

**Strategy description:** The strategy employs deep-value, bottom-up approach. Investments are made in stocks ranked in the lowest decile of price/book ratios that are undervalued, in the team's opinion, relative to their long-term earnings potential. Portfolios typically hold 40-50 stocks and have low turnover.

**Current benchmark:** The Russell 2000 Value Index. The Russell 2000 Value Index measures the performance of those Russell 2000 ( Russell 2000 are the smallest 2000 companies in the Russell 3000 index) companies with lower price/book ratios and lower forecasted growth values

**Analysis:** Based on the holdings-based style analysis the portfolio plots clearly in the value quadrant and small cap. Sector allocations, weighted median market cap and portfolio characteristics are within a reasonable range of the Russell 2000 Value Index.

**Benchmark recommendation:** No change, retain the Russell 2000 Value Index

**Capital Group – Europacific Growth Fund**

**Strategy description:** The strategy's bottom-up fundamental approach is blended with macroeconomic and political judgments on the outlook of economies, industries, currencies, and markets. The fund uses a "multiple manager" system where individual portfolio managers, each with different styles, manage separate sleeves of the strategy independently. Sleeves are then combined to form the fund. Individual managers are selected so that the aggregate fund adheres to its stated objective of capital appreciation.

**Current benchmark:** The MSCI ACWI ex-US Index. The Morgan Stanley Capital International (MSCI) All Country World Index (ACWI) ex-US is a free-float-adjusted market-capitalization-weighted index that is designed to measure the equity market performance of developed and emerging markets excluding the United States. The MSCI ACWI consists of 45 country indexes comprising 22 developed and 23 emerging markets country indexes.

**Analysis:** Based on the holdings-based style analysis the portfolio plots large cap and in the growth quadrant. The portfolio has a higher weighted median market cap compared to the index but is within the range of peers. The same is true for the emerging markets allocation which is higher than the benchmark but within the range of peers. Sector allocations and portfolio characteristics are more in-line with the MSCI ACWI ex-US Growth Index than the MSCI ACWI ex-US Index. However, looking at the historical tracking error, the difference between the MSCI ACWI ex-US Index and the MSCI ACWI ex-US Growth Index are relatively small. Therefore, the Plan can continue using the MSCI ACWI ex-US index as the primary benchmark for this fund. The Plan could consider adding the MSCI ACWI ex-US Growth Index as a secondary benchmark to assist with the evaluation of performance during periods when the Growth index displays performance patterns that are very different from the broader benchmarks.

**Benchmark recommendation:** No change, retain The MSCI ACWI ex-US Index as the primary index and consider using the MSCI ACWI ex-US Growth Index as a secondary index.

**Templeton**

**Strategy description:** The strategy conducts unconstrained search for value across all sectors and regions. The investment philosophy is built upon three tenets, namely Value (as a driver for investment), Patience (for a long-term focus), and Bottom-up Stock Selection. The portfolio is well diversified, holding approximately 100 stocks and has low turnover. Country and industry allocations are a result of bottom-up stock selection.

**Current benchmark:** The MSCI ACWI ex USA Index. The Morgan Stanley Capital International (MSCI) All Country World Index (ACWI) ex USA is a free-float-adjusted market-capitalization-weighted index that is designed to measure the equity market performance of developed and emerging markets excluding the United States. The MSCI ACWI consists of 45 country indexes comprising 22 developed and 23 emerging markets country indexes.

**Analysis:** Based on the holdings-based style analysis the portfolio plots large cap and in the core/value quadrant. Sector allocations and portfolio characteristics are more in-line with the MSCI ACWI ex-US Index than the MSCI EAFE Index. The portfolio’s weighted median market cap is in line with the benchmark. Historically, the portfolio’s allocation to emerging markets equity has been in the mid-to-high teens, which is lower than the emerging markets weight in the MSCI ACWI ex USA index but significantly higher than the MSCI EAFE, which has no allocation to emerging markets. Tracking error for the fund with the MSCI ACWI ex-US index and the MSCI EAFE index is relatively close. Given the portfolio’s allocation to emerging markets equity, the MSCI ACWI ex USA Index is a better benchmark for comparing relative performance.

**Benchmark recommendation:** No change, retain the MSCI ACWI ex USA Index.

### Aberdeen

**Strategy description:** The strategy seeks to identify and purchase good quality stocks cheaply and holding them for the long term. The strategy is comfortable taking decisive bets relative to the benchmark, underpinned by convictions from proprietary analysis. A bottom-up, fundamental process is used to produce diversified portfolio of 50-70 stock.

**Current benchmark:** The MSCI Emerging Markets Index. The Morgan Stanley Capital International (MSCI) Emerging Markets (EM) Index is a free-float-adjusted market-capitalization-weighted index that is designed to measure large- and mid-cap equity market performance of emerging markets. The MSCI EM Index consists of the 24 emerging markets countries.

**Analysis:** Based on the holdings-based style analysis the portfolio plots large/mid cap core and in line with the MSCI EM Index. Sector allocations and portfolio characteristics are within a reasonable range of the index. The portfolio's weighted median market cap is higher than that of the benchmark but well within the range of emerging markets equity peers.

**Benchmark recommendation:** No change, retain the MSCI Emerging Markets Index

### Dimensional Fund Advisors (DFA)

**Strategy description:** The strategy uses a disciplined approach designed to cost- effectively target premiums along the dimensions of expected returns. The strategy invests in a broad cross-section of equities across all market capitalizations in approved emerging markets and offers broad diversification across and within countries. The strategy seems to minimize risk within portfolios through adherence to a well-defined and structured investment approach that is designed to reduce risk through diversification.

**Current benchmark:** The MSCI Emerging Markets Index. The Morgan Stanley Capital International (MSCI) Emerging Markets (EM) Index is a free-float-adjusted market-capitalization-weighted index that is designed to measure large- and mid-cap equity market performance of emerging markets. The MSCI EM Index consists of the 24 emerging markets countries.

**Analysis:** Based on the holdings-based style analysis the portfolio plots core with a slight value tilt and in the mid-small cap range. We compared the DFA fund to both the MSCI EM Index and the MSCI EM IMI index given its all cap approach. The MSCI EM IMI index includes small cap stocks. Sector allocations and portfolio characteristics are within a reasonable range of both the MSCI EM and MSCI EM IMI indices. From a weighted median market cap perspective, the DFA fund's market cap is significantly lower than both indices.

**Benchmark recommendation:** No change, retain MSCI Emerging Markets index

## Fixed Income Managers

The Prepaid529 program has ten public fixed income managers of which two are passively managed funds. Each manager's mandate and current benchmark, along with Callan's recommended benchmark, is shown in Exhibit 13 below.

### Exhibit 13: Fixed Income Manager Benchmarks and Callan Benchmark Recommendations

| Manager | Mandate | Current benchmark | Proposed benchmark |
|---|---|---|---|
| BlackRock Intermediate Corporate Bond | Intermediate credit | Bloomberg Barclays Intermediate Credit | Bloomberg Barclays Intermediate Credit |
| SSGA TIPS | U.S. TIPS | Bloomberg Barclays US TIPS | Bloomberg Barclays US TIPS |
| Schroders MBS | Mortgage backed securities | Bloomberg Barclays CMBS | Bloomberg Barclays US Securitized |
| PGIM High Yield | U.S. High yield | Bloomberg Barclays US HY Ba/B 1% Issuer Capped | Bloomberg Barclays US HY Ba/B 1% Issuer Capped |
| Shenkman Capital Management | Leveraged loans | Credit Suisse Leveraged Loans | Credit Suisse Leveraged Loans |
| Wellington Management | Emerging markets debt | JPMorgan EMBI Plus | JPMorgan EMBI Global Diversified |
| Stone Harbor | Emerging markets debt | 50% JPMorgan EMBI Global Diversified / 50% JPMorgan GBI-EM Global Diversified | 40% JPMorgan EMBI Global Diversified / 50% JPMorgan GBI-EM Global Diversified, 10% JPMorgan CEMBI. |
| Invesco | Stable value | 3-month Tbill +1% | 3-month Tbill +1% |
| Advent Capital Management | Convertible Bonds | TR Global Defensive Investment Grade USDH | TR Global Defensive Investment Grade USDH |
| Ferox Capital Management | Convertible Bonds | TR Global Defensive Investment Grade USDH | TR Global Defensive Investment Grade USDH |

#### BlackRock Intermediate Corporate Bond

**Strategy description:** This is a passively managed strategy that tracks the Bloomberg Barclays US Intermediate Credit Index. The index measures the performance of investment grade corporate debt and agency bonds that are dollar denominated and have remaining maturity of greater than one year and less than ten years.

**Current benchmark:** Bloomberg Barclays US Intermediate Credit Index.

**Analysis:** The strategy mimics the index using a stratified sampling approach and tracks the index with an acceptable level of tracking error.

**Benchmark recommendation:** No change, retain Bloomberg Barclays US Intermediate Credit Index.

#### SSGA U.S. TIPS

**Strategy description:** This is a passively managed strategy that tracks the Bloomberg Barclays US Treasury Inflation-Protection Securities (TIPS) Index, which consists of inflation-protection securities issued by the US Treasury. These securities must have at least one year until final maturity.

**Current benchmark:** Bloomberg Barclays US Treasury Inflation-Protection Securities (TIPS) Index

**Analysis:** The strategy mimics the index using full replication and tracks the index with an acceptable level of tracking error.

**Benchmark recommendation:** No change, retain Bloomberg Barclays US Treasury Inflation-Protection Securities (TIPS) Index.

### Schroders MBS

**Strategy description:** The strategy uses a broad range of mortgage-backed securities (MBS), commercial mortgage-backed securities (CMBS), asset-backed securities (ABS) and collateralized loan obligations (CLOs), to achieve attractive carry, while minimizing exposure to rising rates. The strategy blends different risk profiles, a focus on security selection and credit analysis to achieve a lower level of volatility. The strategy seeks to maintain a high quality profile by restricting below investment grade securities.

**Current benchmark:** Bloomberg Barclays CMBS Investment Grade Index. This index measures the market of US Agency and non-Agency CMBS deals with a minimum current deal size of $300mm.

**Analysis:** In addition to the Bloomberg Barclays CMBS index, the plan also uses the Bloomberg Barclays MBS index as a secondary benchmark for the Schroders' portfolio. However, neither benchmark lines up very well with the Schroders' investment strategy. The BB CMBS Index is 100% comprised of CMBS securities while the BB MBS Index is 100% comprised of agency MBS securities. The strategy itself tends to have a sizeable allocation to agency MBS (roughly 30%) and a smaller allocation to CMBS and ABS securities. Another big allocation for the strategy is non-agency RMBS which are not captured in any market index. Given the more diversified nature of this portfolio, a blended index such as the Bloomberg Barclays US Securitized Bond Index may present a better fit in reflecting the opportunity set of this manager. The Bloomberg Barclays US Securitized Bond index is comprised of agency MBS, CMBS and ABS securities with agency MBS comprising approximately 90% of the index. The portfolio characteristics such as effective yield, effective duration and average quality are more in line with the Bloomberg Barclays US Securitized Bond Index than either the Bloomberg Barclays CMBS Index or the Bloomberg Barclays MBS Index.

**Benchmark recommendation:** Change to Bloomberg Barclays U.S. Securitized Bond Index.

### PGIM High Quality High Yield

**Strategy description:** The Higher Quality US High Yield strategy is an actively managed strategy targeting excess return over the Bloomberg Barclays High Yield Index. The strategy focuses on performing credits in the higher quality, BB and B quality tier. It places heavy focus on downside protection. While this may lead to slightly lower returns in up-markets, it reduces downside risk, minimizes tracking error, and leads to stable returns over time.

**Current benchmark:** The Bloomberg Barclays US High Yield Ba/B 1% Issuer Capped Index. The index covers the universe of fixed-rate, non-investment grade debt. The middle minimum quality rating for securities is Ba (Moody's) or B (Fitch and Standard & Poors) and issuer exposure is capped at 1%.

**Analysis:** Given the strategy's higher quality focus, the Bloomberg Barclays US High Yield Ba/B 1% Issuer Capped Index is in line with the strategy's approach. Key portfolio characteristics such as sector allocation, quality rating, effective yield and effective duration are in line with that of the benchmark.

**Benchmark recommendation:** No change, retain the Bloomberg Barclays US High Yield Ba/B 1% Issuer Capped Index

### Shenkman Capital Management – Bank Loans

**Strategy description:** The strategy's investment objective is to maximize total returns (i.e., current income and capital appreciation) by investing in institutional tranches of floating rate bank loans of non-investment grade (i.e., high yield) companies. This bank loan strategy employs a conservative approach which focuses on principal preservation. The "bottom up" investment approach utilizes two proprietary analytical tools developed in connection with its analysis of debt instruments which have to be U.S. dollar denominated.

**Current benchmark:** Credit Suisse Leveraged Loans Index. This index tracks the investable market of the U.S. dollar denominated leveraged loan market. It consists of issues rated "5B" or lower, meaning that the highest rated issues included in this index are Moody's/S&P ratings of Baa1/BB+ or Ba1/BBB+. All loans are funded term loans with a tenor of at least one year and are made by issuers domiciled in developed countries.

**Analysis:** Shenkman has a defensive philosophy which they express by holding higher quality securities. Callan compared the Shenkman portfolio against the current benchmark as well as another commonly used leveraged loan benchmark called the S&P/LSTA Leveraged Loan index. The analysis shows that portfolio characteristics such as weighted average life and average quality are all fairly close over time. The effective yield is somewhat different with the Credit Suisse Leveraged Loans Index having a higher yield than the Shenkman portfolio because of the lower restrictions inherent in that benchmark. From a risk perspective, tracking error between Shenkman and either benchmark is the same. Based on these observations and the fact that the two indices are highly correlated with each other, Callan is comfortable with the Credit Suisse Leveraged Loan Index as the primary benchmark.

**Benchmark recommendation:** No change, retain Credit Suisse Leveraged Loans Index

### Wellington Emerging Markets Debt

**Strategy description:** The strategy's objective is to exceed the JPMorgan Emerging Markets Bond Index Plus (EMBI+) by investing in a diversified portfolio of emerging markets fixed income instruments. The bulk of the exposure is to sovereign debt but the strategy does invest opportunistically in corporate debt.

**Current benchmark:** JPMorgan Emerging Markets Bond Index Plus. This Index is a market cap weighted, US dollar denominated sovereign emerging markets index. It has a unique liquidity ranking methodology to provide investors with the most liquid set of issues within the asset class.

**Analysis:** This strategy is typically benchmarked to either the JPMorgan EMBI Plus or the JPMorgan EMBI Global Diversified Index. The JPMorgan EMBI Global Diversified index is similar to the JPMorgan EMBI Plus index but includes quasi sovereigns which are securities owned or backed by the national government. The two indices track each other closely when looking at characteristics such as effective yield, effective duration and average quality. The strategy displays a somewhat tighter tracking error and correlation with the EMBI Global Diversified Index than the EMBI Plus Index. Therefore Callan recommends switching the benchmark to the JPMorgan EMBI Global Diversified index.

**Benchmark recommendation:** Change to JPMorgan EMBI Global Diversified Index

### Stone Harbor Emerging Markets Debt

**Strategy description:** The strategy invests in USD and local currency sovereign and corporate emerging markets debt based on short and long- term return distribution scenarios, views of the relative value of each sector, and market outlook.

**Current benchmark:** Blended benchmark of 50% JPMorgan EMBI Global Diversified Index and 50% JPMorgan GBI Emerging Markets Global Diversified Index. The JPMorgan GBI-EM Global Diversified Index includes local currency sovereign debt. This Index is a market cap weighted, US dollar denominated sovereign emerging markets index. It has a unique liquidity ranking methodology to provide investors with the most liquid set of issues within the asset class.

**Analysis:** This strategy invests in both US dollar denominated and local currency emerging markets debt. The majority of the portfolio assets are invested in sovereign and quasi-sovereign securities with a small allocation to corporate EM debt. Given this style, a blended benchmark is the best approach as there is no market index that represents both US dollar denominated EM debt and local currency EM debt.

**Benchmark recommendation:** Change to 50% JPMorgan GBI-EM Global Diversified, 40% JPMorgan EMBI Global Diversified Index, 10% JPMorgan CEMBI.

### Advent Capital Management – Convertibles

**Strategy description:** The strategy's objective is to invest in convertible securities which are trading closer to par value and, thus, are often utilized as either an enhanced fixed income strategy or as a conservative equity replacement. The firm performs bottom-up fundamental credit analysis and equity research to identify out-of-favor companies and sectors with stable balance sheets, stable cash flow, and excellent management teams.

**Primary benchmark:** Thomas Reuters Global Defensive Investment Grade USDH Index. This is a custom index and represents a subset of the Thomas Reuters Global Convertibles Index and includes only those securities that are rated BBB-/Baa3 and above.

**Analysis summary:** Advent manages this convertibles portfolio in a customized version of the firm's Global Phoenix Convertibles strategy with the added constraints of maintaining a minimum average portfolio quality of BBB- as well as hedging the portfolio to the USD. Callan compared the Advent portfolio characteristics against the current benchmark as well as a commonly used convertibles benchmark called the Merrill Lynch Global 300 Convertibles Index. The analysis shows that Advent's portfolio characteristics are more in line with the custom Thomas Reuters Global Defensive Investment Grade USDH Index.

**Benchmark recommendation:** No change, retain the TR Global Defensive Investment Grade USDH Index.

### Ferox Capital – Convertibles

**Strategy description:** The strategy invests in global, diversified convertible securities.

**Primary benchmark:** Thomas Reuters Global Defensive Investment Grade USDH Index. This is a custom index and represents a subset of the Thomas Reuters Global Convertibles Index and includes only those securities that are rated BBB-/Baa3 and above.

**Analysis summary:** Ferox manages this convertibles portfolio under the requirements of maintaining a minimum average portfolio quality of BBB-.  Callan compared Ferox' portfolio characteristics against the current benchmark as well as a commonly used convertibles benchmark called the Merrill Lynch Global 300 Convertibles Index. The analysis shows that Ferox' portfolio characteristics are more in line with the custom Thomas Reuters Global Defensive Investment Grade USDH Index.

**Benchmark recommendation:** No change, retain the TR Global Defensive Investment Grade USDH Index.

**Invesco Stable Value**

**Strategy description:** The strategy invests in high quality, intermediate duration fixed income securities. The portfolio uses insurance wrappers to minimize market value fluctuation and interest rate volatility.

**Current benchmark:** 90-day TBill + 1%

**Analysis:** Stable value strategies are popular offerings in defined contribution plans but are not often used in other type of institutional portfolios that have a total return approach. Stable value is a capital preservation vehicle as it has a stable NAV and has historically offered a return premium over money market funds because the underlying assets can invest further out on the yield curve. Stable Value funds are difficult to benchmark because of their unique quality characteristics, sector allocations, duration and book value accounting. As a result, plan sponsors utilize a wide variety of benchmarks all with their own shortcomings. The stable value fund's current benchmark has the advantage of mimicking the book value insurance wrapper generating being a close risk match while the disadvantage is that the underlying investments have more interest rate and credit risk than U.S. Treasury Bills.

**Benchmark recommendation:** No change, retain 90-day TBill + 1%

## Alternatives Managers

The managers classified under the Alternatives classification capture a large opportunity set unified by the lack of a public market exchange for their underlying investments. As a result of their unique market structures, assessing and assigning benchmarks to private investments entails identifying the systematic or economic sources of risk and finding the best match in public markets and the creation of custom strategy or peer universes. The public market benchmarks seek to answer whether the private market has provided adequate compensation for the lack of investment marketability also known as a liquidity premium. The custom strategy universe seeks to provide insight into how managers of similar strategies are performing and thus a measure of relative skill; note that this analysis does not prescribe specific manager peer universes as they are the result of a custom-built exercise requiring input and discussion with the client. The Alternatives asset class covers the following opportunity sets:

**Hedge Fund of Funds:** A private investment fund vehicle, typically a limited liability partnership (LLP) that owns and manages a diversified portfolio of underlying hedge fund strategies. Due to the fact that the underlying hedge fund strategies are private investment vehicles as well, no investable index is available. Partial liquidity is generally offered on a quarterly basis with 45 day notice while complete liquidity is subject to the liquidity of the underlying hedge fund strategies and cash reserves or credit lines of the Master Fund or Hedge Fund of Funds.

**Private Equity Fund of Funds:** A private investment fund vehicle, typically a limited liability partnership (LLP) that owns and manages a diversified portfolio of underlying private equity partnerships. Due to the fact that the underlying private equity partnerships are private investment vehicles, no investable index is available.

**Private Real Estate:** A private fund vehicle, typically a limited liability partnership (LLP) that owns and manages a diversified portfolio of real estate properties. Due to the fact that the underlying properties are privately held real estate holdings, no investable index is available.

**Private Middle Market Debt:** A private fund vehicle, typically a limited liability partnership (LLP), that makes loans to small and medium sized business either directly or through private equity general partners. Due to the fact that the loans are bilateral agreements between the fund and the borrower, there is no investable index available.

### Exhibit 14: Alternatives Manager Benchmarks and Callan Benchmark Recommendations

| Manager | Mandate | Current benchmark | Proposed benchmark |
|---|---|---|---|
| Blackstone Partners | Hedge Fund of Funds | HFRI Conservative FoF | HFRI Conservative FoF |
| Adam Street Partners | Core Global Private Equity FoF | MSCI ACWI IMI + 300bps | MSCI ACWI IMI + 300bps |
| Aether Real Assets | Small Private Real Asset FoF | MSCI ACWI IMI + 300bps | S&P Gbl Nat Res + 300bps |
| Commonfund | Core Private Real Asset FoF | MSCI ACWI IMI + 300bps | S&P Gbl Nat Res + 300bps |
| Golub Capital Partners | Middle Market Direct Lending | S&P Leveraged Loan | S&P Leveraged Loan |
| LGT Global | Private Equity Secondaries FoF | MSCI ACWI IMI + 300bps | MSCI ACWI IMI + 300bps |
| NeubergerBerman | Core Global Private Equity FoF | MSCI ACWI IMI + 300bps | MSCI ACWI IMI + 300bps |
| Private Advisors | Small U.S. Private Equity FoF | MSCI ACWI IMI + 300bps | Russell 2000 + 300bps |
| Adventura Holdings, LLC | Private Real Estate | NCREIF NPI | NCREIF NPI |
| UBS Real Estate & Private Markets | Core Open-End Real Estate | NCREIF ODCE | NCREIF ODCE |

### *Hedge Fund of Funds*

Prepaid529 has two hedge fund of funds in its portfolio; Aurora Offshore Ltd. II, which is currently being redeemed, and Blackstone Partners Offshore. Because Aurora Offshore is in redemption and its current value is relatively small at $320,000, we do not evaluate it for benchmarking purposes. Further, due to the private structure of the underlying hedge funds and the aggregating hedge fund of fund vehicle, peer group indexes are the best available benchmark measurement tool. The benchmark for the hedge fund of funds program is the HFRI FOF Conservative Index.

**Blackstone Partners Offshore**

**Strategy description:** Launched in July of 1996. Invests across 17 separate hedge fund strategies in 46 different funds. Broadly diversified commingled fund seeking low volatility and low beta to equity and interest rates. Designed to provide an asymmetric return pattern that displays a higher percentage of positive performance months than broad asset classes.

**Current benchmark:** The Blackstone Partners Offshore Fund identifies its primary benchmark as the HFRI FOF Conservative Index. The index represents a peer group of hedge fund of funds that exhibit low historical return volatility and is primarily populated with lower risk underlying strategies such as Equity Market Neutral, Fixed Income Arbitrage, and Convertible Arbitrage.

**Analysis:** Blackstone Partners Offshore Fund is a constituent of the HFRI FOF Conservative Index as such, there is some duplication within the benchmark; Blackstone's approximate weight in the index is 2.9%, which Callan views as minimal. To measure fit, we ran returns based analysis versus two additional indexes that have potentially similar return behavior; the HFRI Market Defensive Index (invests in funds that generally engage in short-biased strategies such as short selling and managed futures; displays a low to negative correlation to broad equity markets. A fund in the FOF Market Defensive Index displays higher returns during down markets than during up markets) and the HRFI FOF Diversified Index (underlying funds tend to have positively skewed returns and exhibit a broad mix of underlying hedge fund strategies)

To measure fit against the three benchmarks, the following measures were analyzed during the last seven years of quarterly performance history:

- 12 quarter tracking error: Measuring the standard deviation of benchmark excess return resulting in 17 observations per benchmark
- 12 quarter R-Squared: Measuring the proportion of the variance in the hedge fund of funds that is predictable from the benchmark resulting in 17 observations per benchmark
- 12 quarter correlation: Measuring the strength of the relationship between the relative movements of the hedge fund of funds and the benchmark resulting in 17 observations per benchmark

Analysis of the Blackstone Partners Offshore fund strategy description relative to the underlying fund holdings of the three indexes in addition to the returns based analysis indicate that the HFRI Conservative Fund of Funds index is the most appropriate performance index.

**Benchmark recommendation:** No change, retain HFRI Conservative Fund of Funds index

### *Private Equity Fund of Funds*

Prepaid529 maintains relationships with six different private equity fund of fund managers and one private debt manager. The private equity fund of funds cover core global fund of funds, specialty natural resources private equity strategies, secondary market strategies, and middle market focused funds. The private debt strategy focuses on middle market direct lending to private equity sponsored companies typically senior in the capital structure. The private equity funds are benchmarked to the MSCI All Country World Index Investable Markets Index plus 3.0% (MSCI ACWI IMI + 300bps). The private debt fund is benchmarked to the S&P LSTA Leveraged Loan Index which is a market-weighted index that tracks the performance of syndicated institutional leveraged loans or senior secured debt obligations rated below investment grade. With the exception of Golub, all of the private equity funds are benchmarked against their own performance during the first four years of their life to mitigate the effects of the J-curve and capital deployment pattern, which is under the control of the manager; Callan believes this methodology is prudent and reasonable.

**Adam Street Partners**

**Strategy description:** Offers annual core global fund series composed of U.S. and non-U.S. private equity funds covering primaries, secondaries, and co-investments investing in sub-classes of venture capital, small buyouts, mid buyouts, large buyouts, and special situations. Their advertised return objective is to outperform public markets by 400bps or 4% over the life of their funds.

**Current benchmark:** The Long-Nickel's Index Comparison Method using the MSCI ACWI IMI + 300bps.

Vintage Year(s) Invested: 2011, 2012, 2013, 2014, 2015, 2016, 2017*, 2018*.

**Represent allocations to Adam Street Partners Venture Innovation Fund Series I & II*

**Analysis:** The MSCI ACWI IMI + 300bps is a reasonable long-term performance benchmark which reflects both the opportunity cost of capital or what the assets could have achieved in a global market equity index as well as the long-term illiquidity and skill premium of 300 basis points. The downfall of the benchmark is that it represents public markets whereas the performance of private equity is a combination of appraisal based net asset values and episodic cash-flows and sale realizations that are not continuous.

**Benchmark recommendation:** No change, retain MSCI ACWI IMI + 300bps, 1-quarter lag, using the Long-Nickel's Index Comparison Method.

**Aether Real Assets**

**Strategy description:** Fund series focusing on private, upstream investments in natural resources with positive correlation to commodities. Primaries, secondaries, and co-investments. Opportunity sets focus on Oil & Natural Gas, Metals & Mining, Agriculture, and Timberland. Focus on smaller transaction sizes in North America with smaller allocations to Europe and the rest of the world.

**Current benchmark:** The Long-Nickel's Index Comparison Method using the MSCI ACWI IMI + 300bps, 1-quarter lag.

Vintage Year(s) Invested: 2013, 2016, 2018.

**Analysis:** The MSCI ACWI IMI + 300bps is not a very good systematic representation of the fund's underlying investments. Accepting that public market benchmarks are imperfect representations of private markets where returns are calculated on appraisal-based net asset values, episodic cash-flows, and sale realizations that are not continuous, MSCI ACWI's geographical and sector differences introduce unnecessary error in the evaluation relative to public markets. Analyzing the funds GICS sectors and geography, Callan would recommend using the S&P Global Natural Resources Index + 300bps. One element that would not be controlled for is the smaller size of the private equity funds and deals that Aether targets but could be an accepted portion of the 300bps premium added to the index.

**Benchmark recommendation:** Change to S&P Global Natural Resources Index + 300bps, 1-quarter lag, using the Long-Nickel's Index Comparison Method.

**Commonfund Natural Resources Fund Series**

**Strategy description:** Primaries, Secondaries and Co-investments. Opportunity sets focus on Oil & Natural Gas, Metals & Mining, Energy Infrastructure, and other natural resources-related industries including: clean and renewable energy, manufacturing, and timber.

**Current benchmark:** The Long-Nickel's Index Comparison Method using the MSCI ACWI IMI + 300bps, 1-quarter lag.

Vintage Year(s) Invested: 2012.

**Analysis:** The MSCI ACWI IMI + 300bps is not a very good systematic representation of the funds underlying investments. Accepting that public market benchmarks are imperfect representations of private markets where returns are calculated on appraisal-based net asset values, episodic cash-flows, and sale realizations that are not continuous, MSCI ACWI's geographical and sector differences introduce unnecessary error in the evaluation relative to public markets. Analyzing the funds GICS sectors and geography, Callan would recommend using the S&P Global Natural Resources Index + 300bps.

**Benchmark recommendation:** Change to S&P North American Natural Resources Index + 300bps, 1-quarter lag, using the Long-Nickel's Index Comparison Method.

### Golub Capital Partners

**Strategy description:** Direct origination of private middle market floating rate loans to private equity sponsored companies. Composed of senior secured and unitranche loan structures.

**Current benchmark:** S&P Leveraged Loan Index, 1-quarter lag.

Vintage Year(s) Invested: 2018.

**Analysis:** The fund's first capital call was January of 2018 and so is too early to analyze based on past performance. Based on the investment strategy as described by the offering documents, the S&P Leveraged Loan Index and the Credit Suisse Leverage Loan Index were reviewed. The S&P Leveraged Loan Index while potentially having a higher average loan size than the portfolio and the Credit Suisse index, all of the underlying loans are senior secured which matches the Golub strategy. Both indexes are composed of syndicated bank loans and thus have greater liquidity and trade while the Golub fund is a buy and hold strategy. The S&P Leveraged Loan Index provides the best liquid market benchmark for the strategy.

**Benchmark recommendation:** No change, retain S&P Leveraged Loan Index plus, 1-quarter lag.

### LGT Global Secondaries

**Strategy description:** The fund's focus is on acquiring secondary market limited partner interests in private equity fund with a mix of early and mature secondaries with an average funding level of 79%. The majority of the funds will be those where LGT has had prior secondary or primary market experience. The geographic spread of the strategy is currently 30% U.S., 70% non-U.S with 42% of investor capital committed.

**Primary benchmark:** The Long-Nickel's Index Comparison Method using the MSCI ACWI IMI + 300bps, 1-quarter lag.

Vintage Year(s) Invested: 2017.

**Analysis:** While the geographic spread of the secondary opportunities is in flux, the global nature of LGT's secondary and core private equity offerings suggest that MSCI ACWI IMI + 300bps would be a reasonable benchmark.

**Benchmark recommendation:** No change, retain the Long-Nickel's Index Comparison Method using the MSCI ACWI IMI + 300bps, 1-quarter lag.

**NeubergerBerman Crossroads Fund Series**

**Strategy description:** Offers an annual core to U.S. focused global middle market fund series composed of four global strategy sleeves investing in venture capital, small buyouts, mid buyouts, large buyouts, and special situations via primary partnerships, secondary interests, and co-investments.

**Current benchmark:** The Long-Nickel's Index Comparison Method using the MSCI ACWI IMI + 300bps, 1-quarter lag.

Vintage Year(s) Invested: 2016.

**Analysis:** The MSCI ACWI IMI + 300bps is a reasonable long-term performance benchmark which reflects both the opportunity cost of capital or what the assets could have achieved in a global market equity index as well as the long-term illiquidity and skill premium of 300 basis points. The downfall of the benchmark is that it represents public markets whereas the performance of private equity is a combination of appraisal based net asset values and episodic cash-flows and sale realizations that are not continuous. One additional flaw to the primary benchmark is the fund's greater focus on middle market whereas the primary benchmark is a market-weighted benchmark that skews more heavily to large capitalization companies.

**Benchmark recommendation:** No change, retain The Long-Nickel's Index Comparison Method using the MSCI ACWI IMI + 300bps, 1-quarter lag.

**Private Advisors Small Company Buyout and Small Company Private Equity Fund Series**

**Strategy description:** The fund series offers a small company buy-out and venture capital focused fund offering. The funds are and have been geographically focused on North America with approximately 95% of their exposure in U.S. and Canada.

**Current benchmark:** The Long-Nickel's Index Comparison Method using the MSCI ACWI IMI + 300bps, 1-quarter lag.

Vintage Year(s) Invested: 2010, 2014, 2016.

**Analysis:** The MSCI ACWI IMI + 300bps is not a very good systematic representation of the funds underlying investments. Accepting that public market benchmarks are imperfect representations of private markets where returns are calculated on appraisal-based net asset values, episodic cash-flows, and sale realizations that are not continuous, MSCI ACWI's geographical and sector differences introduce unnecessary error in the evaluation relative to public markets. Analyzing the fund's GICS sectors and geography, Callan would recommend using the Russell 2000 + 300bps.

**Benchmark recommendation:** Change to Russell 2000 + 300bps, 1-quarter lag, using the Long-Nickel's Index Comparison Method.

### *Private Real Estate*

Prepaid529 has two private real estate investments in its portfolio; UBS Trumbull Property Fund, a core open-end real estate fund, and Aventura Holdings, LLC which is the structure that owns the office building that houses

Virginia529's operations. Due to the private structure of the two vehicles, peer group indexes are the best available benchmark measurement tool. The benchmarks used for the private real estate program the NCREIF ODCE Index, used for the UBS Trumbull Property Fund and the NCREIF NPI Index used for Aventura Holdings, LLC.

**Aventura Holdings LLC**

**Strategy description:** A limited liability corporation (LLC) that houses the office building from which Virginia529 operates.

**Current benchmark:** NCREIF NPI Index, 1-quarter lag

Vintage Year(s) Invested: 2008

**Analysis:** Benchmarking a single building is very difficult due to the heterogeneous nature of real estate. The NCREIF Property Index is the most appropriate widely available index because it is a property-level index that does not include the effect of leverage while the various versions of the ODCE index incorporate leverage and other fund-level effects. The NCREIF Property Index also provides property level returns for various metropolitan statistical areas and sub-property types. The most appropriate stream, which was included in this analysis for comparison purposes, was a sub-index of the NPI that tracks the performance of the Washington DC, Maryland and Virginia regions. It currently comprises of 64 office buildings in the major metropolitan areas within each of the states. This regional, property-type specific index was tested in the analysis to determine if it might represent a better fit. The outcome of this analysis however showed that the standard deviation of return, R-squared, and correlation statistics were highest between Aventura Holdings, LLC. and the NCREIF NPI index which while surprising may indicate a high level of heterogeneity of the 64 office properties captured in the regional sub-index. The one measure where Aventura and the Washington DC, Maryland and Virginia region index was a better fit was in the return attribution where income as a percentage of total return was a much tighter fit than for the broader NCREIF NPI and ODCE indexes. Callan's opinion is that the NCREIF NPI Index lagged one quarter is an appropriate benchmark for Aventura Holdings LLC.

**Benchmark recommendation:** No change, retain NCREIF NPI Index lagged one quarter

**UBS Trumbull Property Fund**

**Strategy description:** A core open-end private real estate fund that invests across property types including apartments, office, retail, industrial, and hotel/other in the four major regions of the U.S. property market including the East, West, Midwest, and South. Unlike closed-end funds, the core open-end structure allows for quarterly liquidity in the absence of a net redemption queue.

**Current benchmark:** NCREIF ODCE Value Weighted Index, 1-quarter lag

Vintage Year(s) Invested: 2011

**Analysis:** The ODCE Value Weighted Index is a peer core open-end fund index ODCE index that incorporates the use of leverage and other fund-level effects common to return streams of the peer universe. Currently, the index consists of 25 member funds, all with similar return objectives and diversification constraints of the UBS Trumbull Property Fund per the guidelines to be a contributor. The Value Weighted Index is well diversified by contributors, with the single largest fund accounting for 17% of the market weight. However, approximately 47% of the index value consist from funds that are ~$20.0

billion or larger. This includes the UBS Trumbull Property Fund. Comparatively, approximately 80% of the ODCE calculated on an equal fund weighted basis consist of funds half the size of the UBS Fund or smaller. Both the geographic and property-type sector variances between the two ODCE index options and the NPI are immaterial. When evaluating returns-based statistics of total return, income return, and capital appreciation return, the ODCE value-weighted index shows the lowest tracking error relative to the other indexes. Additionally when reviewing summary statistical measures of r-squared and correlation, the  ODCE value-weighted index also shows the tightest fit albeit, the differences between the indexes is fairly small. The only measure that displays a higher match to an index other than the ODCE value-weighted index is standard deviation of return where UBS Trumbull has a significantly lower 10 year standard deviation than the index (6.66 vs 8.50) while the 10 year standard deviation of total return for the NCREIF NPI is 5.74. In Callan's opinion, the NCREIF ODCE Value Weighted Index lagged one quarter is an appropriate benchmark for the UBS Trumbull Property Fund.

**Benchmark recommendation:** No change, retain NCREIF ODCE Value Weighted Index lagged one quarter.

## CONCLUSION

Based on the analysis that was conducted, we conclude that changing the way the total fund benchmark and asset class benchmarks are constructed would allow for a more complete review of performance and assist with identifying the different sources of return.

At the Prepaid529 IPS Asset Class Level, moving to a four broad asset class structure approach using static target weights would produce a benchmark that is easier to comprehend for the different interested parties and allow for separating and evaluating more distinct sources of excess return.

At the Total Fund Level, benchmarking using the 13 asset classes modelled during the 2016 Asset/Liability study would allow for more accurate disaggregation of the Asset Class Effect and Asset Allocation Effect which yield valuable information in the management of the Total Fund.

The recommendation for each of the asset classes is to move, where recommended, to a benchmark that reflects the objective of each asset class within the overall asset allocation framework. Each asset class benchmark should be customized by using a blend of market indices that are indicative of the risk/return expectations modeled in the asset/liability study for each of the sub-asset classes. For the asset class benchmark, the weights of each of the underlying sub-asset classes should be static based on the target weight that was modeled. Such a custom benchmark would allow for separating and evaluating the different implementation decisions

At the individual manager level the analysis found that the majority of the benchmarks used for each managers are in line with the mandates that the managers were hired for. There are a few instances for the public markets managers, were a different market index is recommended for benchmarking purposes.

In total, this analysis found that using a static weighting methodology for benchmarks at the investment manager level, the asset class level, and the total fund levels would yield valuable information to both the high-level stakeholders and implementers of the Total Fund and potentially improve operating results in the future.

## CALLAN CONSULTING & PROJECT TEAM

Callan Consulting provides discretionary and non-discretionary investment advice to wide variety of institutional investors including 529 savings and prepaid plans, endowments, foundations, operating funds, insurance trusts, public and corporate defined benefit plans, and other large institutional asset pools. Supported by a deep team of research professionals, this division is organized to deliver customized solutions that meet the needs of the most sophisticated institutional investment programs. Services include strategic planning, plan implementation, monitoring and evaluation, and continuing education.

Together, these services constitute a disciplined and comprehensive process for plan sponsor investment decision making and oversight of institutional investment programs. We believe that adherence to a disciplined process allows plan sponsors to make better and more informed investment decisions and enables them to achieve better investment results. We are not dogmatic about our consultation and do not enter a client’s office with a predetermined solution. Instead, we engage the client to understand history, objectives, and other key considerations. We then work within this framework to create tailored solutions.

### Experience

Callan has been working with 529 plan clients dating as far back as 2002. On a retainer basis we have worked with six prepaid 529 plans over the years where establishing performance benchmarks was part of our retainer services. At present, we work with two prepaid plans in a retainer capacity. Our current retainer 529 plan clients (pre-paid and savings plans) and are listed in the table below.

**Exhibit 15: Callan 529 Plan Retainer Clients**

| 529 Plan Client Organization Name | Client Type | Assets Under Management ($mm) | Date Hired |
|---|---|---|---|
| Alabama CollegeCounts - Direct 529 Fund | Retainer | $259 | Oct-15 |
| Alabama CollegeCounts - Advisor Plan | Retainer | $968 | Oct-15 |
| Education Trust of Alaska 529 Tuition Savings Plan | Retainer | $8,242 | Jul-02 |
| Florida College Investment Plan | Retainer | $578 | Jan-12 |
| Florida Prepaid College Plan | Retainer | $11,657 | Jun-09 |
| Florida ABLE Plan | Retainer | $6 | Jun-15 |
| Illinois Student Assistance Commission529 Prepaid Tuition Plan | Retainer | $879 | Jan-12 |
| State of Idaho College Savings Program Board | Retainer | $445 | Sep-10 |

### Project Consulting Team

**Alexander Browning** is a Senior Vice President in Callan's Denver Fund Sponsor Consulting office. Alex works with a variety of fund sponsor clients, including public defined benefit plans, insurance companies, foundations, and family offices. His responsibilities include strategic planning, implementation, performance evaluation, and continuing education. Alex is a member of Callan's Alternatives Review Committee and Research Oversight Committee.

Prior to joining Callan in 2015, Alex worked for Wilshire Consulting where he helped launch the non-discretionary hedge fund advisory business. Prior to that, he worked as a general consultant. Alex started his career at Wilshire Consulting in 2006 in their capital markets research group publishing white papers and developing and maintaining beta models. Alex began his career in finance in 1999 at Morgan Stanley Dean Witter.

Alex holds an MBA from the University of Southern California and a B.S. in Economics from the University of Oregon.

**Annoesjka T. West** is a Senior Vice President in Callan's New Jersey Fund Sponsor Consulting office. She joined Callan in February 2001. Annoesjka works with a variety of fund sponsor clients, including corporate and public defined benefit plans, corporate defined contribution plans, and endowments and foundations. Her client responsibilities include strategic planning, plan implementation and coordination of special client projects. Annoesjka is a member of Callan's Manager Search and Defined Contribution committees and a shareholder of the firm.

Prior to joining Callan, Annoesjka worked at New York Life Investment Management as a Sr. Actuarial Services Representative in the Stable Value group.

Annoesjka earned an MBA in Finance from Rutgers University and graduated with honors and distinction from the Pennsylvania State University with a Bachelor of Science.

**John Pirone, CFA, FRM, CAIA**, is a Senior Vice President and a consultant in the Capital Markets Research group. He is responsible for assisting clients with their strategic investment planning, conducting asset allocation studies, developing optimal investment manager structures, and providing custom research on a variety of investment topics. He is a shareholder of the firm.

Prior to joining Callan in 2015, John was a Managing Director at BlackRock in the Client Solutions Group, advising major institutional clients throughout the Americas on total portfolio strategy issues.

From 1997 to 2009, John was a Client Advisory Strategist at Barclays Global Investors. Previously, he was a Fixed Income Analyst at Gifford Fong Associates.

John is co-author of "Optimizing Manager Structure and Budgeting Manager Risk" which received the Bernstein Fabozzi/Jacobs Levy award from The Journal of Portfolio Management.

John earned a MSc in Finance from the London Business School, a MA in Economics from the University of California at Santa Barbara and a BA in Biology from Washington University in St. Louis. John is a holder of the right to use the Chartered Financial Analyst® designation. He has earned the right to use the Financial Risk Manager and Chartered Alternative Investment Analyst designations and is a member of the CFA Society of San Francisco and CFA Institute.

**Gary Chang, CFA**, is a Vice President and an associate consultant in the Capital Markets Research group. He is responsible for supporting the group's senior actuaries and consultants in the conduct of project-related work on behalf of Callan's broader client base. He is also involved in the research and testing efforts dedicated to enhancing Callan's economic and financial modeling processes directed at strategic planning. Gary is a shareholder of the firm.

Prior to joining Capital Markets Research, Gary was a Senior Analyst in the Measurement Development group where he was responsible for performance measurement analytics, product development, and custom projects and initiatives.

Gary earned a BA in Economics from Harvard University and has earned the right to use the Chartered Financial Analyst designation.

## END NOTES:

1. Source: JLARC Legislator's Guide Virginia529 2018

# APPENDIX: SUPPORTING GRAPHS & TABLES OF THE ANALYSIS

Dream Save Achieve

Mary G. Morris
Chief Executive Officer
Direct: 804-786-0832

November 27, 2018

Hal Greer
Director
Joint Legislative Audit and Review Commission
919 East Main Street, Suite 2101
SunTrust Building
Richmond, Virginia 23219

VIA EMAIL

Re: JLARC Assessment of Virginia529's Prepaid Investment Benchmarks

Dear Mr. Greer:

Thank you for the opportunity to review and comment on the exposure draft of the *November 2018 JLARC Assessment of Virginia529's Prepaid529 Investment Benchmarks* prepared by its consultant Callan (the Benchmark Report).

The Virginia College Savings Plan (Virginia529 or the Plan) is an independent agency of the Commonwealth of Virginia, and operates pursuant to its statutory authority under Title 23.1, Subtitle II, Chapter 7 of the Code of Virginia (Va. Code §§ 23.1-700 et seq.). Virginia529 has two aspects to its planning and saving mission, the first of which is to assist families and others in achieving their education goals through three education savings programs, Prepaid529 (Prepaid529), Invest529 (Invest529), and CollegeAmerica, as part of our statutory mandate to help make college more affordable and accessible. Virginia529 has a more recent, but no less important mission, to assist individuals with disabilities save for qualified disability expenses while retaining most federal and state means-tested benefits through its two ABLE disability savings programs, ABLEnow and ABLEAmerica.

JLARC, in its *2017 Prepaid 529 Investment Management Report* (Investment Report), discussed Prepaid529 performance, benchmark philosophy and the transparency and clarity of performance reporting. The Investment Report recommended that Virginia529 undertake an independent third party review of its existing portfolio benchmarks to assess whether they represented appropriate indicators against which to measure performance and recommended development of a regular attribution analysis at the total fund and asset class levels.

Prior to the Investment Report, the Virginia529 Investment Advisory Committee (IAC) had commenced an internal benchmark review in conjunction with its investment consultant, Mercer, and continued that work before moving forward with an independent review, which was included in the 2018 Appropriation Act with the engagement supervised by JLARC. Based on its internal work and on the contents of the Investment Report, Virginia529 in March 2018 adopted a revised benchmark framework which employs an approach that includes a pro-rata roll up of individual investment manager benchmarks, weighted to each manager's end of period market value. In addition, a formal Fund attribution analysis was adopted which separates the performance effect from investment manager's performance vs. Fund asset allocation decisions.

In adopting the revised benchmark framework, Virginia529 was attempting to address comments in the Investment Report related the transparency and clarity of performance reporting. The recommendations in the Investment Report provided an opportunity for Virginia529 to evaluate the current portfolio structure and whether it is performing as expected given the long-term focus and defensive posture established for the Prepaid529 portfolio and the market conditions in the current cycle.

JLARC engaged Callan, an independent investment consultant, to perform an assessment of the Prepaid529 investment benchmarks, addressing specifically whether those benchmarks are appropriate in light of the positioning of the Fund and whether they adequately reflect Fund performance to its stated investment goals. The result of that engagement is the Benchmark Report which focused on analyzing the Prepaid529 portfolio relative to their benchmarks at three different attribution levels: Total Fund, Asset Class and Investment Manager. Additionally, the Benchmark Report recommends additional granularity in the reporting of asset classes, for example, delineating between Core and Non-Core Fixed income.

Interestingly, prior to the March 2018 adoption of the revised benchmark framework, the Prepaid529 Fund legacy benchmark framework encompassed the use of a Policy Index and Blended Benchmark. The Policy Index captured the asset allocation decisions made by Virginia529 and the IAC while the Blended Benchmark captured the stylistic (defensive) posture and manager selection of the portfolio. The legacy Prepaid529 benchmark methodology is generally consistent with the recommendations in the Benchmark Report. The current quarterly attribution analysis provided by the Fund includes the three levels of attribution recommended by the Benchmark Report. Virginia529 is in the process of developing its 2019 work plan and will include an asset liability study which takes into account the discussion in the Benchmark Report relative to whether the defensive stylistic posture of the Fund is adequately reflected in the Fund's asset liability model, as this could impact specific benchmark selections. Additionally, the Plan will consider whether a reversion, in whole or in part, to the legacy benchmark framework is necessary to adequately provide needed transparency and clarity in performance reporting.

We express our appreciation to JLARC's staff and the study team at Callan for the professional, courteous and cooperative manner in which they conducted their work. I also commend the Virginia529 team, its consultant Mercer and its Board and Committees for their work in 2017-2018 to address benchmarking methodologies in an attempt to enhance transparency and clarity in performance reporting.

Sincerely,

Mary G. Morris

pc: Members, Virginia529 Board
Kimberly Sarte, JLARC
Joe McMahon, JLARC

Callan

November 26, 2018

# Virginia Prepaid 529

## Appendix Exhibits


**Alex Browning**

**Gary Chang, *CFA***

**Annoesjka West**

**John Pirone, *CFA, CAIA, CRM***

# Total Fund

# Total Fund Attribution

## As of June 30, 2018

**One Year Annualized Relative Return Attribution**

| A<br>Asset Class | B<br>Effective Actual Weight | C<br>Effective Target Weight | D<br>Actual Return | | E<br>Target Return | | F<br>Asset Allocation Effect | | G<br>Asset Class Structure Effect | | H<br>Manager Selection Effect | I<br>Total Relative Return |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| US Equities | 15% | 15% | 14.19% | | 14.78% | | 0.00% | | 0.17% | | (0.27%) | (0.10%) |
| EAFE Equities | 10% | 10% | 7.08% | | 6.84% | | 0.00% | | 0.05% | | (0.03%) | 0.02% |
| Emerging Equities | 8% | 8% | (0.03%) | | 8.59% | | 0.00% | | 0.02% | | (0.68%) | (0.66%) |
| Core Bonds | 17% | 15% | 3.42% | | (0.40%) | | (0.12%) | | 0.60% | | 0.06% | 0.54% |
| TIPS | 5% | 5% | 2.06% | | 2.11% | | 0.00% | | 0.00% | | 0.00% | 0.00% |
| Intermediate Credit | 3% | 5% | (0.45%) | | (0.36%) | | 0.13% | | 0.01% | | (0.01%) | 0.13% |
| High Yield | 10% | 10% | 2.75% | | 2.62% | | 0.00% | | (0.08%) | | 0.09% | 0.01% |
| EMD Hard | 9% | 5% | (2.85%) | | (1.60%) | | (0.28%) | | (0.21%) | | 0.09% | (0.40%) |
| EMD Local | 2% | 5% | (2.33%) | | (2.33%) | | 0.24% | | 0.00% | | 0.00% | 0.24% |
| Convertibles | 7% | 8% | 0.71% | | 12.02% | | (0.02%) | | (1.10%) | | 0.28% | (0.84%) |
| Hedge Funds | 5% | 5% | 5.66% | | 5.17% | | 0.00% | | (0.04%) | | 0.07% | 0.03% |
| Core Real Estate | 3% | 5% | 6.77% | | 7.47% | | (0.05%) | | (0.01%) | | (0.02%) | (0.08%) |
| Private Equity | 7% | 5% | 16.94% | | 16.49% | | 0.21% | | 0.01% | | 0.08% | 0.30% |
| **Total** | | | **5.18%** | **=** | **5.98%** | **+** | **0.11%** | **+** | **(0.57%)** | **+** | **(0.34%)** | **(0.80%)** |

- The total fund attribution analysis examines the cumulative sources of excess return relative to the target. The cumulative sources of return are broken down into Asset Allocation Effect, Asset Class Structure effect (aka style misfit effect), and Manager Selection Effect.
- Ideally, the Asset Allocation and Asset Class Structure effects are close to zero and the Manager Selection Effect is positive.

**Please note that the target return reflects the modeled asset class benchmark return at the target policy weight.*

# Total Fund Attribution

## As of June 30, 2018

**Three Year Annualized Relative Return Attribution**

| A<br>Asset Class | B<br>Effective Actual Weight | C<br>Effective Target Weight | D<br>Actual Return | E<br>Target Return | F<br>Asset Allocation Effect | G<br>Asset Class Structure Effect | H<br>Manager Selection Effect | I<br>Total Relative Return |
|---|---|---|---|---|---|---|---|---|
| US Equities | 15% | 15% | 9.53% | 11.58% | (0.02%) | (0.06%) | (0.24%) | (0.32%) |
| EAFE Equities | 10% | 10% | 5.00% | 4.90% | (0.02%) | 0.05% | (0.04%) | (0.01%) |
| Emerging Equities | 7% | 8% | 4.43% | 5.98% | 0.01% | 0.00% | (0.13%) | (0.12%) |
| Core Bonds | 17% | 15% | 2.84% | 1.72% | (0.07%) | 0.20% | (0.02%) | 0.11% |
| TIPS | 5% | 5% | 1.86% | 1.93% | 0.00% | (0.01%) | 0.00% | (0.01%) |
| Intermediate Credit | 3% | 5% | 1.92% | 1.96% | 0.09% | (0.01%) | 0.01% | 0.09% |
| High Yield | 10% | 10% | 5.69% | 5.53% | 0.00% | (0.08%) | 0.09% | 0.01% |
| EMD Hard | 9% | 5% | 4.64% | 4.63% | (0.07%) | (0.02%) | 0.03% | (0.06%) |
| EMD Local | 1% | 5% | 1.96% | 1.96% | 0.01% | 0.00% | 0.00% | 0.01% |
| Convertibles | 7% | 8% | 1.68% | 7.72% | (0.01%) | (0.50%) | 0.06% | (0.46%) |
| Hedge Funds | 6% | 5% | 3.37% | 1.94% | (0.03%) | 0.08% | 0.01% | 0.06% |
| Core Real Estate | 4% | 5% | 7.47% | 8.38% | (0.04%) | 0.02% | (0.05%) | (0.07%) |
| Private Equity | 6% | 5% | 13.74% | 11.88% | 0.06% | 0.04% | 0.05% | 0.14% |
| **Total** | | | **5.23%** | **= 5.86%** | **+ (0.09%)** | **+ (0.29%)** | **+ (0.25%)** | **(0.63%)** |

- The total fund attribution analysis examines the cumulative sources of excess return relative to the target. The cumulative sources of return are broken down into Asset Allocation Effect, Asset Class Structure effect (aka style misfit effect), and Manager Selection Effect.
- Ideally, the Asset Allocation and Asset Class Structure effects are close to zero and the Manager Selection Effect is positive.

**Please note that the target return reflects the modeled asset class benchmark return at the target policy weight.*

# Total Fund Attribution

## As of June 30, 2018

**Five Year Annualized Relative Return Attribution**

| A<br>Asset Class | B<br>Effective Actual Weight | C<br>Effective Target Weight | D<br>Actual Return | | E<br>Target Return | | F<br>Asset Allocation Effect | | G<br>Asset Class Structure Effect | | H<br>Manager Selection Effect | I<br>Total Relative Return |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| US Equities | 16% | 15% | 11.61% | | 13.29% | | 0.03% | | (0.08%) | | (0.15%) | (0.20%) |
| EAFE Equities | 10% | 10% | 6.78% | | 6.44% | | (0.01%) | | (0.02%) | | 0.05% | 0.02% |
| Emerging Equities | 7% | 8% | 2.75% | | 5.39% | | 0.01% | | (0.01%) | | (0.19%) | (0.19%) |
| Core Bonds | 17% | 15% | 2.82% | | 2.27% | | (0.09%) | | 0.06% | | 0.02% | (0.01%) |
| TIPS | 5% | 5% | 1.55% | | 1.68% | | (0.01%) | | (0.01%) | | 0.00% | (0.02%) |
| Intermediate Credit | 3% | 5% | 2.25% | | 2.51% | | 0.10% | | 0.02% | | (0.02%) | 0.10% |
| High Yield | 10% | 10% | 5.53% | | 5.51% | | 0.00% | | (0.03%) | | 0.03% | 0.00% |
| EMD Hard | 9% | 5% | 4.75% | | 5.15% | | (0.06%) | | (0.07%) | | 0.03% | (0.10%) |
| EMD Local | 1% | 5% | (1.40%) | | (1.40%) | | 0.18% | | 0.00% | | 0.00% | 0.18% |
| Convertibles | 7% | 8% | 3.76% | | 10.00% | | (0.01%) | | (0.57%) | | 0.12% | (0.47%) |
| Hedge Funds | 7% | 5% | 3.96% | | 3.46% | | (0.03%) | | 0.02% | | 0.01% | 0.00% |
| Core Real Estate | 4% | 5% | 8.72% | | 10.03% | | (0.04%) | | 0.00% | | (0.05%) | (0.09%) |
| Private Equity | 4% | 5% | 10.80% | | 10.03% | | 0.04% | | 0.02% | | 0.02% | 0.08% |
| **Total** | | | **5.68%** | **=** | **6.37%** | **+** | **0.11%** | **+** | **(0.66%)** | **+** | **(0.14%)** | **(0.69%)** |

- The total fund attribution analysis examines the cumulative sources of excess return relative to the target. The cumulative sources of return are broken down into Asset Allocation Effect, Asset Class Structure effect (aka style misfit effect), and Manager Selection Effect.
- Ideally, the Asset Allocation and Asset Class Structure effects are close to zero and the Manager Selection Effect is positive.

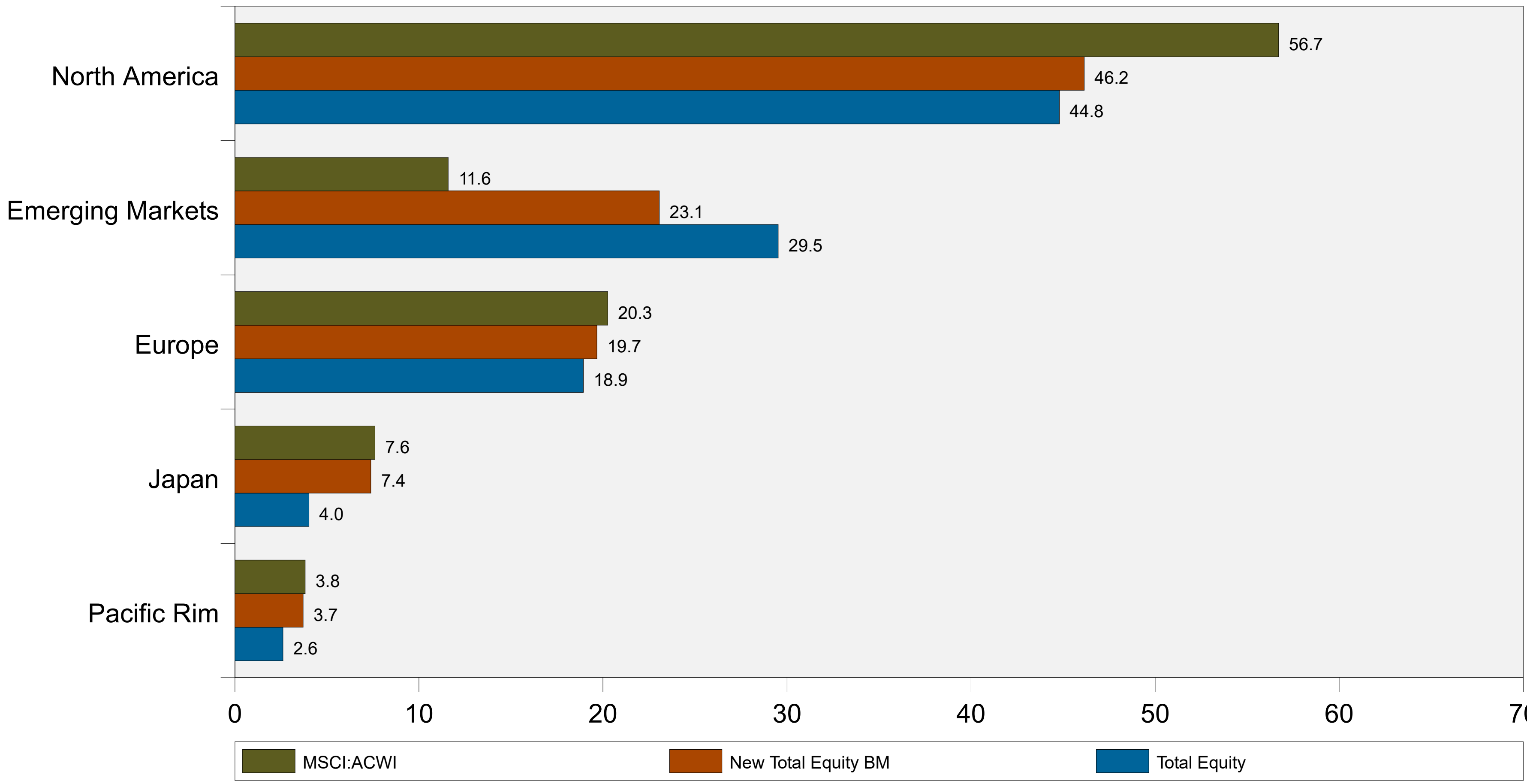
**Please note that the target return reflects the modeled asset class benchmark return at the target policy weight.*

# Asset Class

# Total Equity – Regional Exposures

- The charts below compare the regional exposures of the broad global opportunity set as represented by MSCI ACWI Index, the total equity benchmark, and the actual implementation.

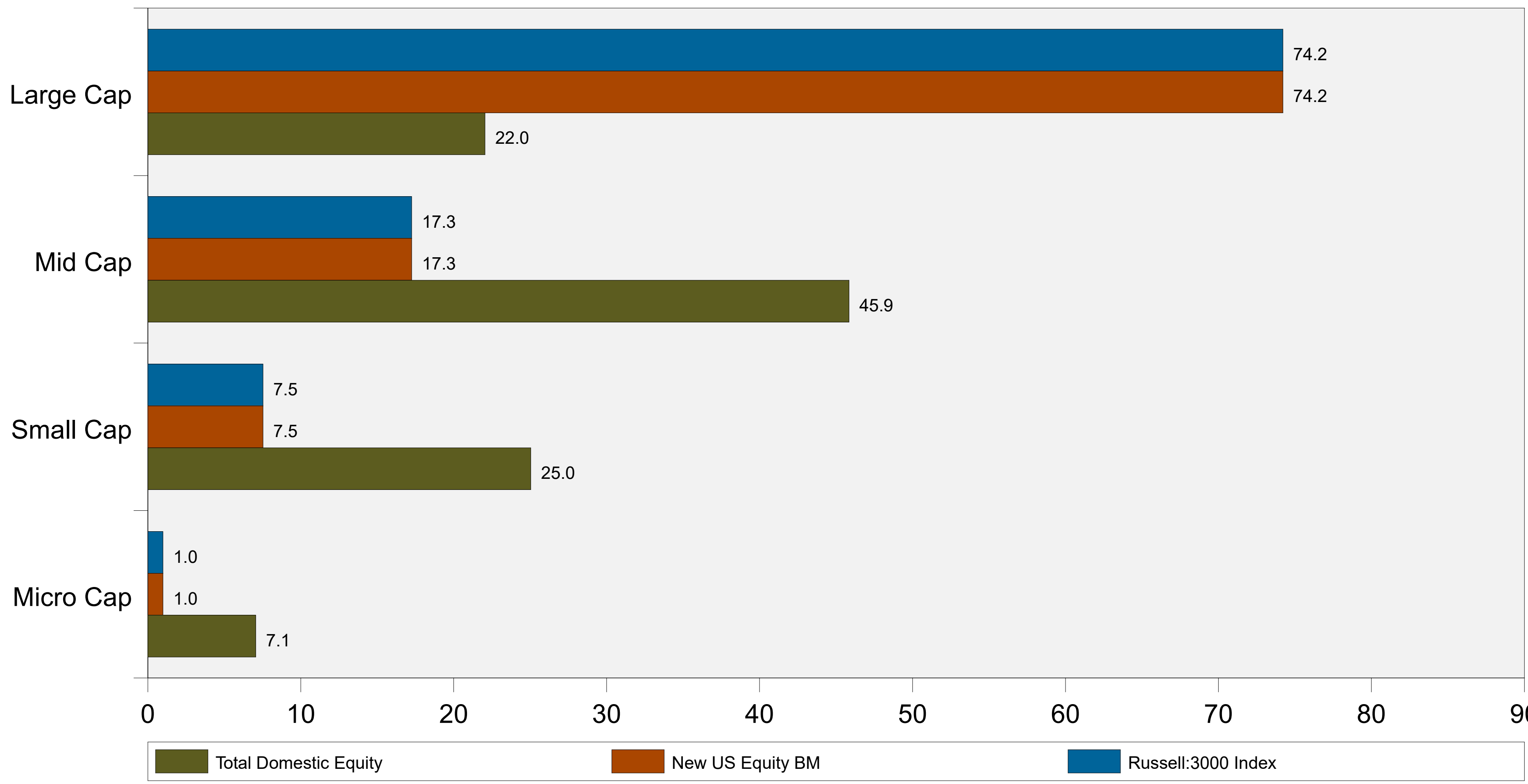
**Regional Exposures**
**as of June 30, 2018**



# Domestic Equity – Capitalization Exposures

- The charts below compare the capitalization exposures of the broad opportunity set represented by the Russell 3000 Index, the total domestic equity benchmark, and the actual implementation.

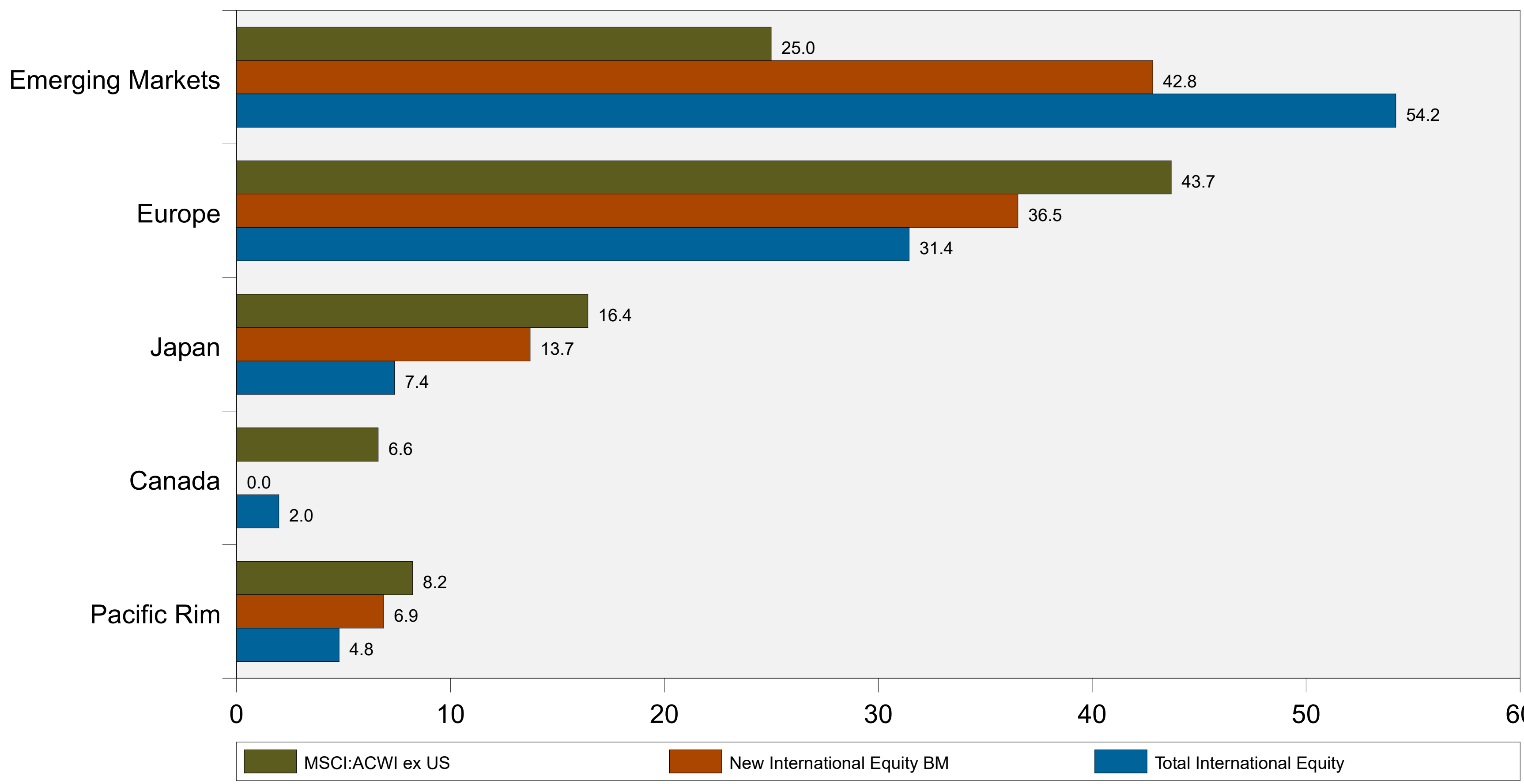
**Capitalization Exposures**
**as of June 30, 2018**



# Non-U.S. Equity – Regional Exposures

- The charts below compare the capitalization exposures of the broad opportunity set represented by the MSCI ACWI ex-U.S. Index, the international equity benchmark, and the actual implementation.

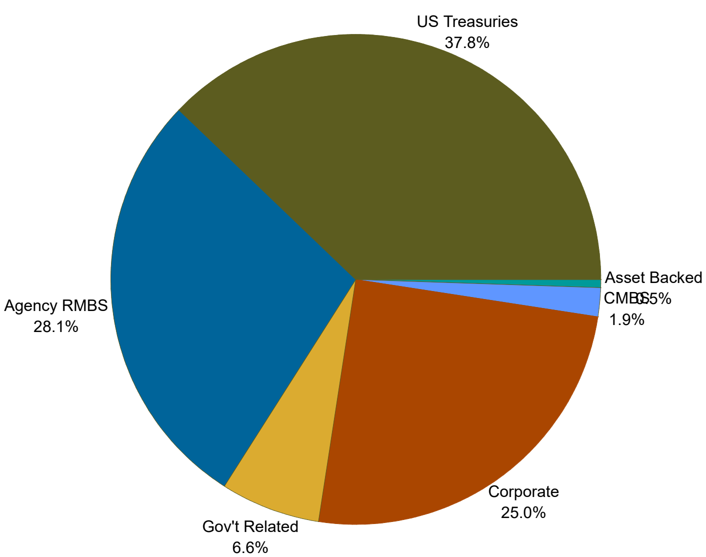
**Regional Exposures**
**as of June 30, 2018**



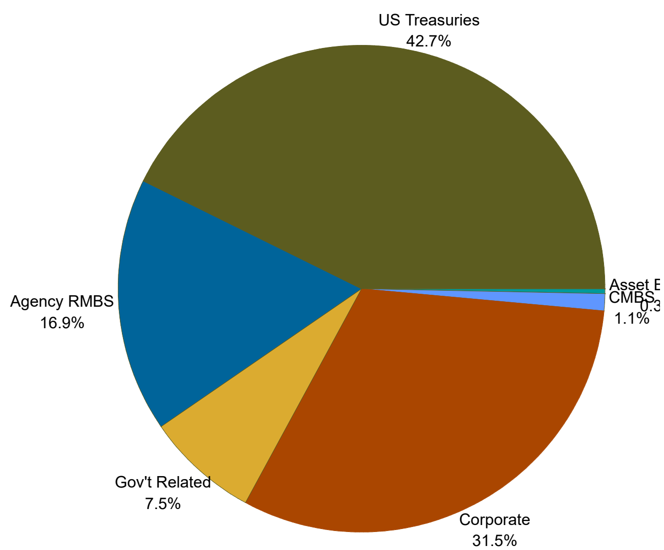
# Core Fixed Income – Sector Exposures

- The charts below compare the sector weights of the broad core U.S. fixed income opportunity set as represented by Bloomberg Aggregate, the total core fixed income benchmark, and the actual implementation.

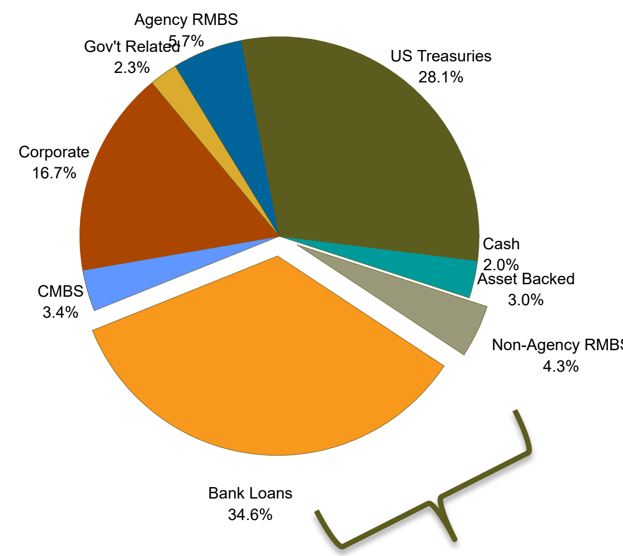
Fixed Income Sector Exposure
as of June 30, 2018
Blmbg:Aggregate




Fixed Income Sector Exposure
as of June 30, 2018
New Core Fixed Income BM




Fixed Income Sector Exposure
as of June 30, 2018
Core Fixed Income

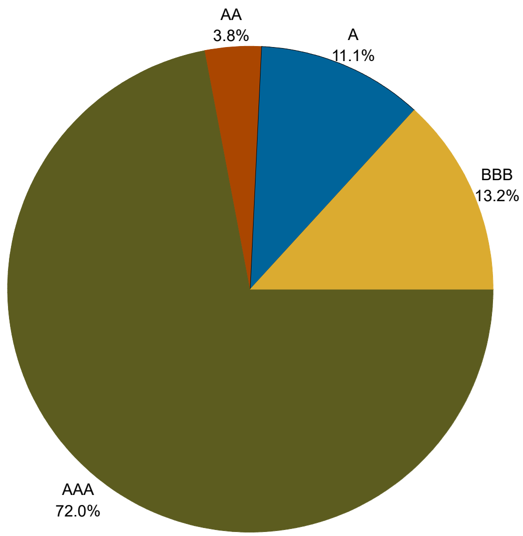



Non-Benchmark Sectors: 39%

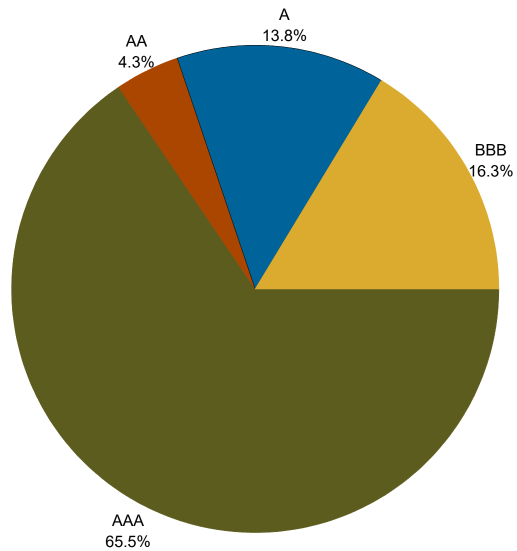
# Core Fixed Income – Quality Exposures

- The charts below compare the quality exposures of the broad core U.S. fixed income opportunity set as represented by Bloomberg Aggregate, the total core fixed income benchmark, and the actual implementation.

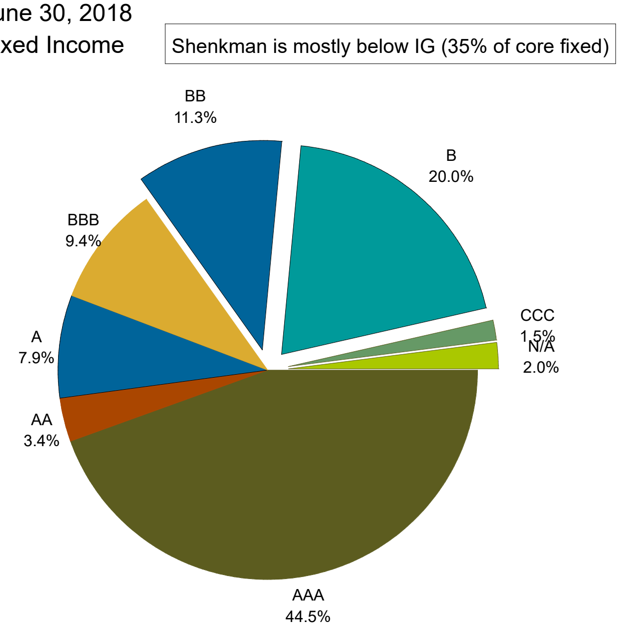
Quality Exposure
as of June 30, 2018
Blmbg:Aggregate




Quality Exposure
as of June 30, 2018
New Core Fixed Income BM




Quality Exposure
as of June 30, 2018
Core Fixed Income

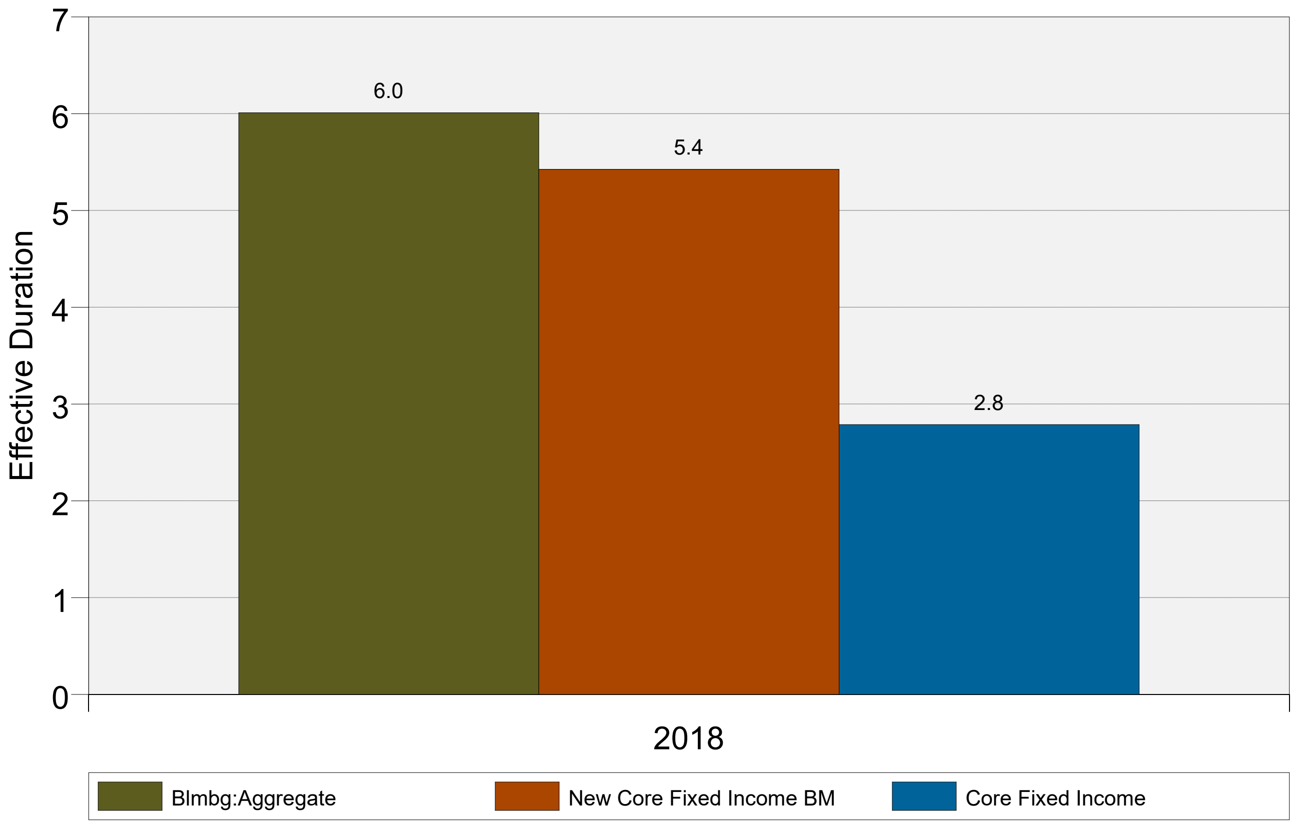



- Note that Shenkman Capital Management's Bank Loans strategy, which represents 35% of Core Fixed Income, is mostly below investment grade.

# Core Fixed Income – Duration

- The chart below compares the effective duration of the core U.S. fixed income opportunity set as represented by Bloomberg Aggregate, the total core fixed income benchmark, and the actual implementation.

Effective Duration
for 1 Quarter Ended June 30, 2018



**Public Equity**

Investment Managers Benchmarks

# Analytical Approach

- Benchmarks are used to measure the value added by active management over a long time frame.
- Benchmarks should be investable and accommodate the style and strategy of the investment manager.
- VA Prepaid 529 must be mindful of the impact of the selection of the benchmark on the management of portfolios.
  - Some managers will alter holdings in response to different benchmarks.
- In conducting the review, Callan reached out to the managers to better understand the mandate and benchmark usage.
- The following analytics were used for the U.S. equity managers:
  - Style and sector analysis;
  - Tracking error and R-Squared analysis; and,
  - Other analytics included weighted average and weighted median market cap where appropriate.
- The following analytics were used for the Non-U.S. Equity managers:
  - Style and sector analysis;
  - Tracking error and R-Squared analysis;
  - Other analytics included weighted average and weighted median market cap; emerging markets exposure; and selected valuation metrics where appropriate.

# U.S. Equity Managers

# Vanguard Institutional Index

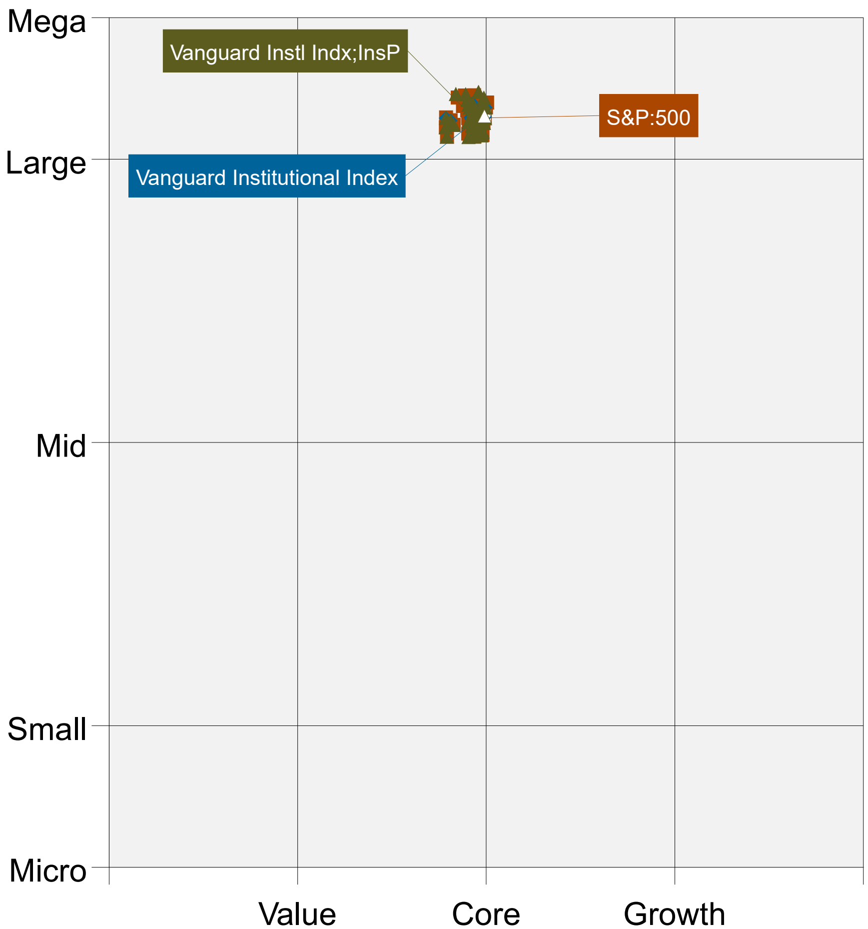
## Index Evaluation

- Current Index: S&P 500 Index.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

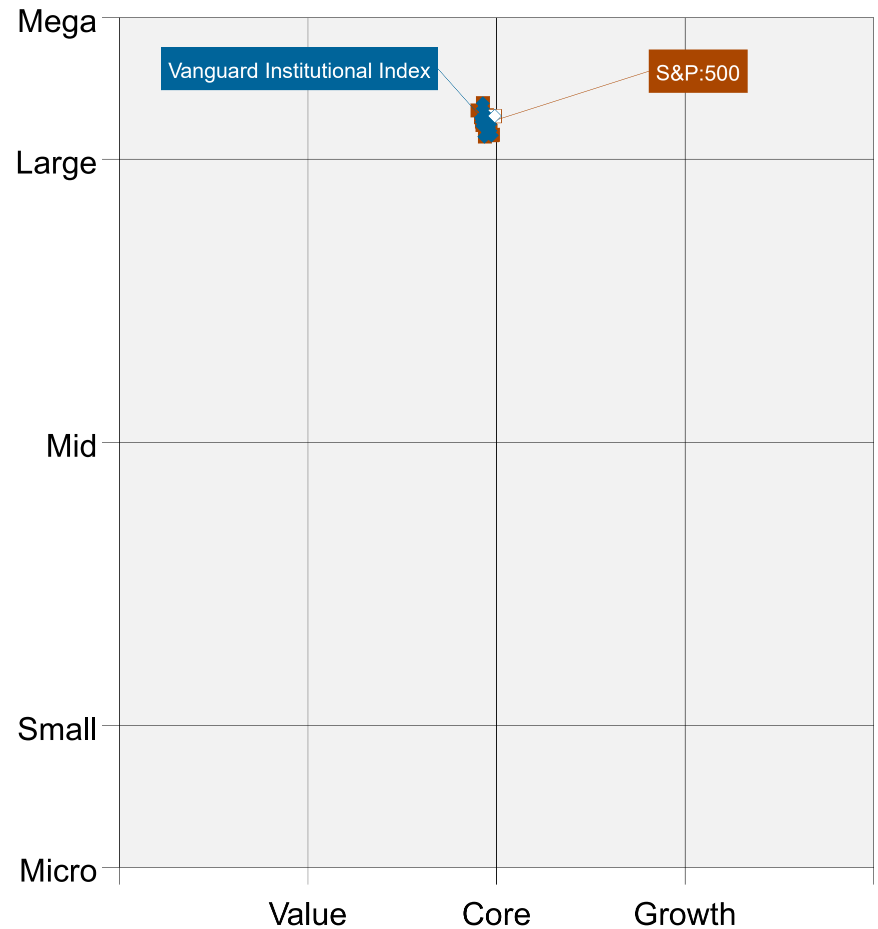
# Vanguard Institutional Index

## Index Evaluation

**Style Map**
**for 15 Years Ended June 30, 2018**



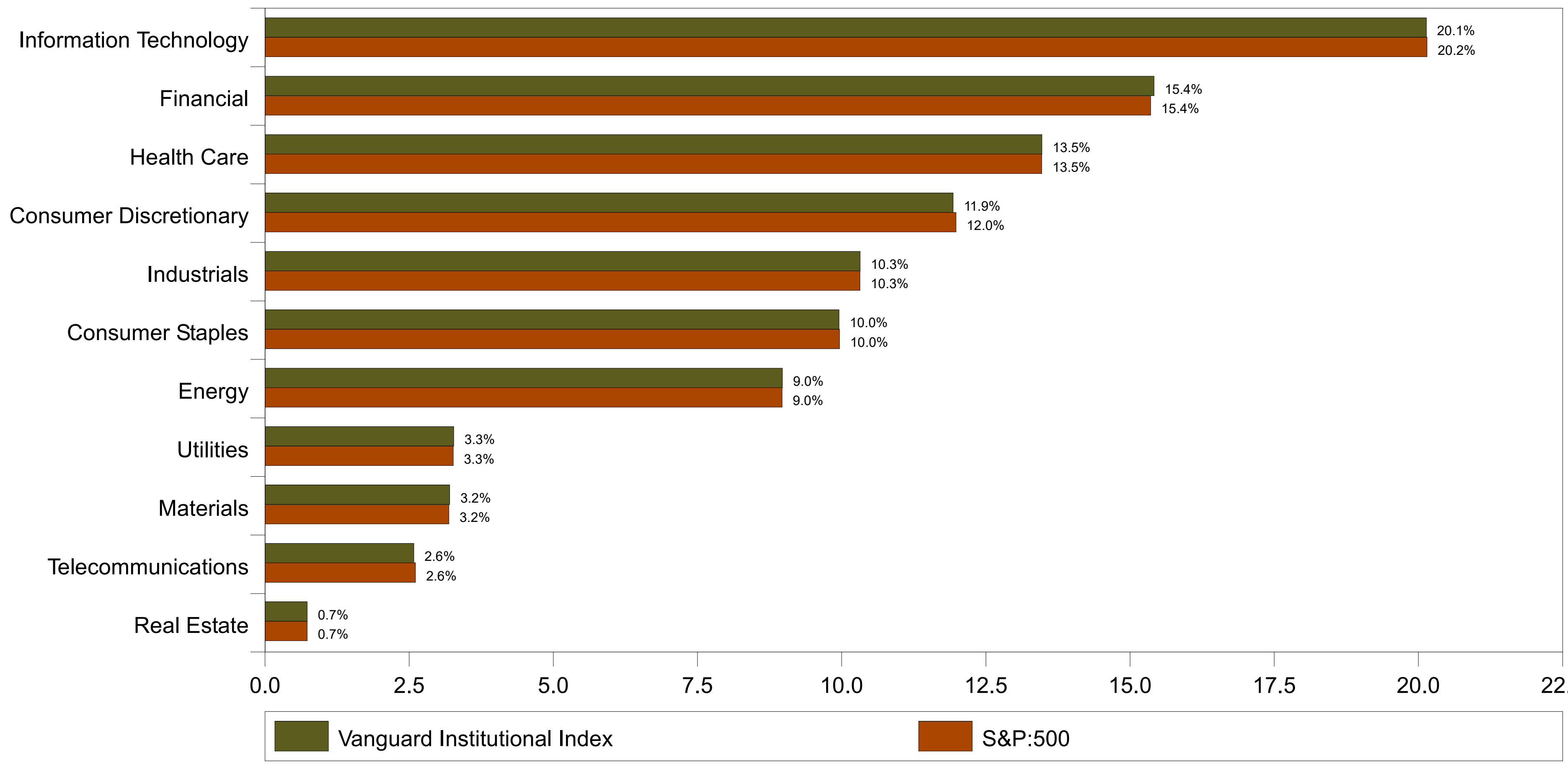

**Style Map**
**for 5 Years Ended June 30, 2018**



# Vanguard Institutional Index

## Index Evaluation

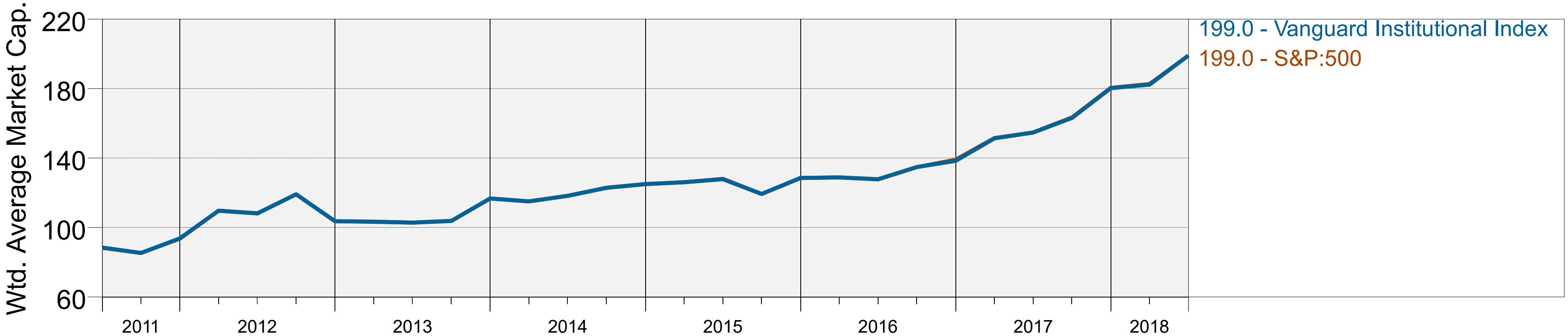
### Effective Sector Weights
### vs S&P:500
### for 7 Years Ended June 30, 2018



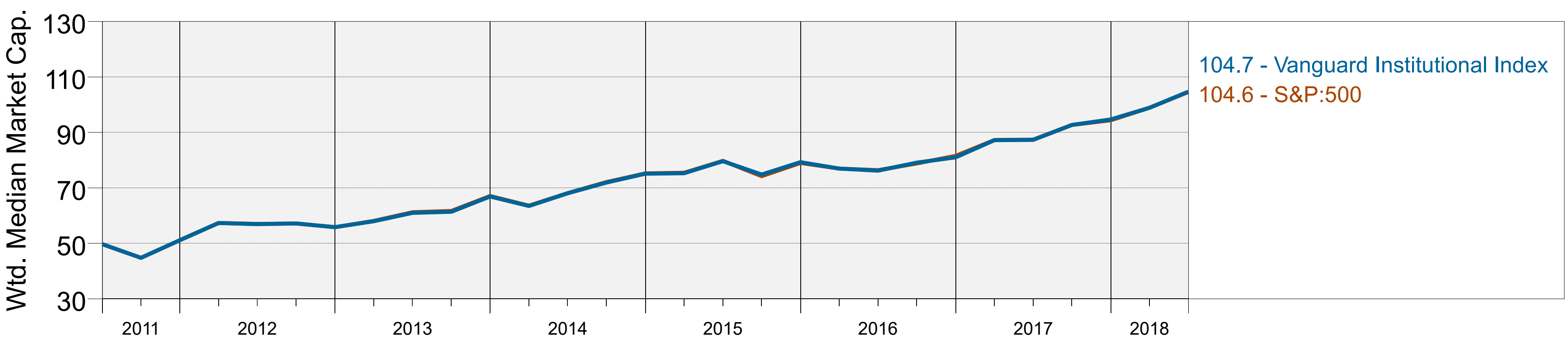
# Vanguard Institutional Index

## Index Evaluation

**Wtd. Average Market Cap.**
**for 7 Years Ended June 30, 2018**



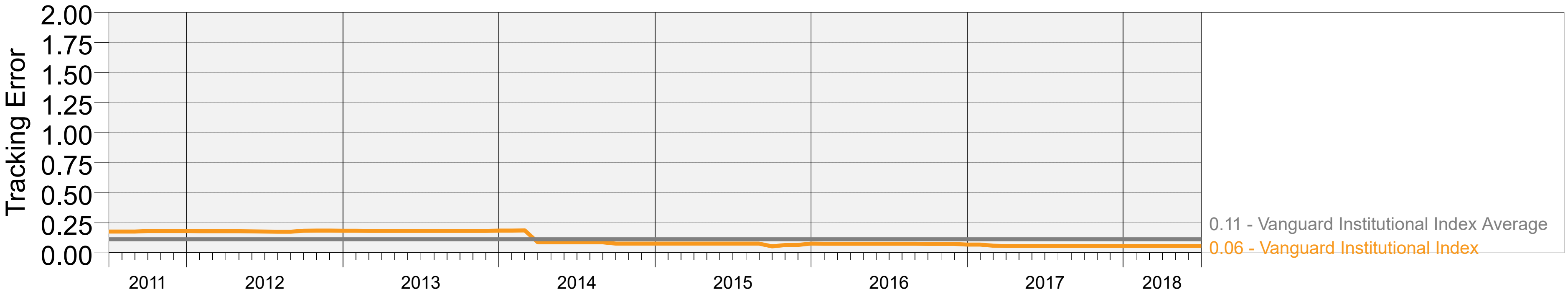

**Wtd. Median Market Cap.**
**for 7 Years Ended June 30, 2018**



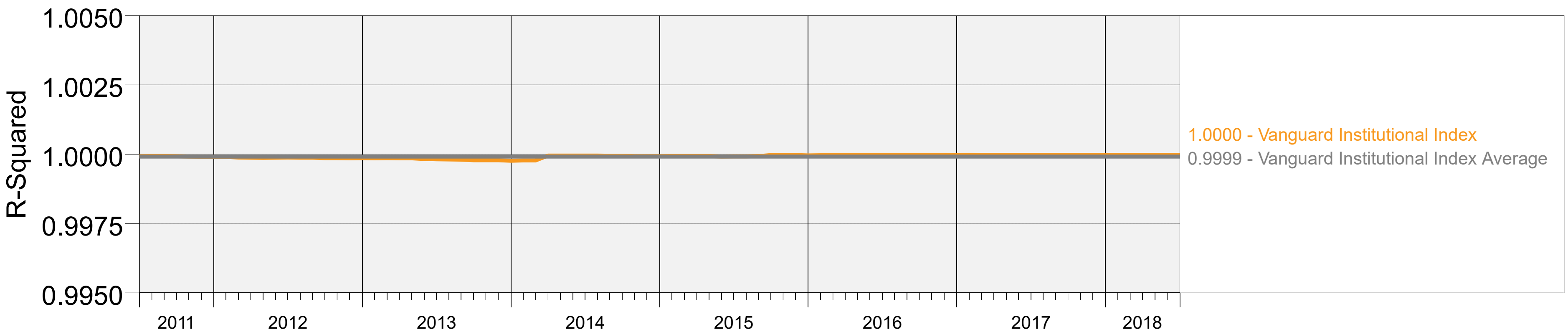
# Vanguard Institutional Index

## Index Evaluation

### Rolling 36 Month Tracking Error Relative To S&P:500 for 7 Years Ended June 30, 2018




### Rolling 36 Month R-Squared Relative To S&P:500 for 7 Years Ended June 30, 2018



# Westfield Capital Management – Small/Mid Cap Growth Equity

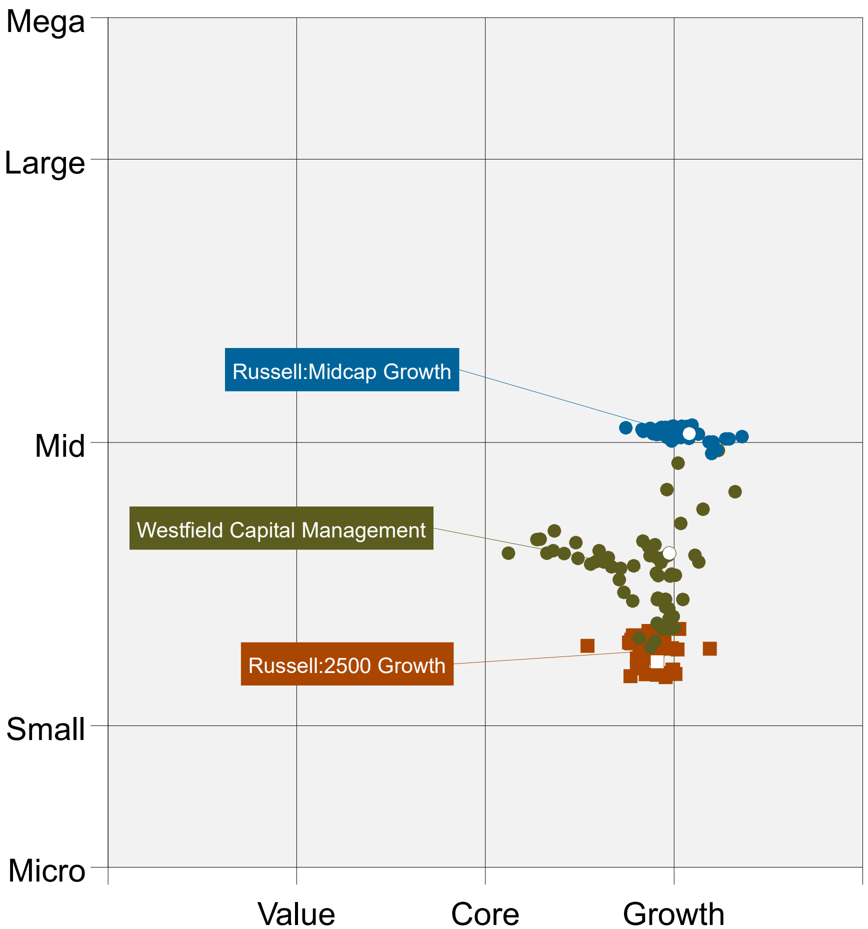
## Index Evaluation

- Current Index: Russell 2500 Growth Index.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

# Westfield Capital Management – Small/Mid Cap Growth Equity

## Index Evaluation

**Style Map**
**for 15 Years Ended June 30, 2018**

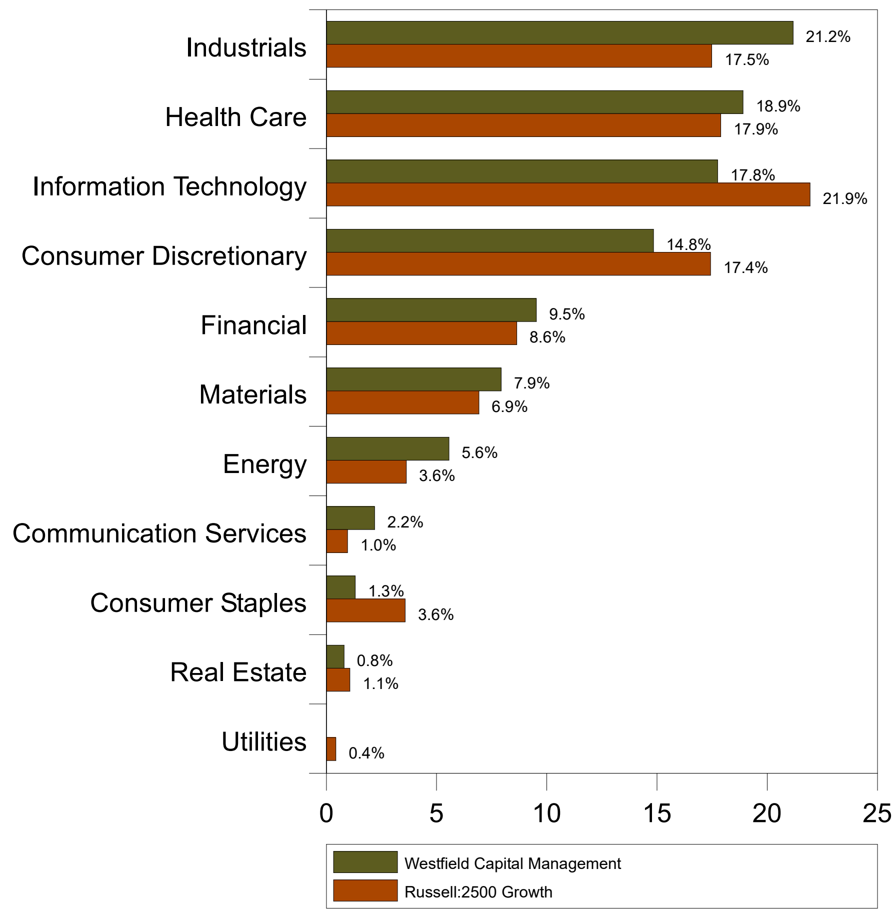



**Style Map**
**for 5 Years Ended June 30, 2018**

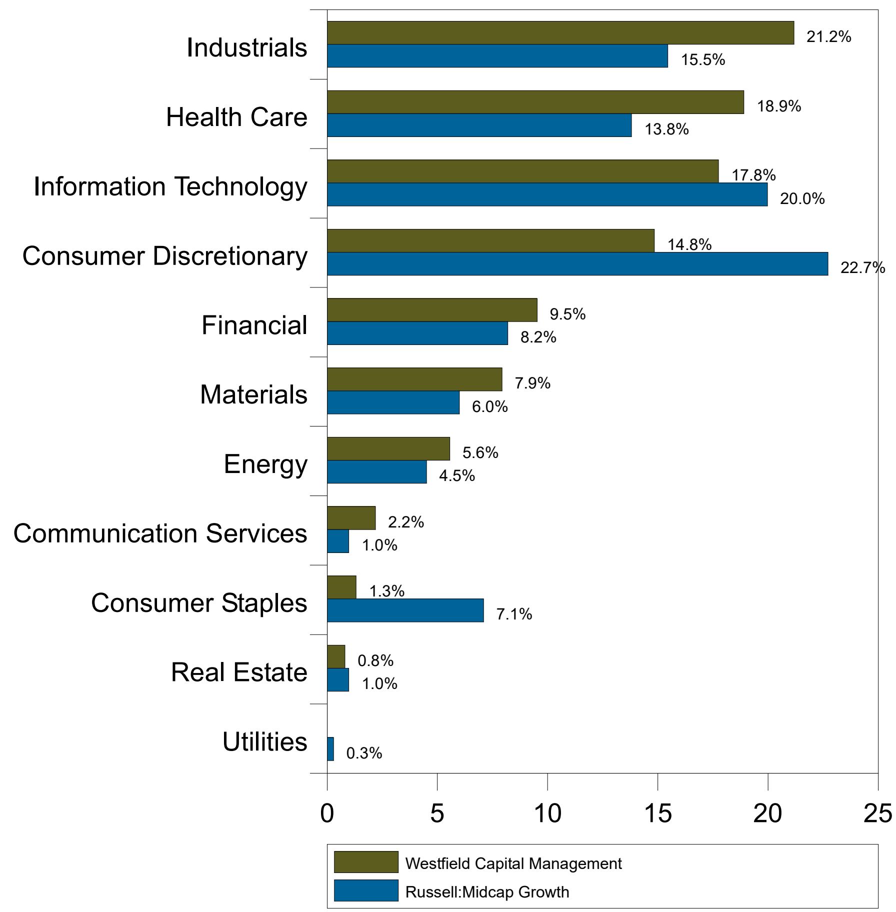
# Westfield Capital Management – Small/Mid Cap Growth Equity

## Index Evaluation

### Effective Sector Weights vs Russell:2500 Growth for 7 Years Ended June 30, 2018



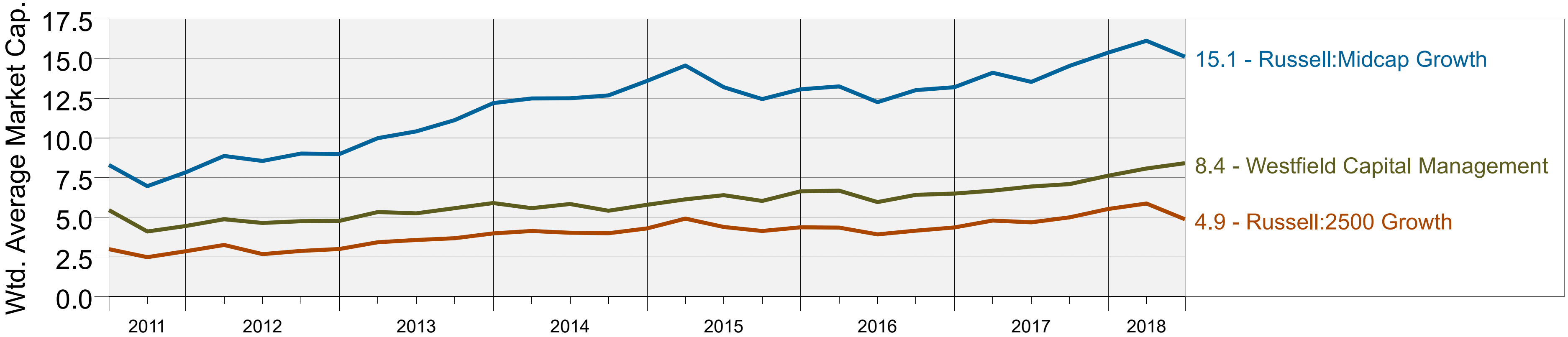

### Effective Sector Weights vs Russell:Midcap Growth for 7 Years Ended June 30, 2018



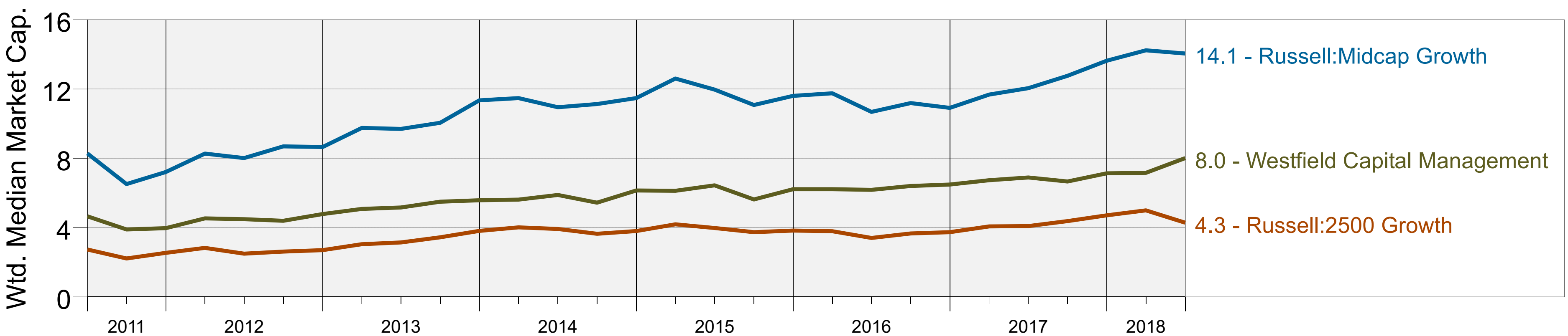
# Westfield Capital Management – Small/Mid Cap Growth Equity

## Index Evaluation

**Wtd. Average Market Cap.**
**for 7 Years Ended June 30, 2018**



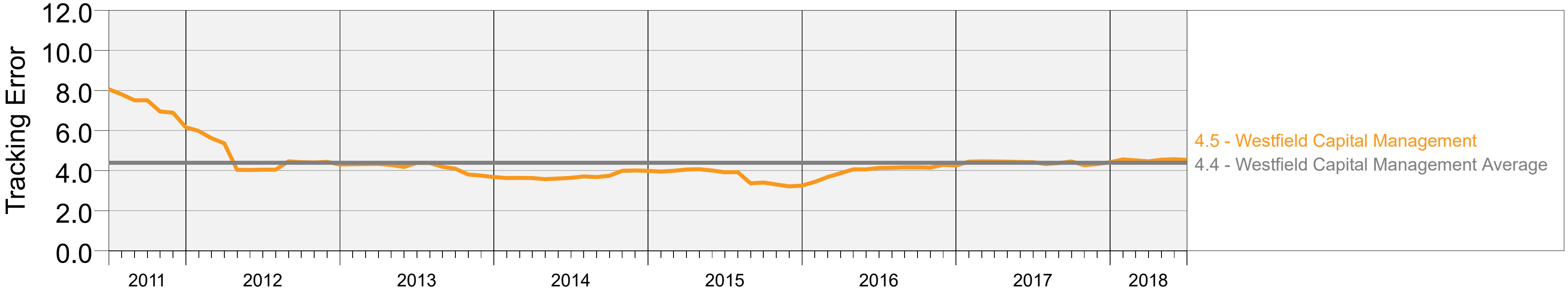

**Wtd. Median Market Cap.**
**for 7 Years Ended June 30, 2018**



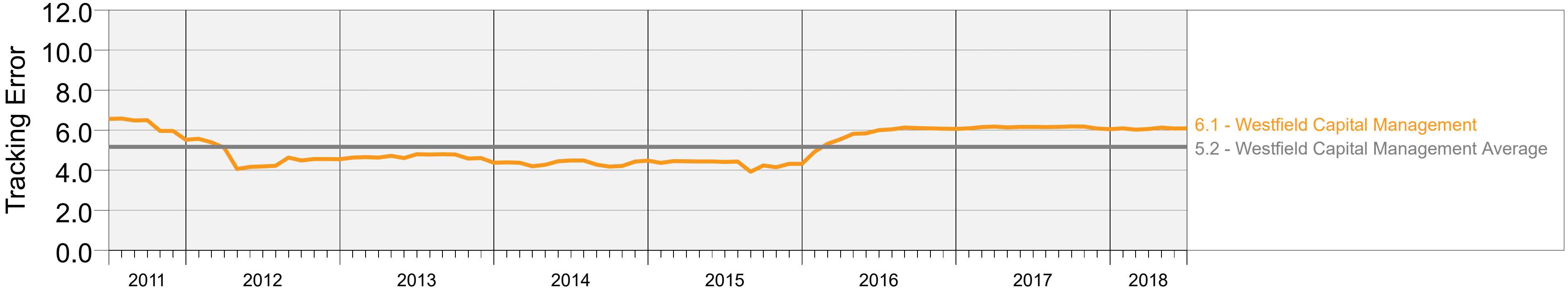
# Westfield Capital Management – Small/Mid Cap Growth Equity

## Index Evaluation

**Rolling 36 Month Tracking Error Relative To Russell:2500 Growth for 7 Years Ended June 30, 2018**



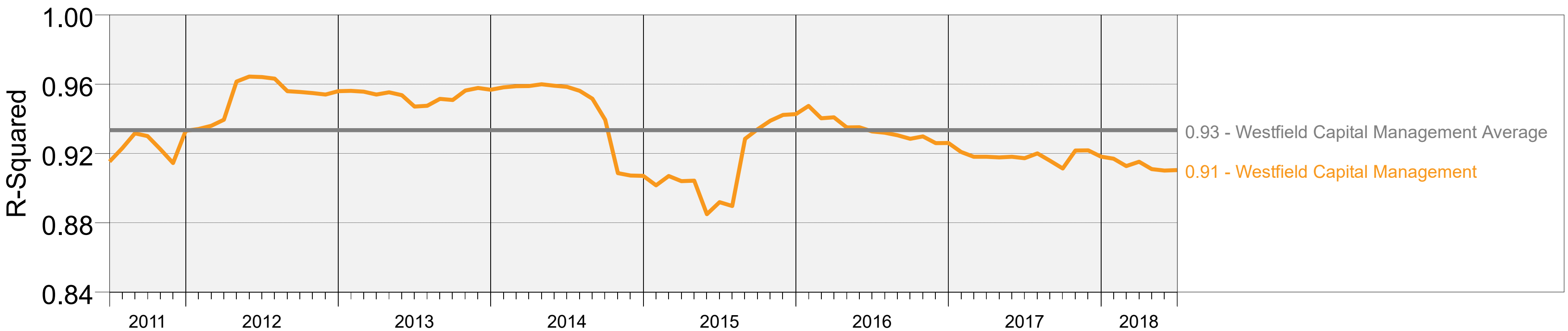

**Rolling 36 Month Tracking Error Relative To Russell:Midcap Growth for 7 Years Ended June 30, 2018**



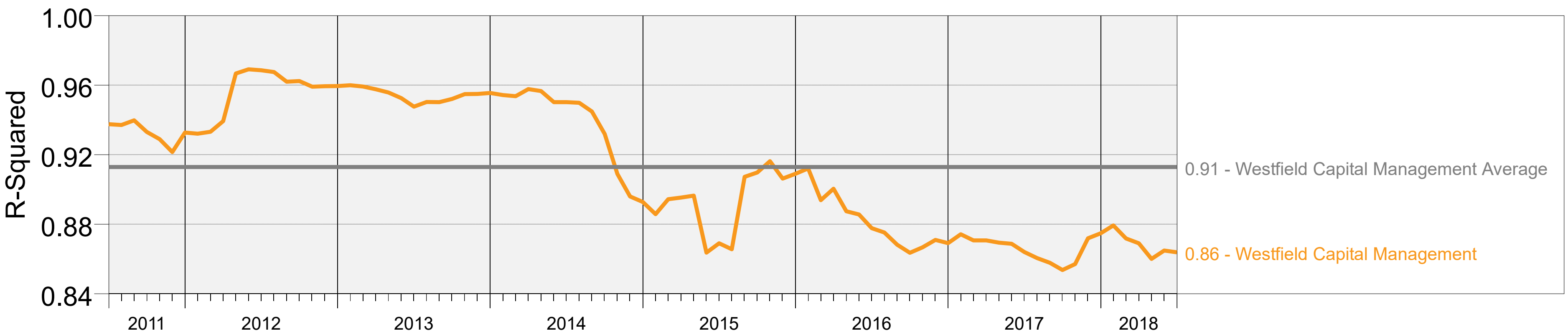
# Westfield Capital Management – Small/Mid Cap Growth Equity

## Index Evaluation

**Rolling 36 Month R-Squared Relative To Russell:2500 Growth**
**for 7 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To Russell:Midcap Growth**
**for 7 Years Ended June 30, 2018**



# Thompson, Siegel and Walmsley – Small/Mid Cap Value Equity

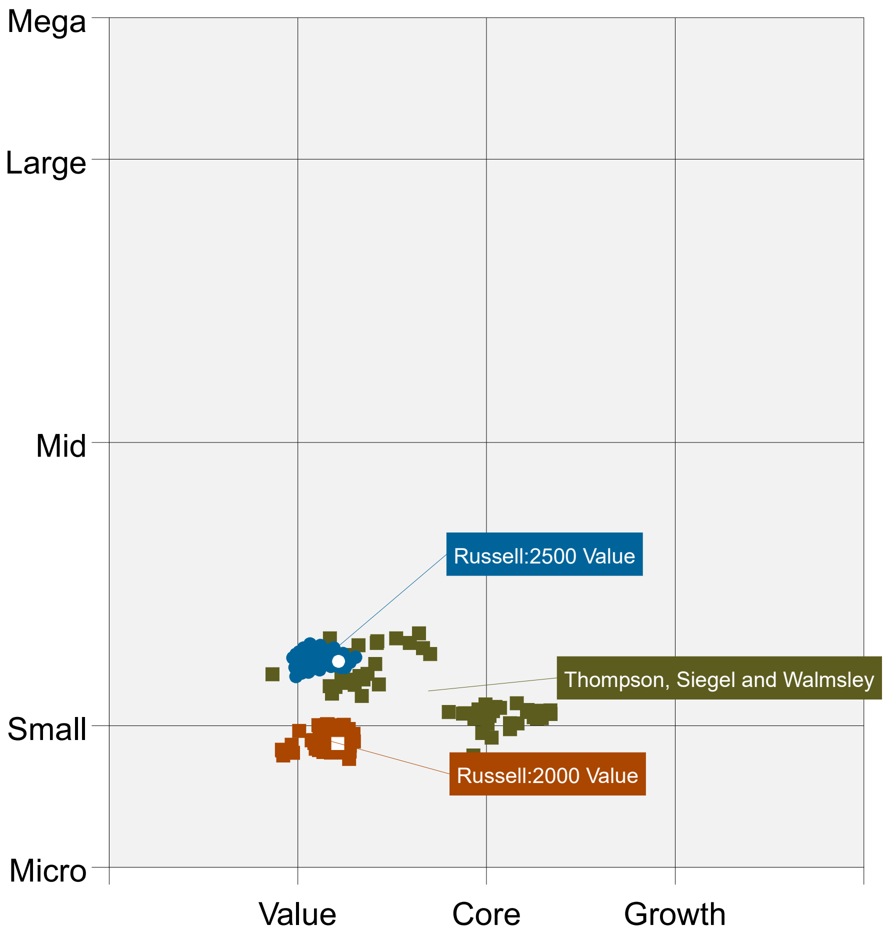
## Index Evaluation

- Current Index: Russell 2500 Value Index.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

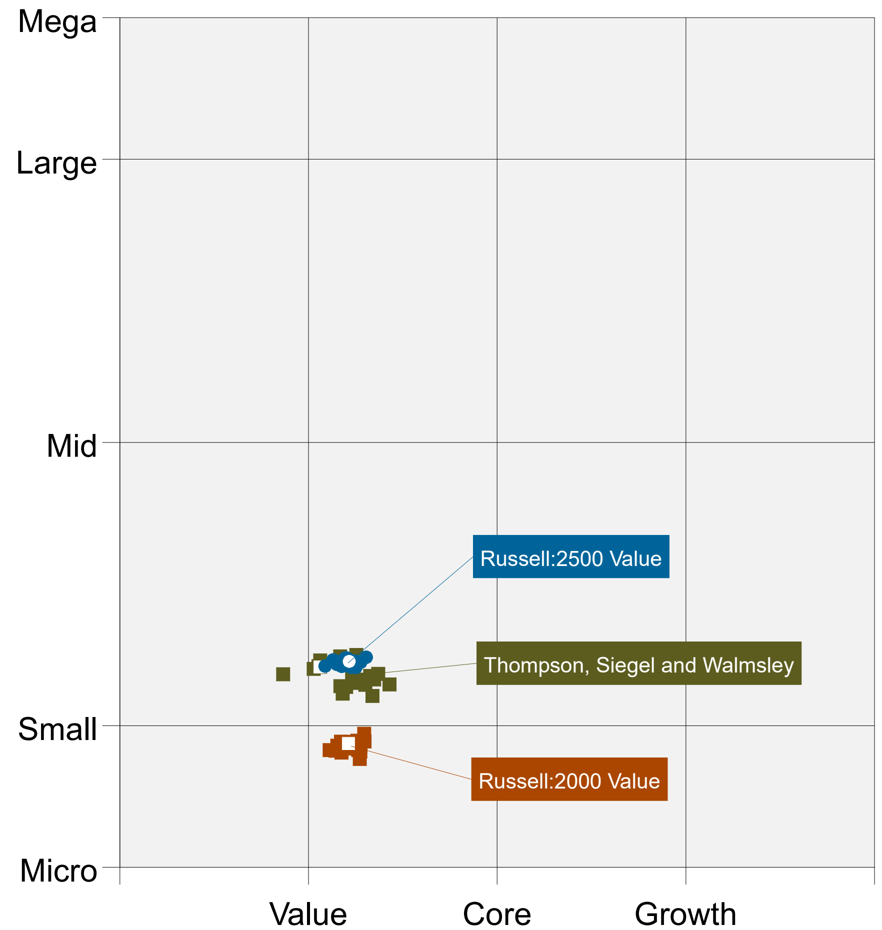
# Thompson, Siegel and Walmsley – Small/Mid Cap Value Equity

## Index Evaluation

**Style Map**
**for 15 Years Ended June 30, 2018**



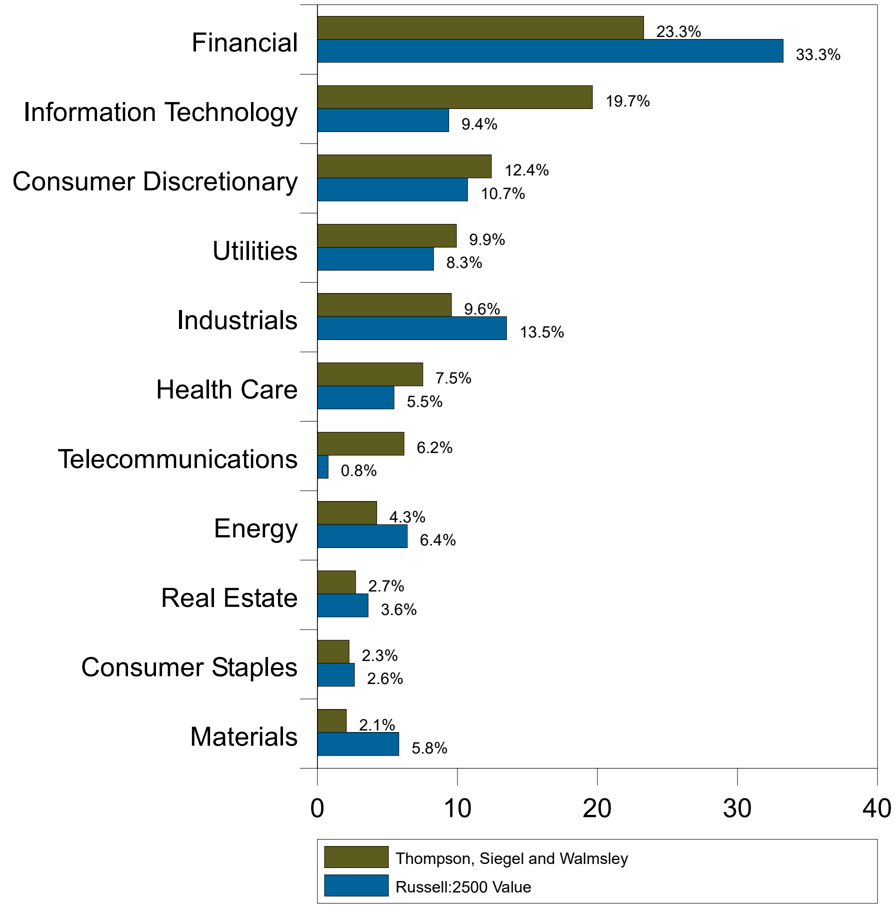

**Style Map**
**for 5 Years Ended June 30, 2018**



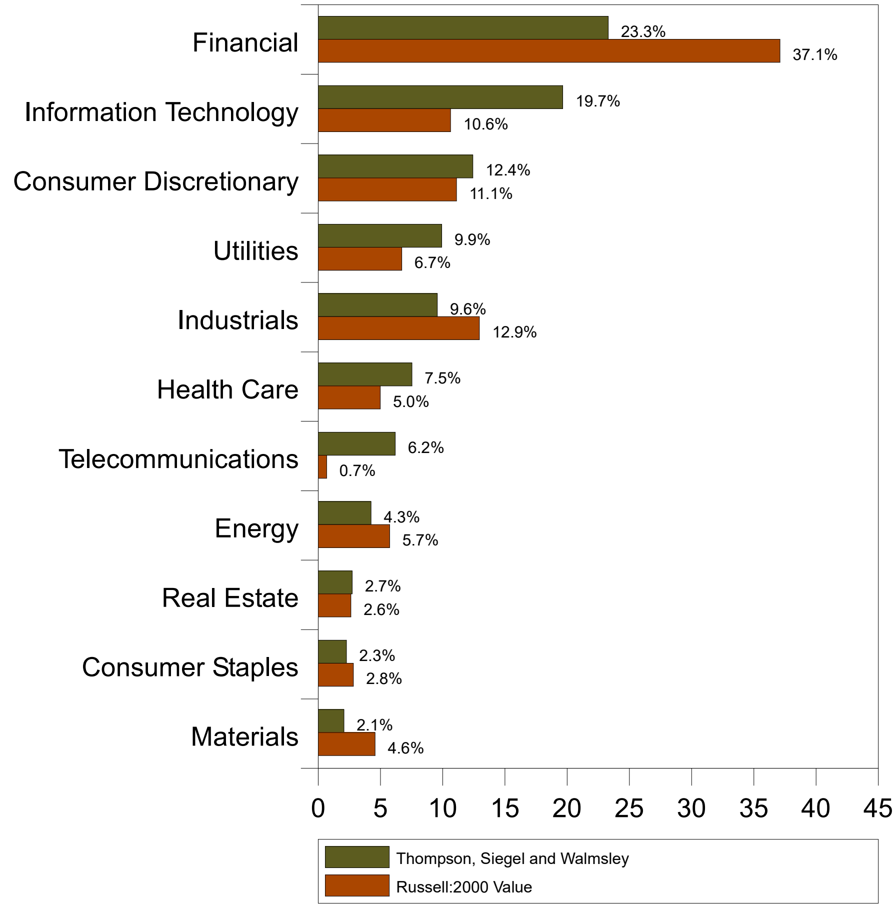
# Thompson, Siegel and Walmsley – Small/Mid Cap Value Equity

## Index Evaluation

### Effective Sector Weights vs Russell:2500 Value for 7 Years Ended June 30, 2018



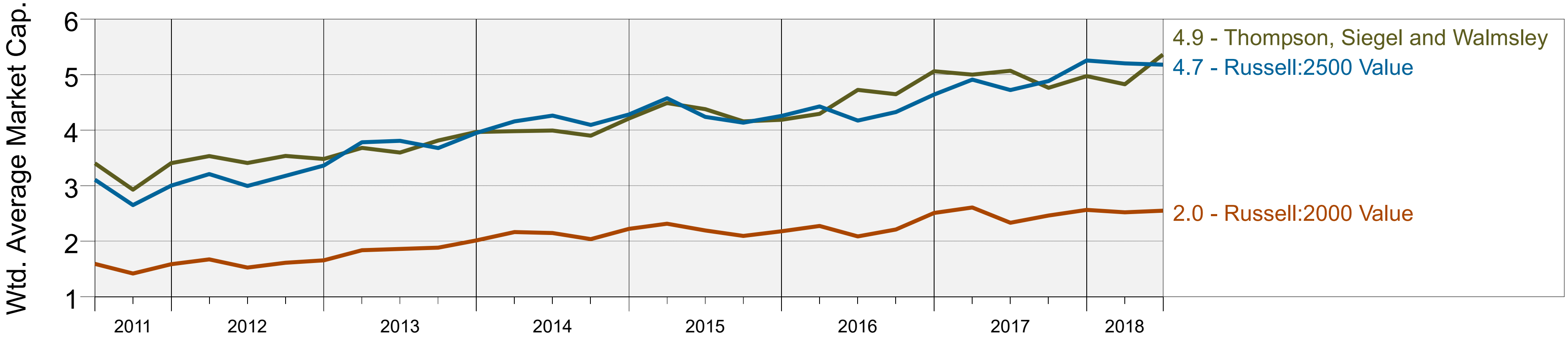

### Effective Sector Weights vs Russell:2000 Value for 7 Years Ended June 30, 2018



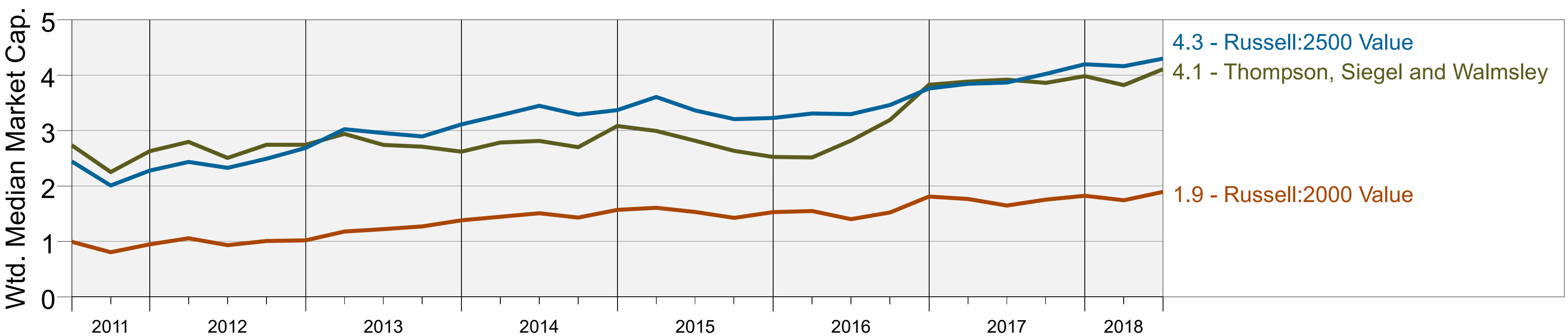
# Thompson, Siegel and Walmsley – Small/Mid Cap Value Equity

## Index Evaluation

**Wtd. Average Market Cap.**
**for 7 Years Ended June 30, 2018**



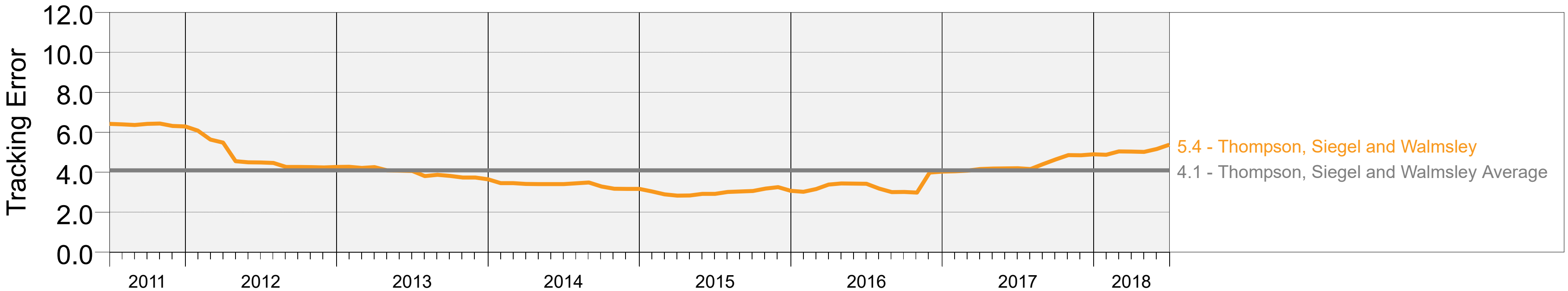

**Wtd. Median Market Cap.**
**for 7 Years Ended June 30, 2018**



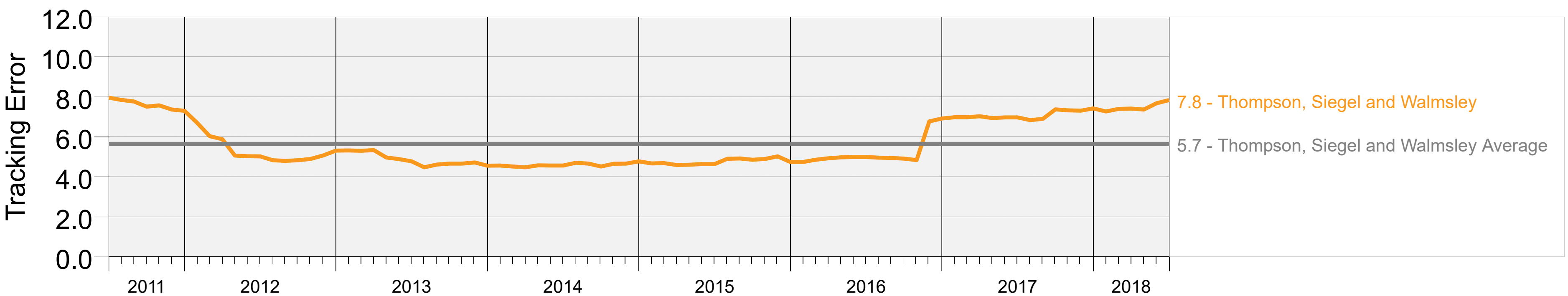
# Thompson, Siegel and Walmsley – Small/Mid Cap Value Equity

## Index Evaluation

**Rolling 36 Month Tracking Error Relative To Russell:2500 Value for 7 Years Ended June 30, 2018**



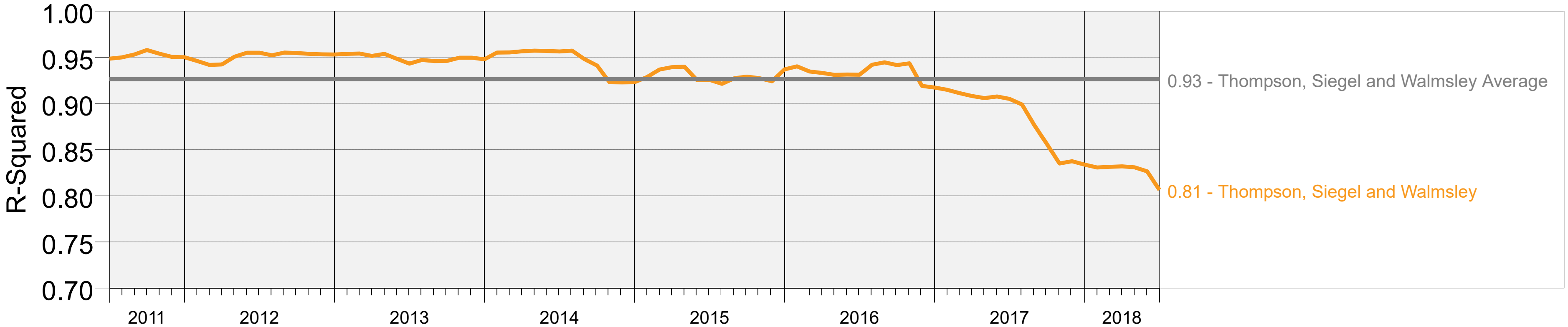

**Rolling 36 Month Tracking Error Relative To Russell:2000 Value for 7 Years Ended June 30, 2018**



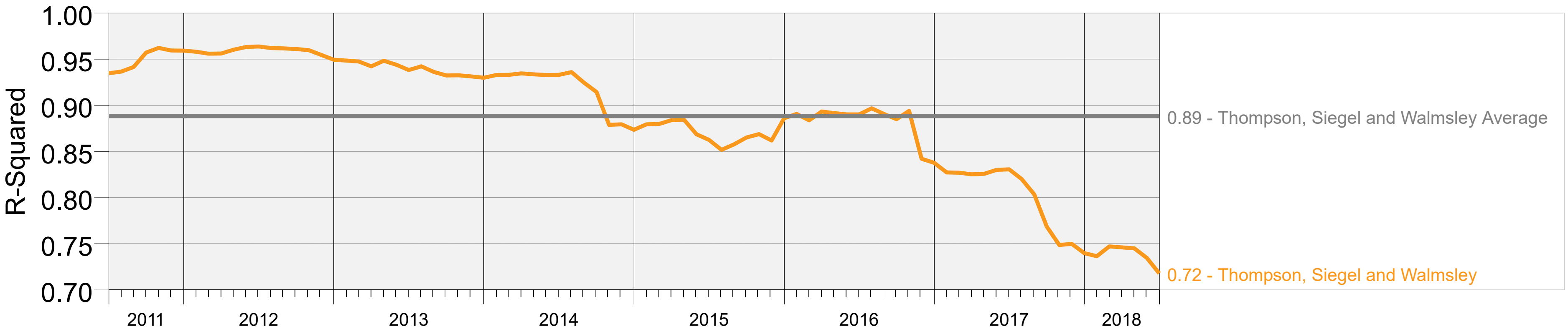
# Thompson, Siegel and Walmsley – Small/Mid Cap Value Equity

## Index Evaluation

**Rolling 36 Month R-Squared Relative To Russell:2500 Value for 7 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To Russell:2000 Value for 7 Years Ended June 30, 2018**



# Donald Smith and Company – Small Cap Value Equity

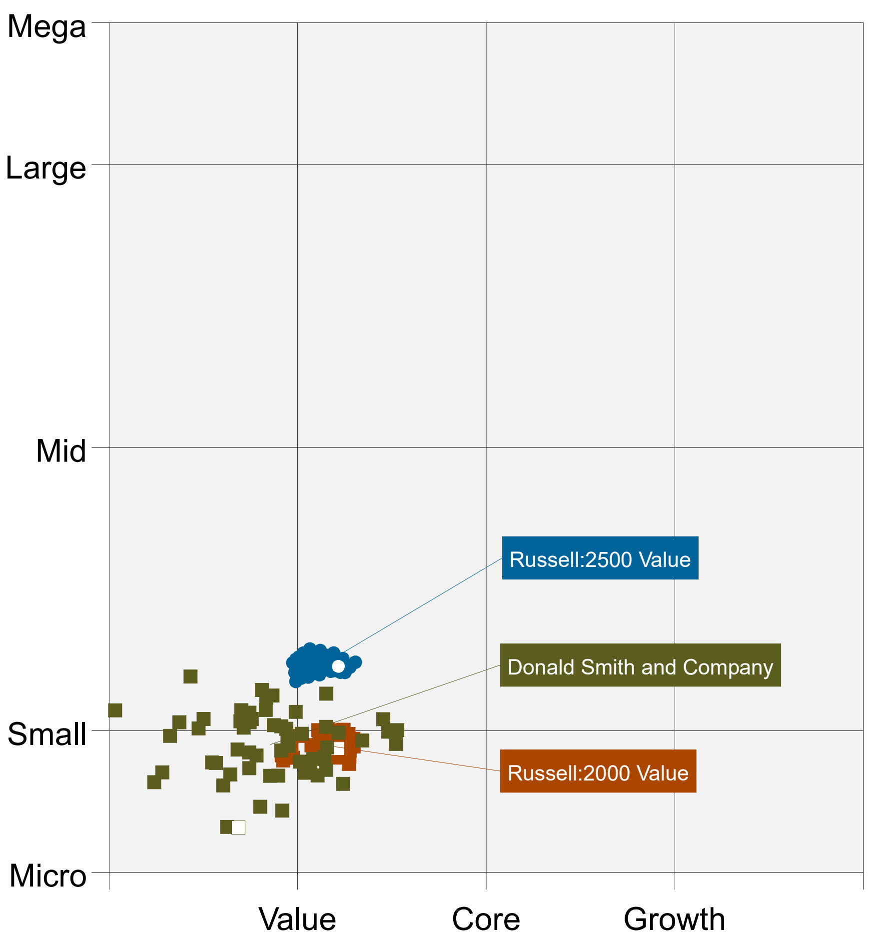
## Index Evaluation

- Current Index: Russell 2000 Value Index.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

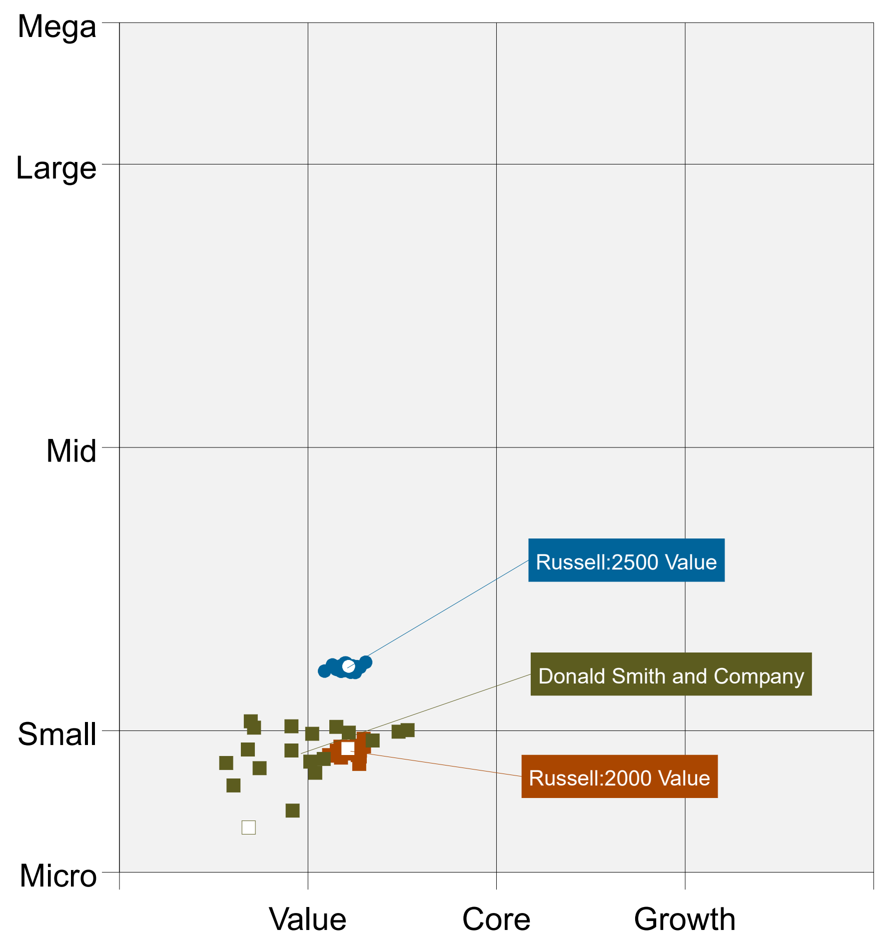
# Donald Smith and Company – Small Cap Value Equity

## Index Evaluation

**Style Map**
**for 15 Years Ended June 30, 2018**



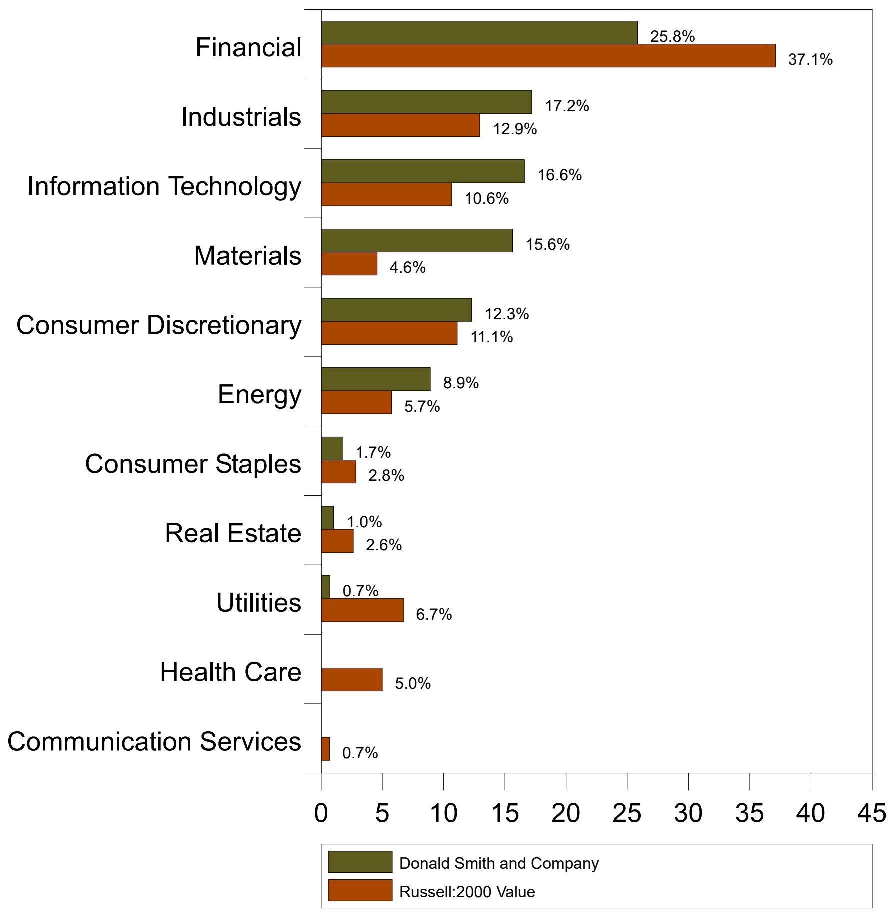

**Style Map**
**for 5 Years Ended June 30, 2018**



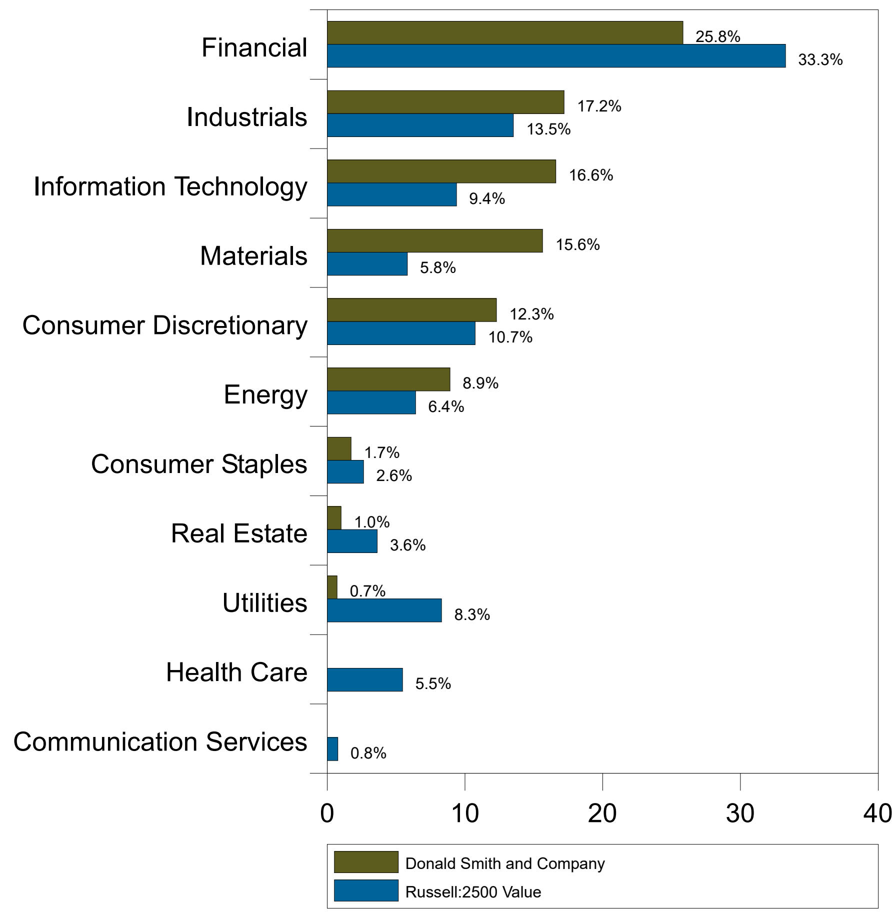
# Donald Smith and Company – Small Cap Value Equity

## Index Evaluation

### Effective Sector Weights vs Russell:2000 Value for 7 Years Ended June 30, 2018



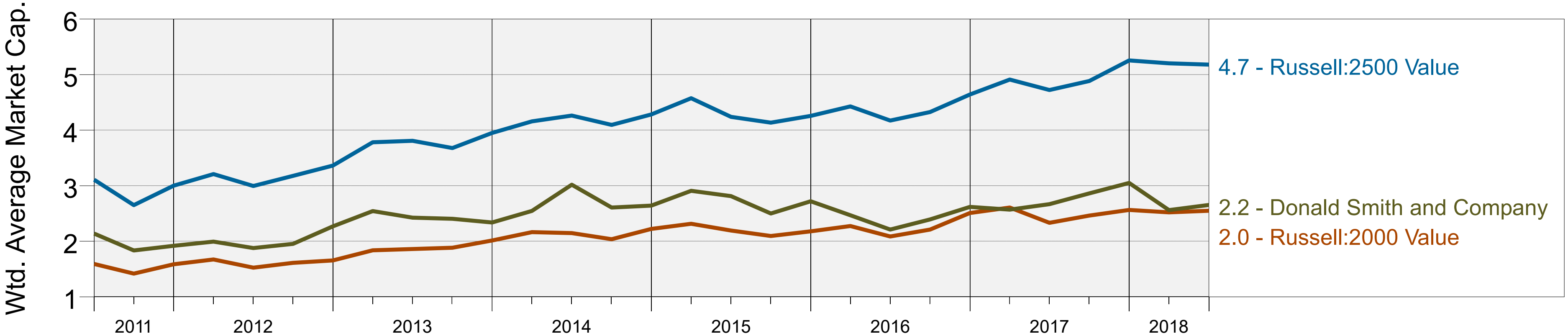

### Effective Sector Weights vs Russell:2500 Value for 7 Years Ended June 30, 2018



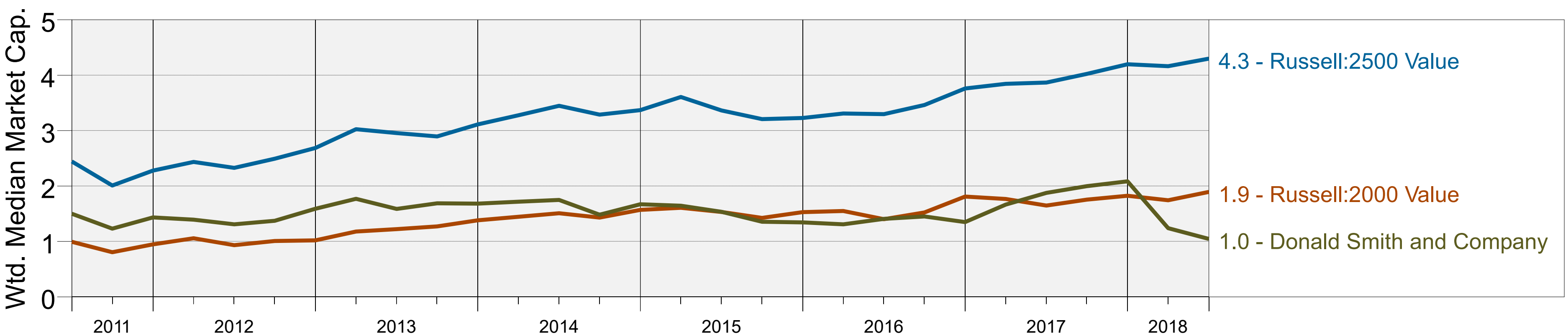
# Donald Smith and Company – Small Cap Value Equity

## Index Evaluation

**Wtd. Average Market Cap.**
**for 7 Years Ended June 30, 2018**



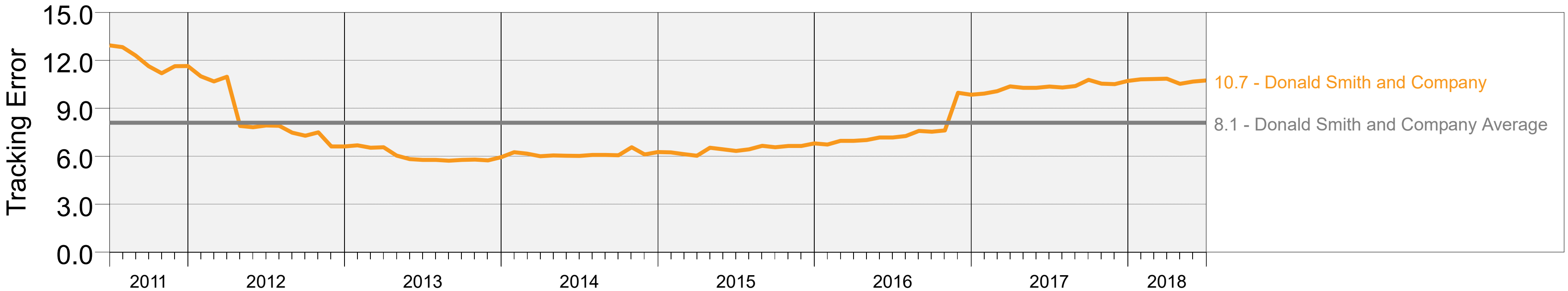

**Wtd. Median Market Cap.**
**for 7 Years Ended June 30, 2018**



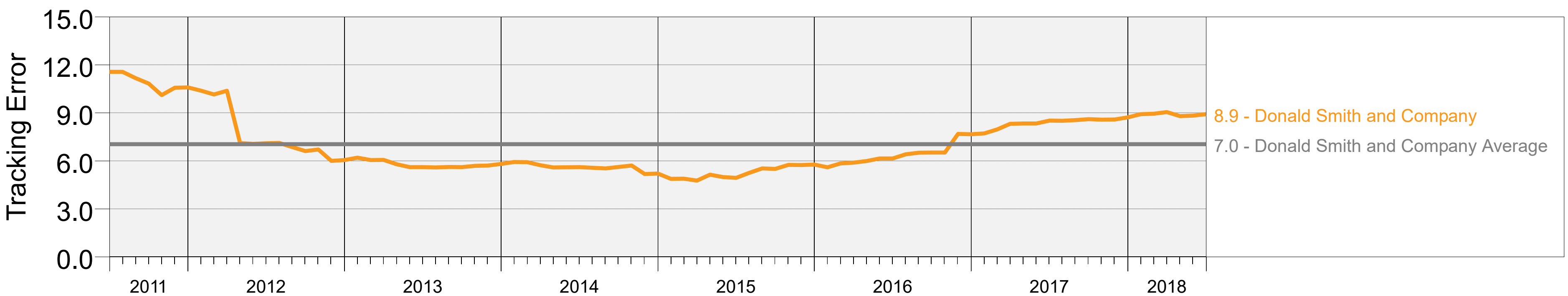
# Donald Smith and Company – Small Cap Value Equity

## Index Evaluation

**Rolling 36 Month Tracking Error Relative To Russell:2000 Value for 7 Years Ended June 30, 2018**



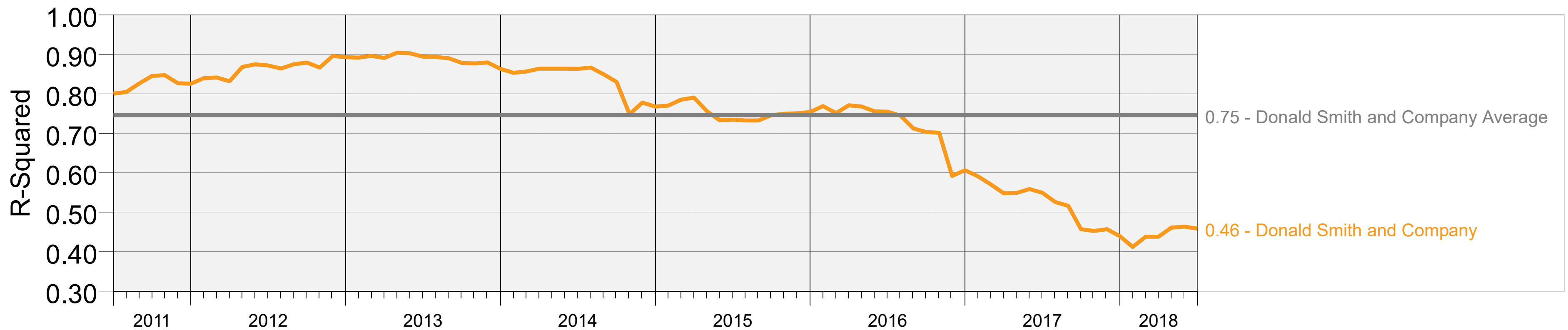

**Rolling 36 Month Tracking Error Relative To Russell:2500 Value for 7 Years Ended June 30, 2018**



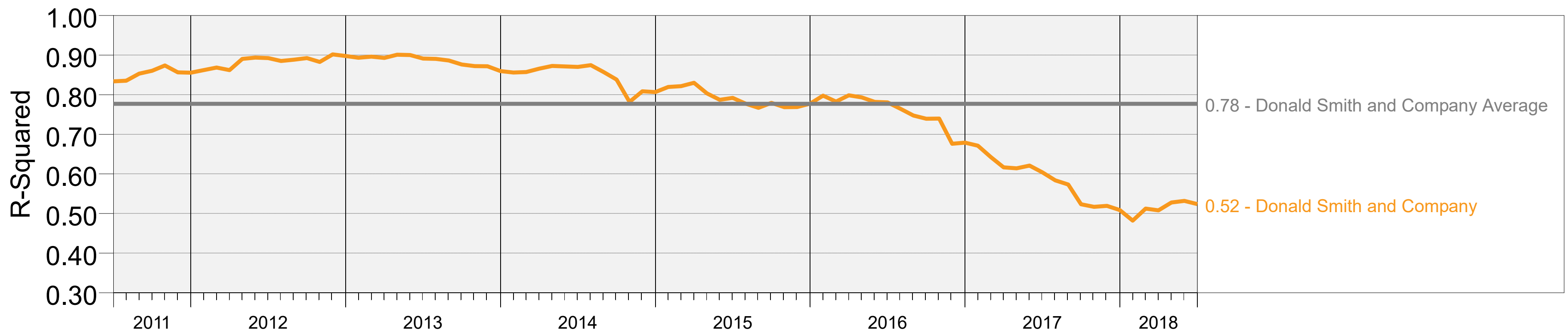
# Donald Smith and Company – Small Cap Value Equity

## Index Evaluation

**Rolling 36 Month R-Squared Relative To Russell:2000 Value for 7 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To Russell:2500 Value for 7 Years Ended June 30, 2018**



# Non-U.S. Equity Managers

# Capital Group – EuroPacific Growth Fund

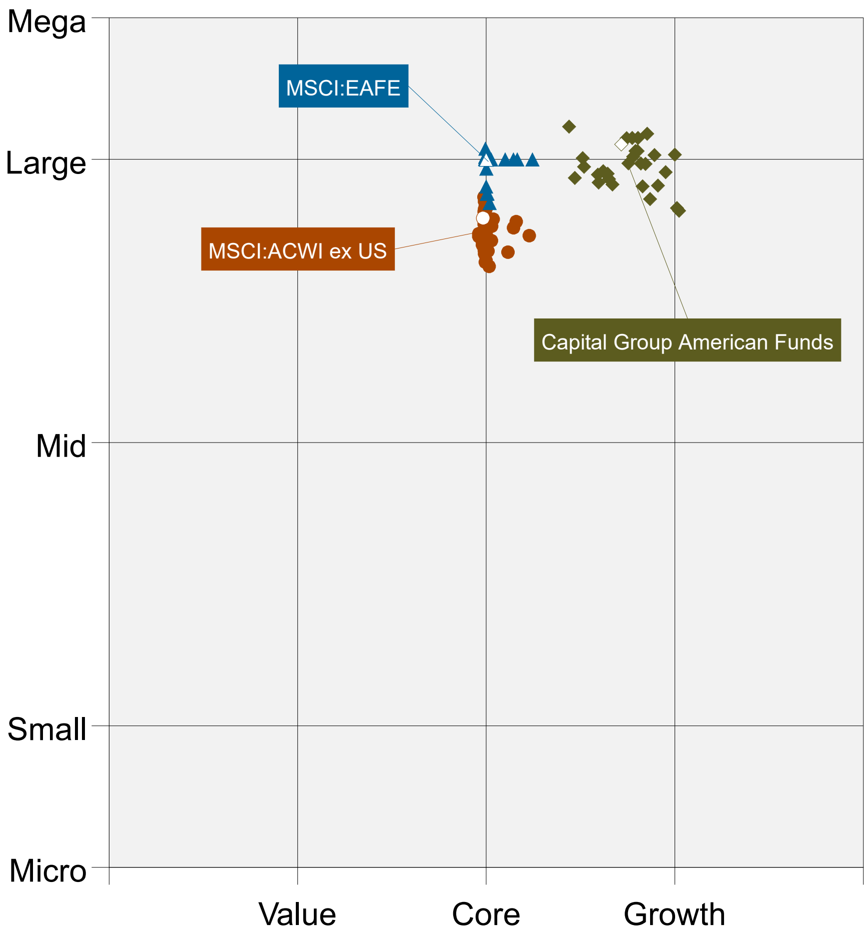
## Index Evaluation

- Current Index: MSCI ACWI ex U.S. Index.
- Callan Recommendation: We agree the MSCI ACWI ex U.S. Index is most appropriate, consider adding the MSCI ACWI ex U.S. Growth Index as a secondary benchmark.
- Rationale: The EuroPacific Growth Fund exhibits a moderate growth style tilt.

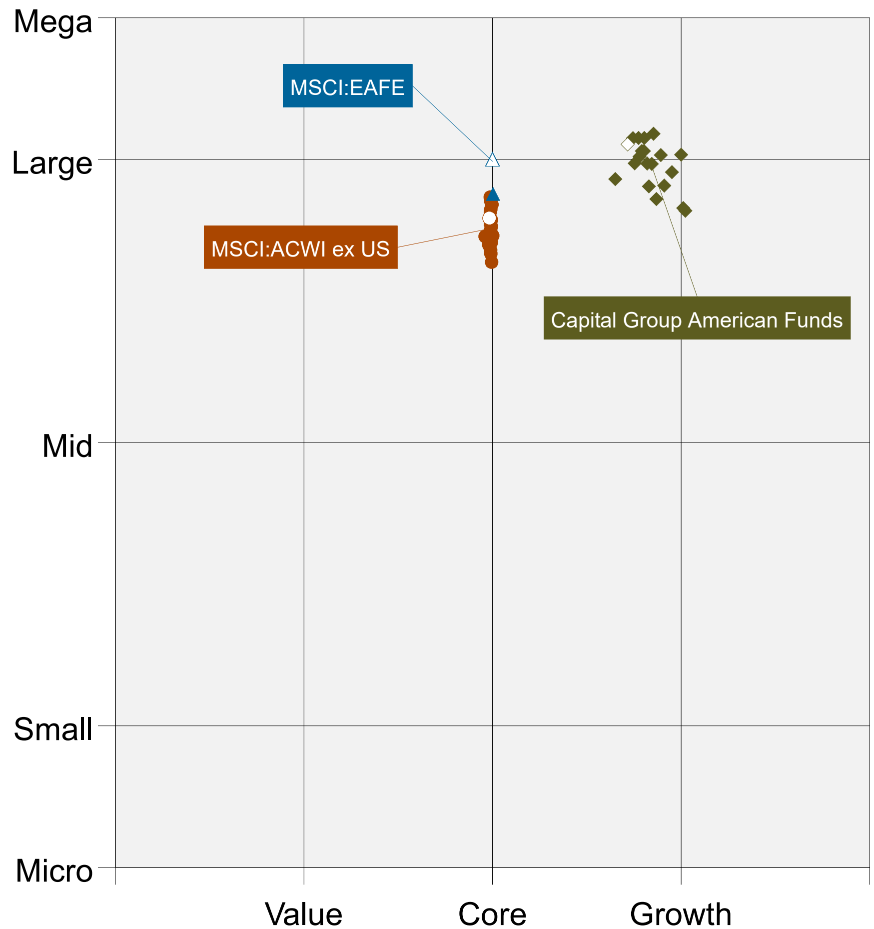
# Capital Group – EuroPacific Growth Fund

## Index Evaluation

**International Equity Style Map**
**for 15 Years Ended June 30, 2018**



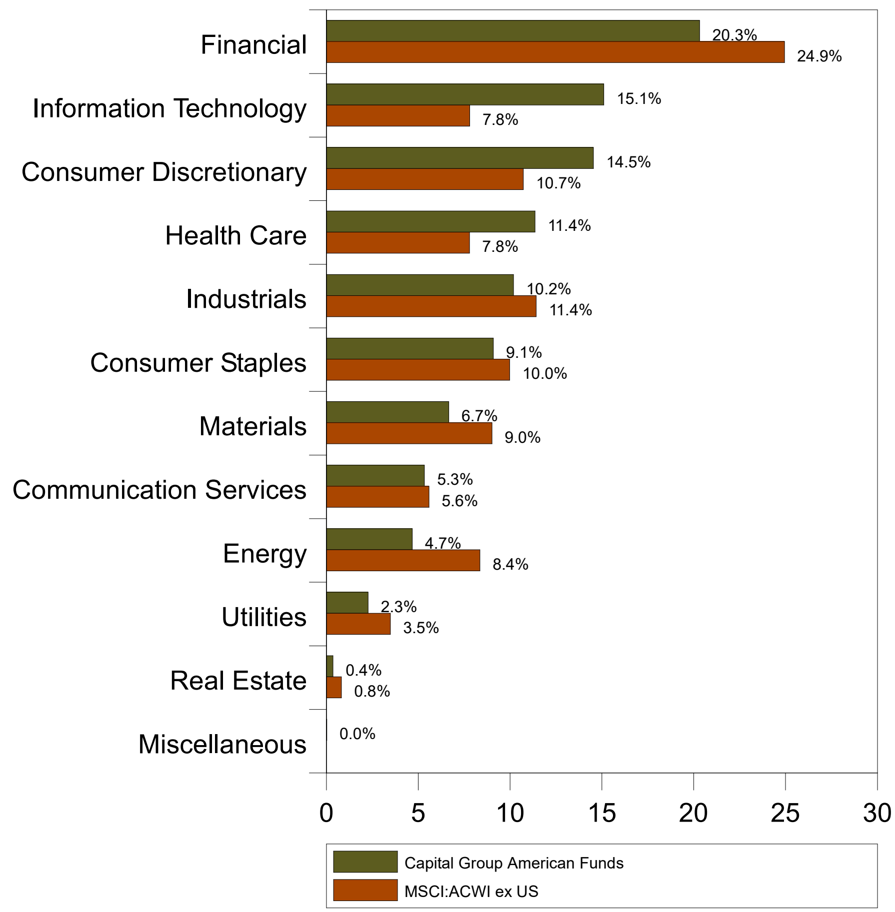

**International Equity Style Map**
**for 5 Years Ended June 30, 2018**



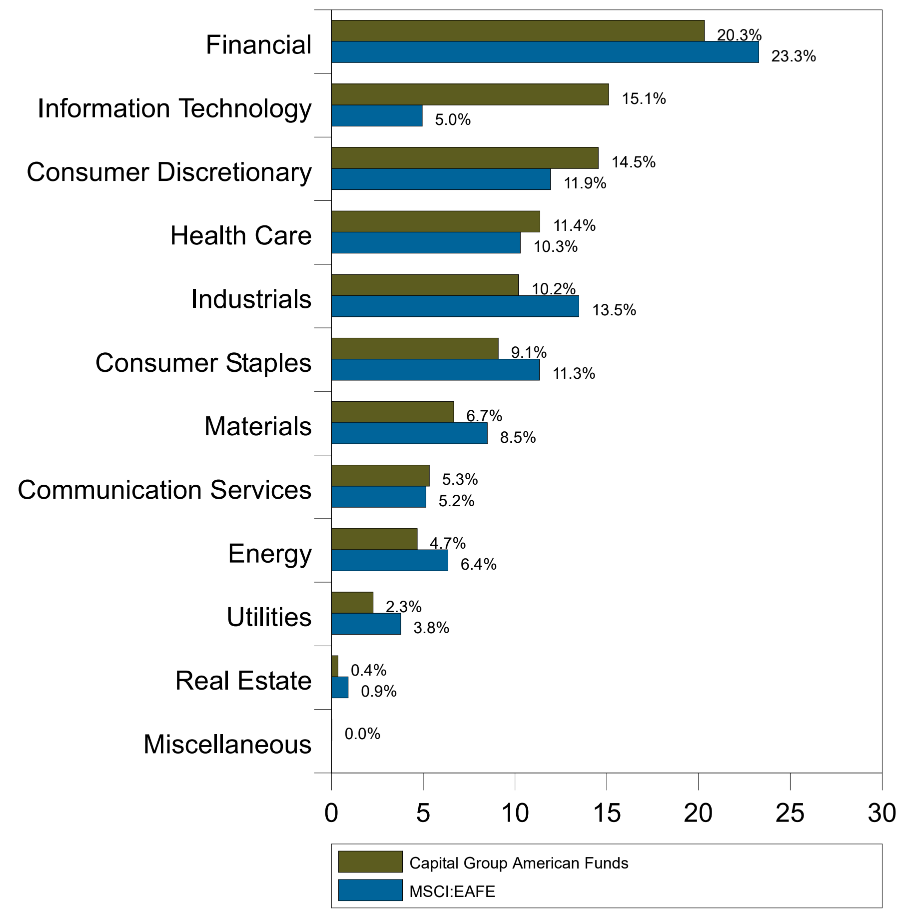
# Capital Group – EuroPacific Growth Fund

## Index Evaluation

### Effective Sector Weights vs MSCI:ACWI ex US for 7 Years Ended June 30, 2018



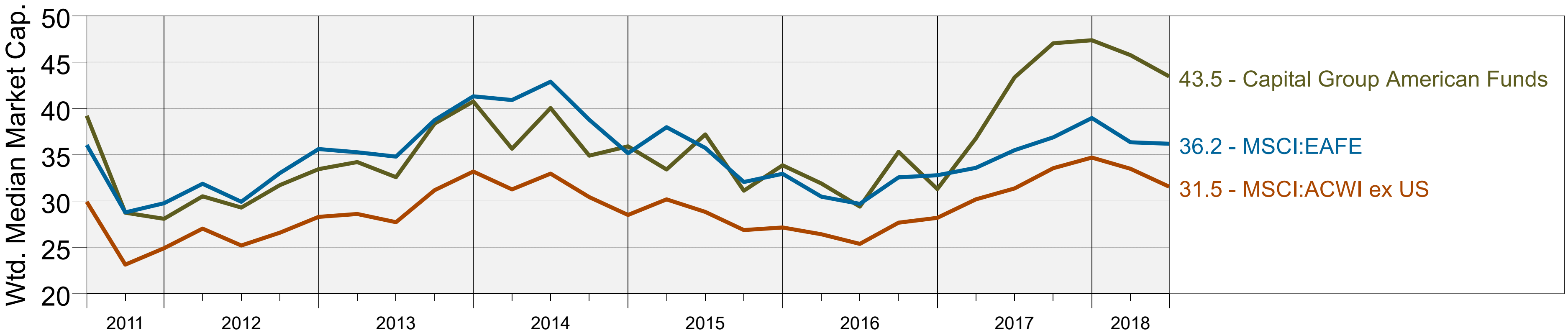

### Effective Sector Weights vs MSCI:EAFE for 7 Years Ended June 30, 2018



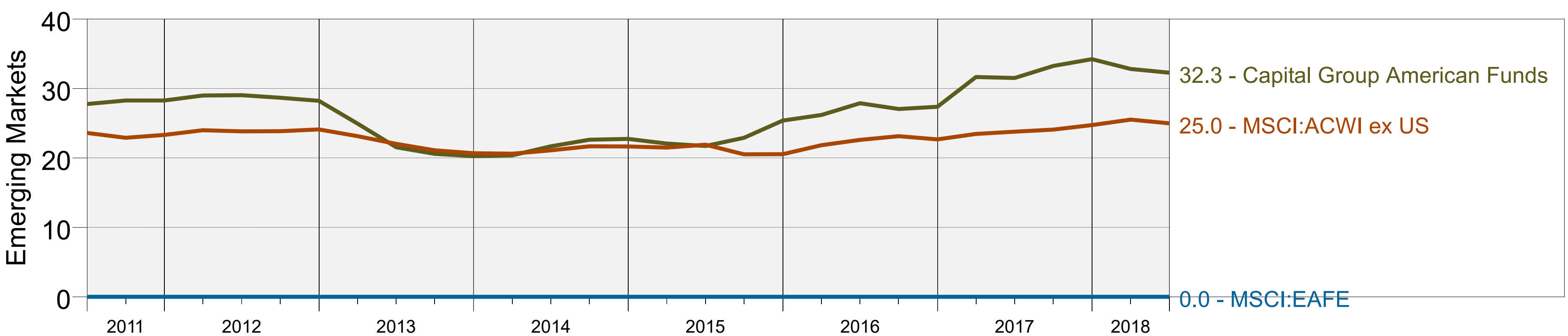
# Capital Group – EuroPacific Growth Fund

## Index Evaluation

**Wtd. Median Market Cap.**
**for 7 Years Ended June 30, 2018**



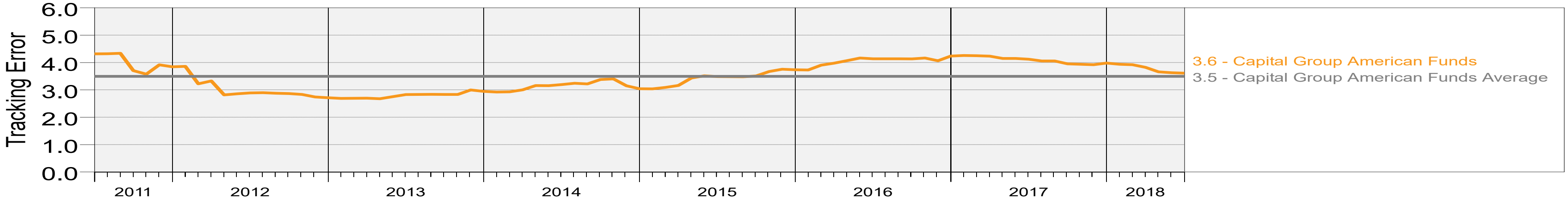

**Emerging Markets (Domicile)**
**for 7 Years Ended June 30, 2018**



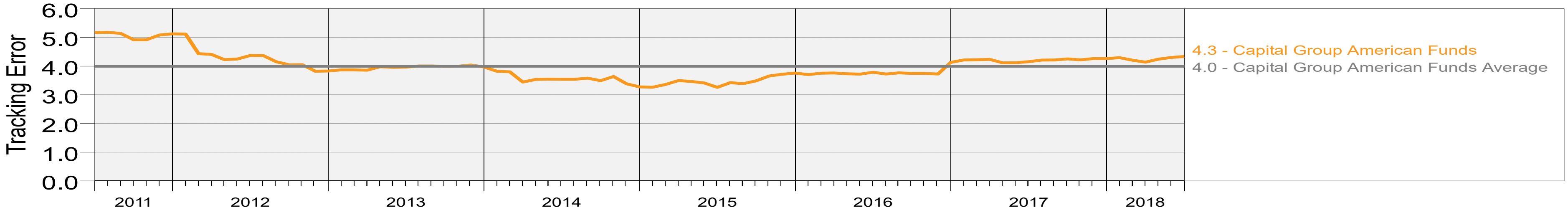
# Capital Group – EuroPacific Growth Fund

## Index Evaluation

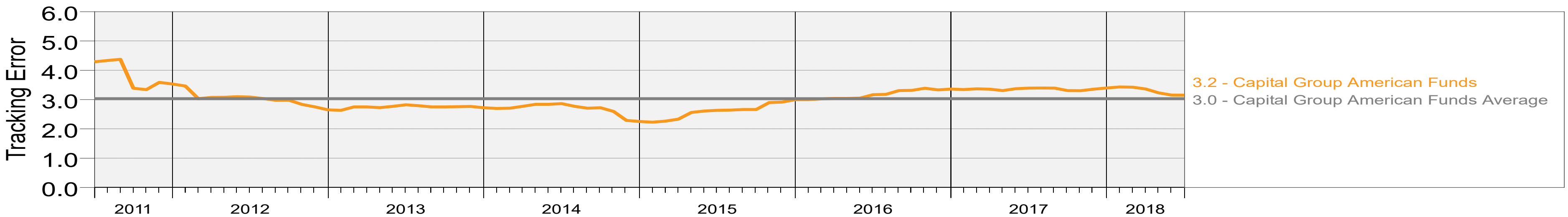
**Rolling 36 Month Tracking Error Relative To MSCI:ACWI ex US for 7 Years Ended June 30, 2018**




**Rolling 36 Month Tracking Error Relative To MSCI:EAFE for 7 Years Ended June 30, 2018**



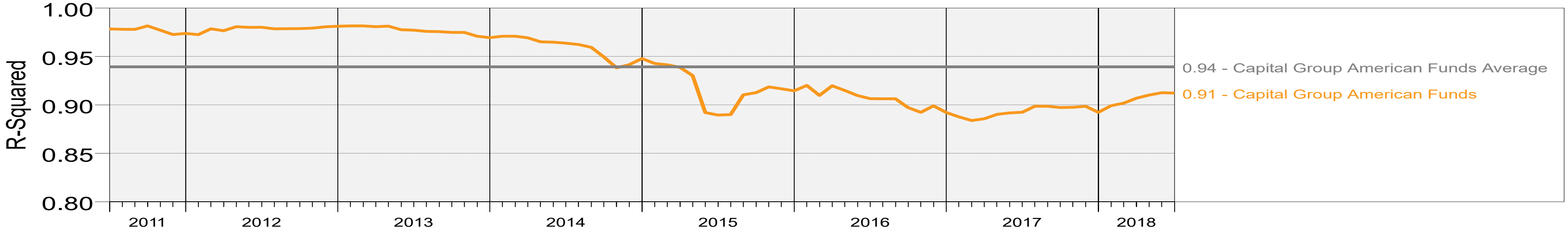

**Rolling 36 Month Tracking Error Relative To MSCI:ACWI ex US Growth for 7 Years Ended June 30, 2018**



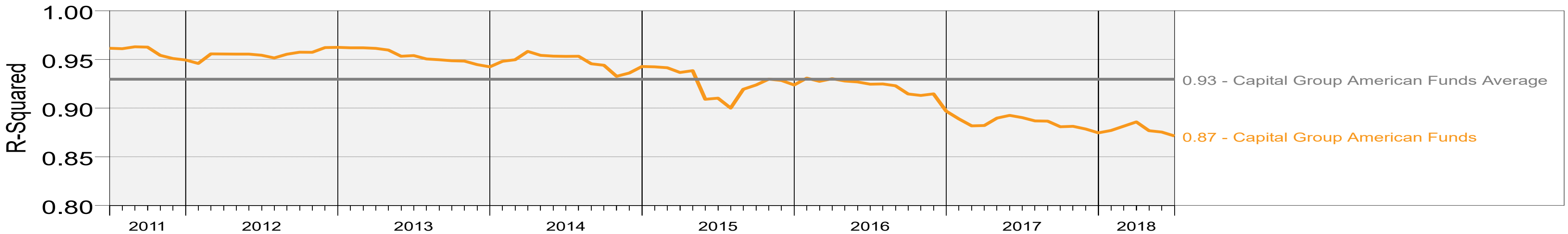
# Capital Group – EuroPacific Growth Fund

## Index Evaluation

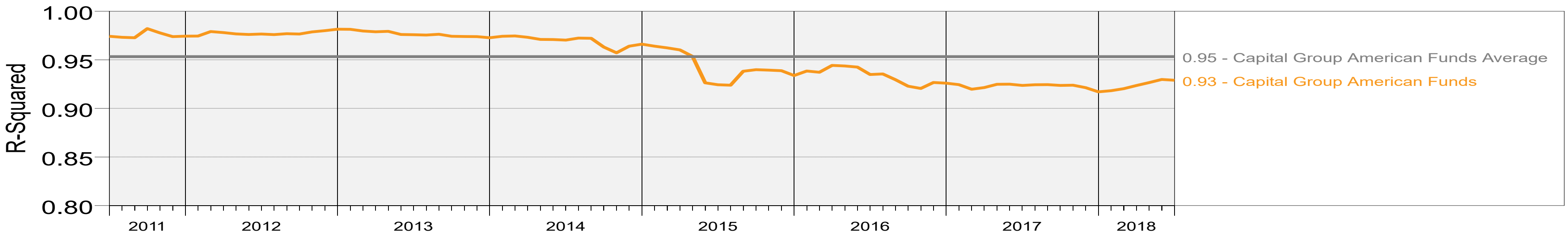
**Rolling 36 Month R-Squared Relative To MSCI:ACWI ex US**
**for 7 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To MSCI:EAFE**
**for 7 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To MSCI:ACWI ex US Growth**
**for 7 Years Ended June 30, 2018**



# Templeton – International Equity

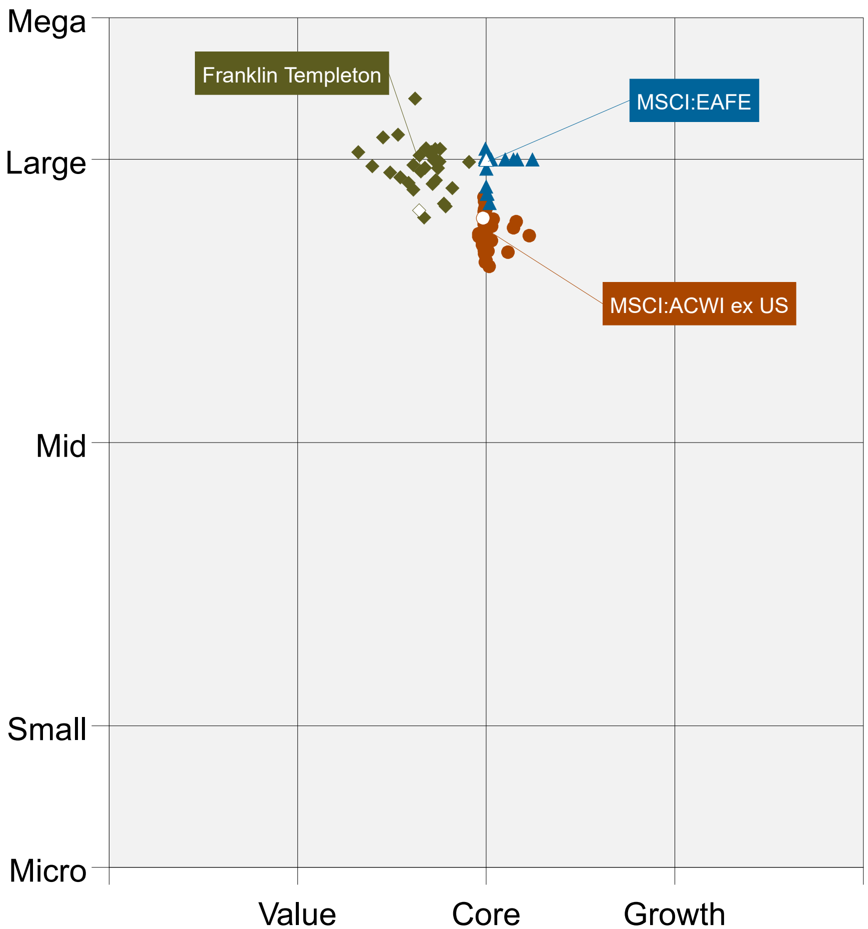
## Index Evaluation

- Current Index: MSCI ACWI ex U.S. Index.
- Callan Recommendation: No changes.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

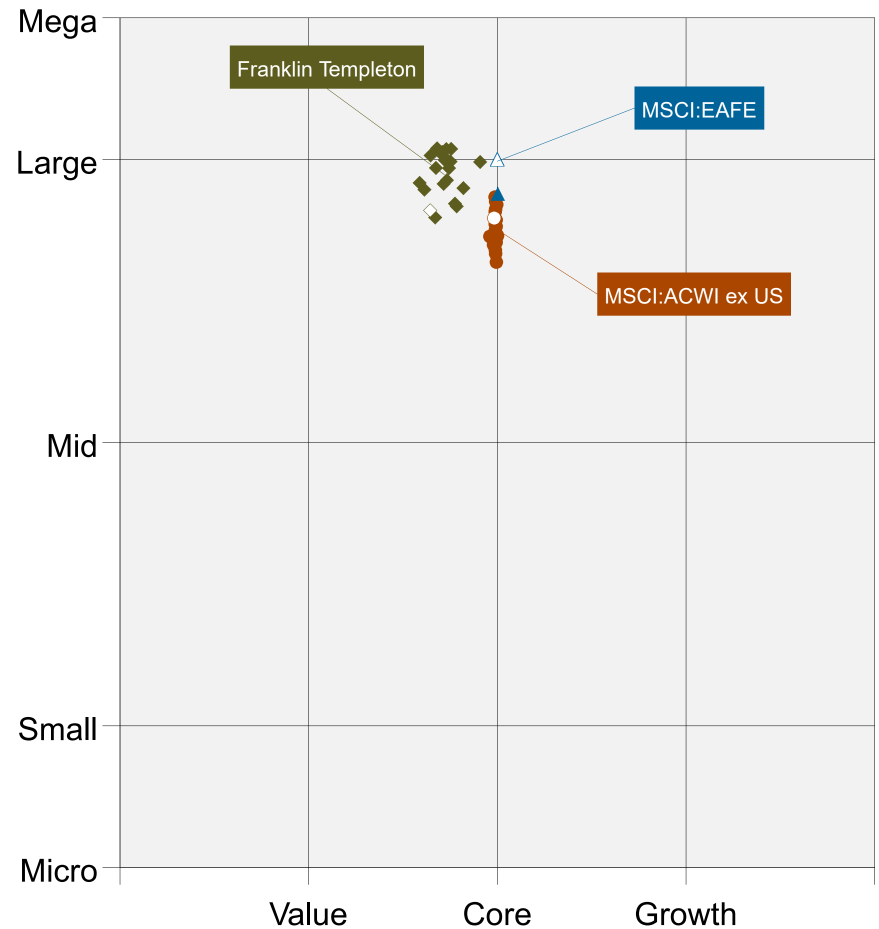
# Templeton – International Equity

## Index Evaluation

**International Equity Style Map**
**for 15 Years Ended June 30, 2018**



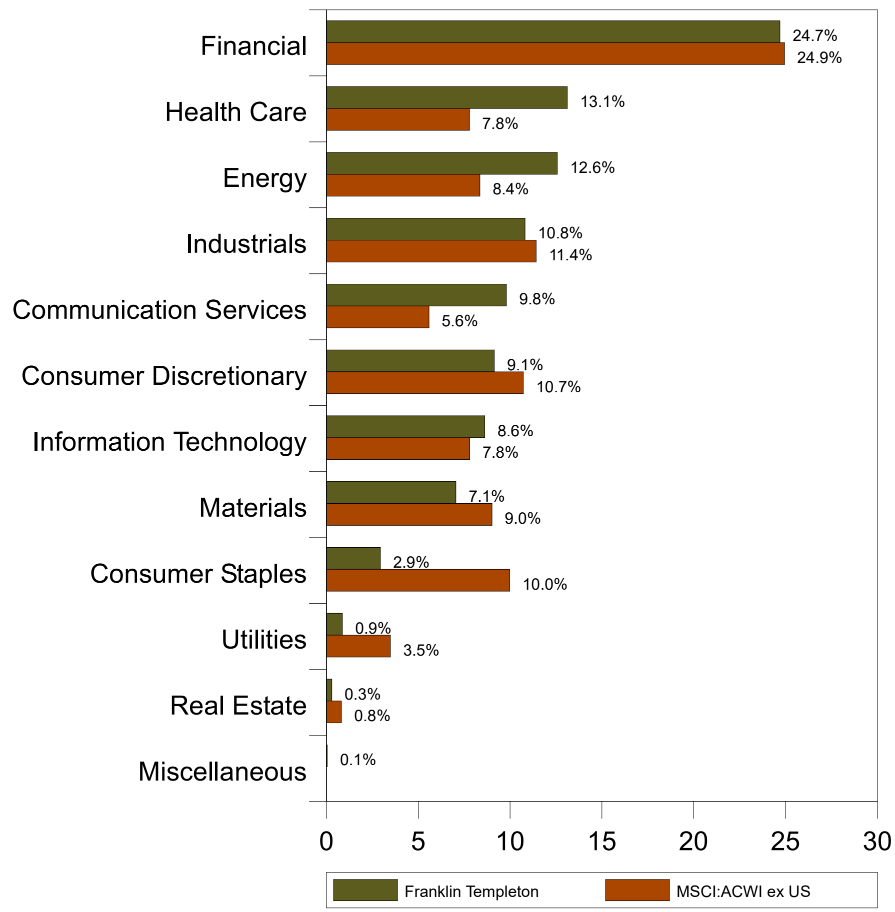

**International Equity Style Map**
**for 5 Years Ended June 30, 2018**



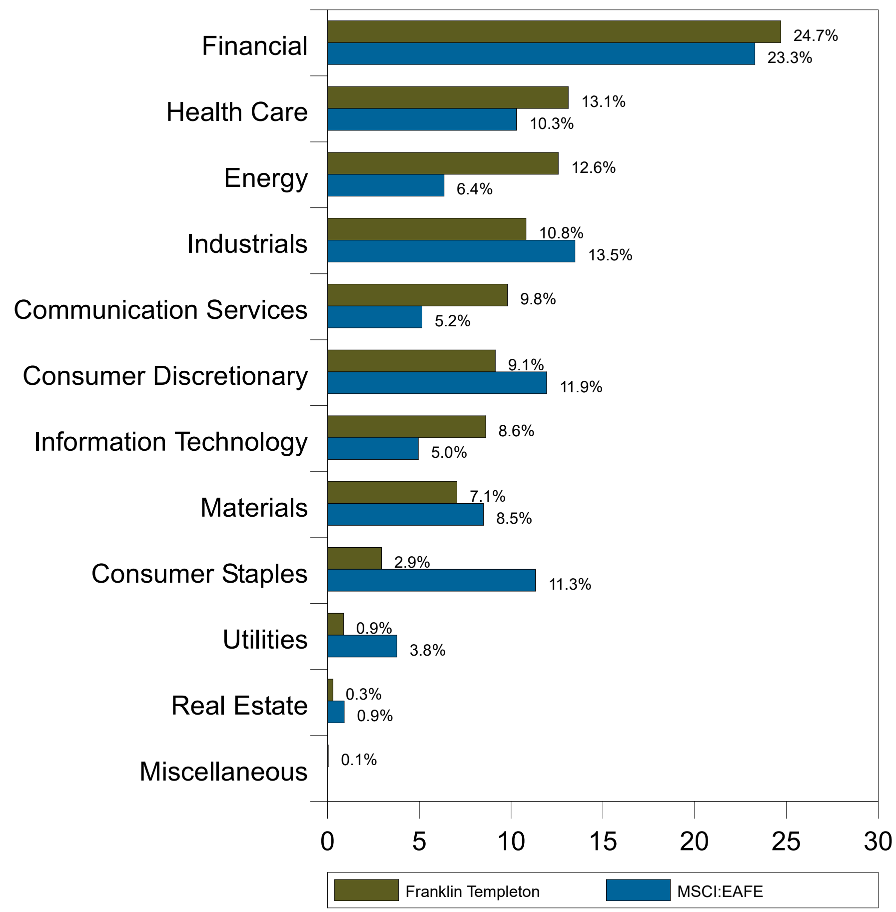
# Templeton – International Equity

## Index Evaluation

### Effective Sector Weights vs MSCI:ACWI ex US for 7 Years Ended June 30, 2018



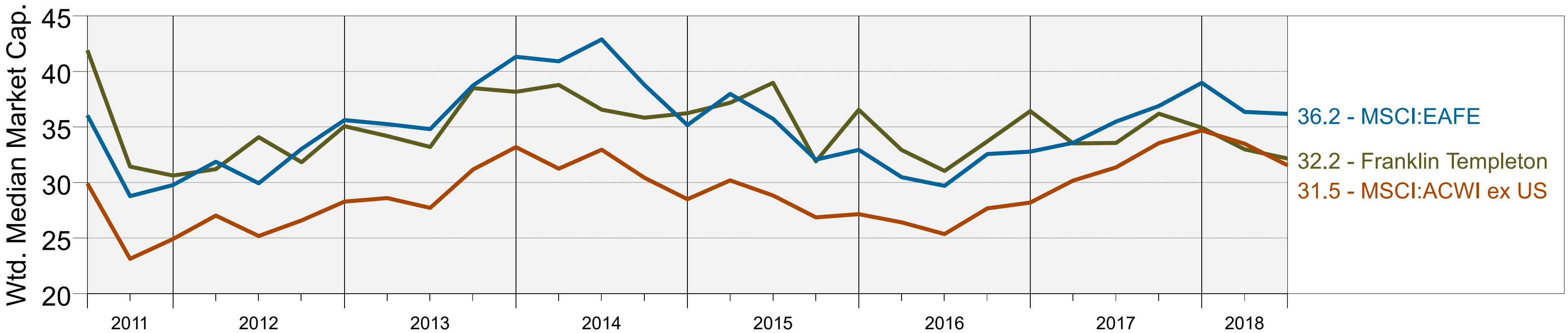

### Effective Sector Weights vs MSCI:EAFE for 7 Years Ended June 30, 2018



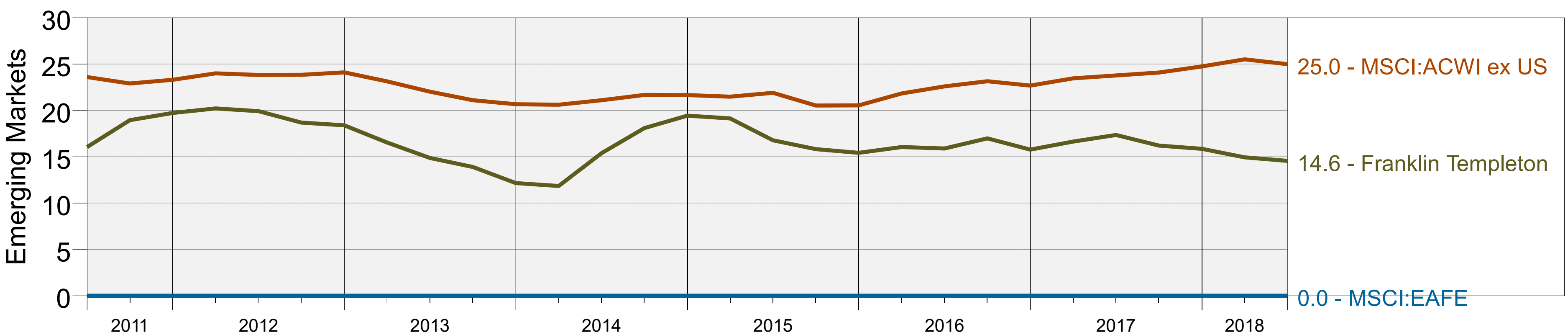
# Templeton – International Equity

## Index Evaluation

### Wtd. Median Market Cap.
### for 7 Years Ended June 30, 2018



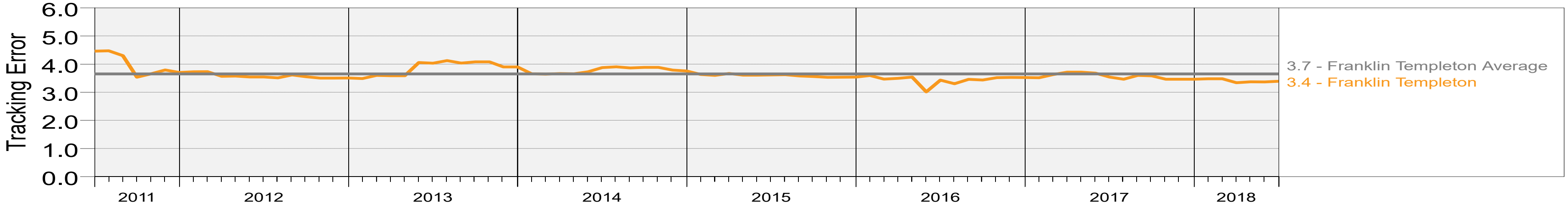

### Emerging Markets (Domicile)
### for 7 Years Ended June 30, 2018



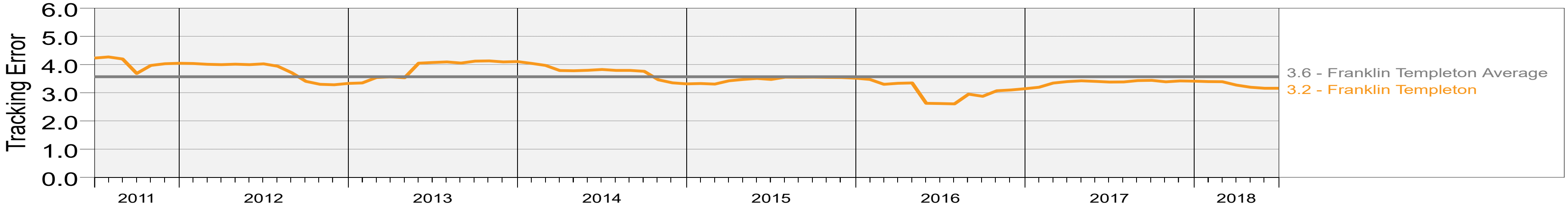
# Templeton – International Equity

## Index Evaluation

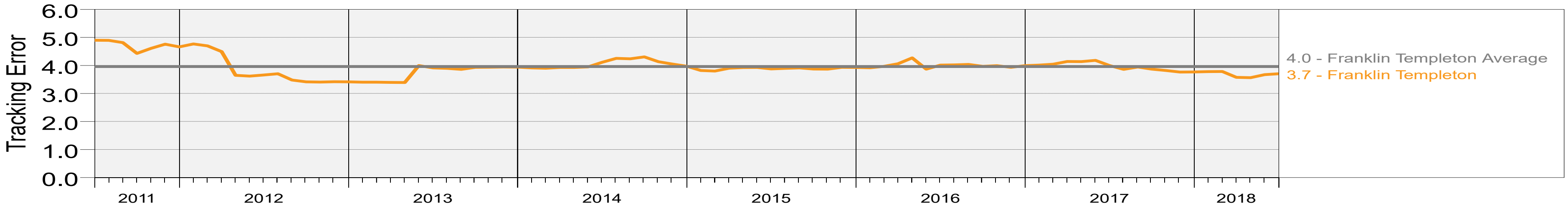
**Rolling 36 Month Tracking Error Relative To MSCI:ACWI ex US for 7 Years Ended June 30, 2018**




**Rolling 36 Month Tracking Error Relative To MSCI:EAFE for 7 Years Ended June 30, 2018**



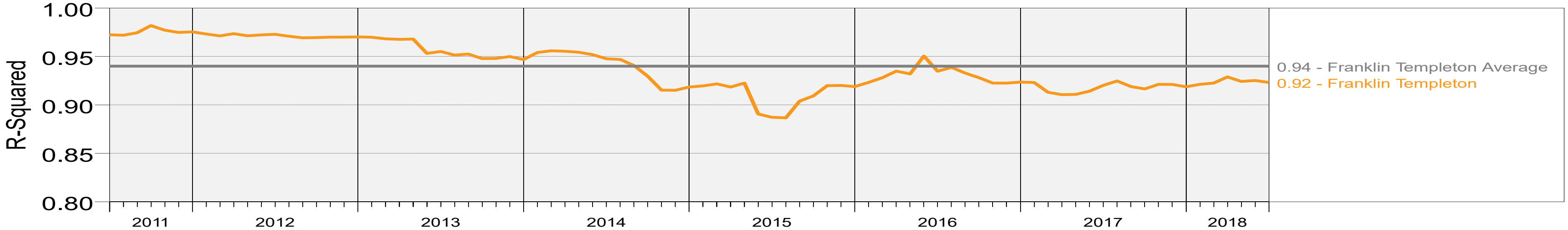

**Rolling 36 Month Tracking Error Relative To MSCI:ACWI ex US Value for 7 Years Ended June 30, 2018**



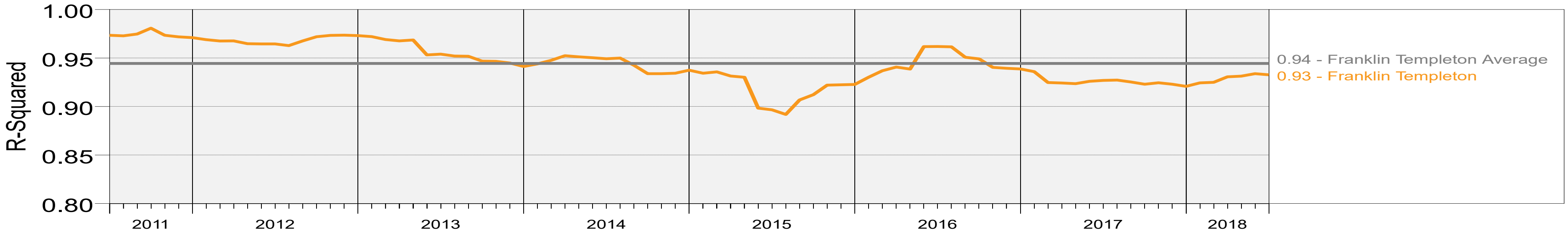
# Templeton – International Equity

## Index Evaluation

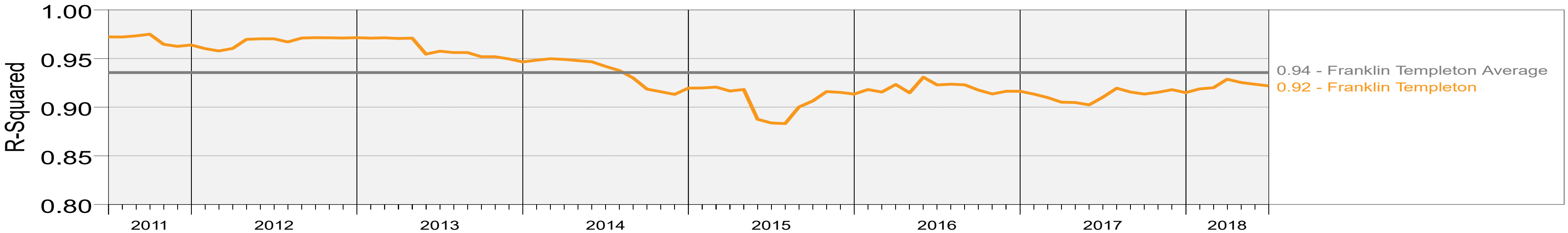
**Rolling 36 Month R-Squared Relative To MSCI:ACWI ex US**
**for 7 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To MSCI:EAFE**
**for 7 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To MSCI:ACWI ex US Value**
**for 7 Years Ended June 30, 2018**



# Aberdeen – Emerging Markets Equity

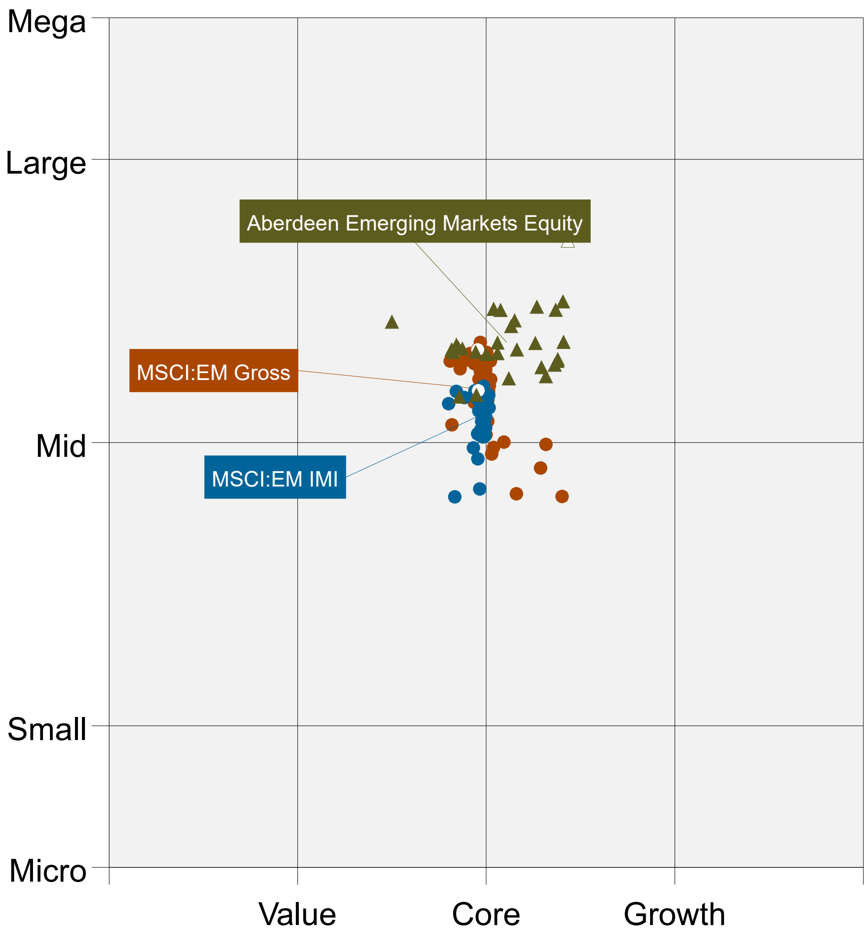
## Index Evaluation

- Current Index: MSCI Emerging Markets Index.
- Callan Recommendation: No changes.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

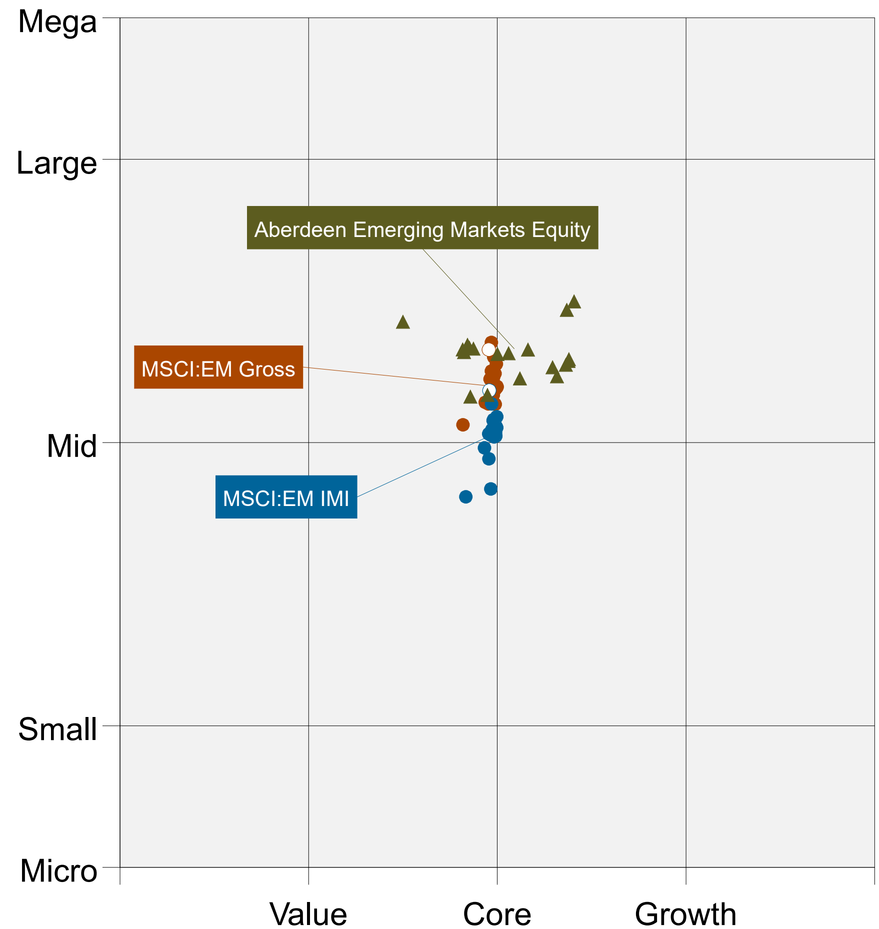
# Aberdeen – Emerging Markets Equity

## Index Evaluation

**International Equity Style Map for 15 Years Ended June 30, 2018**



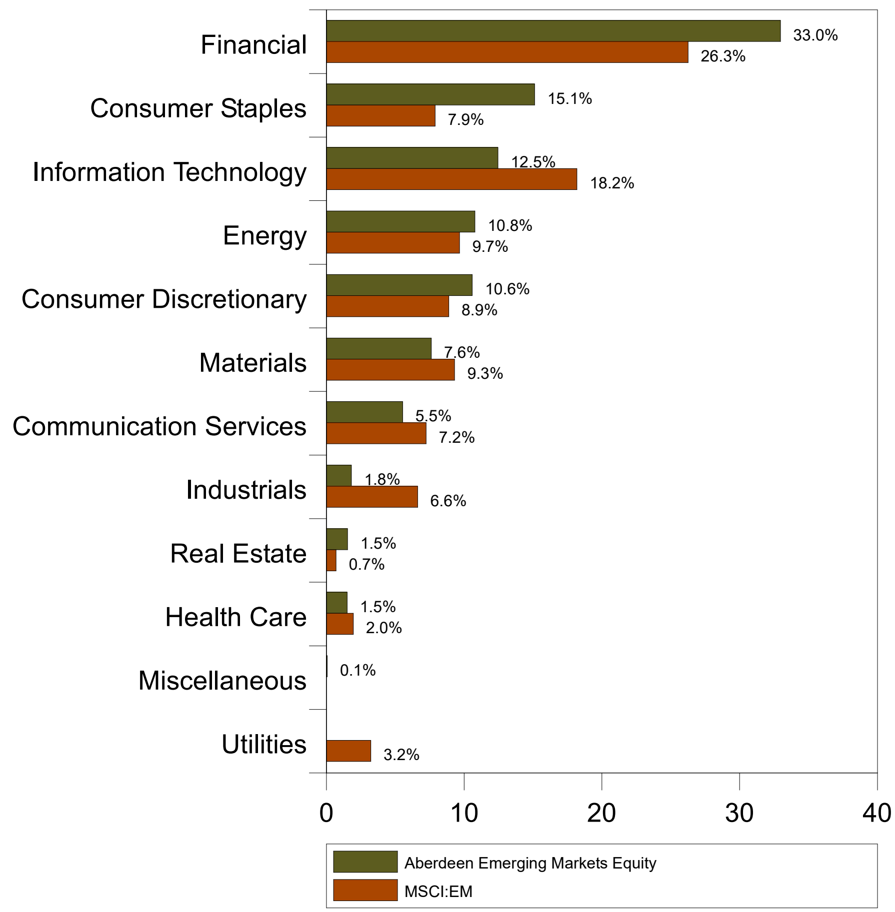

**International Equity Style Map for 5 Years Ended June 30, 2018**



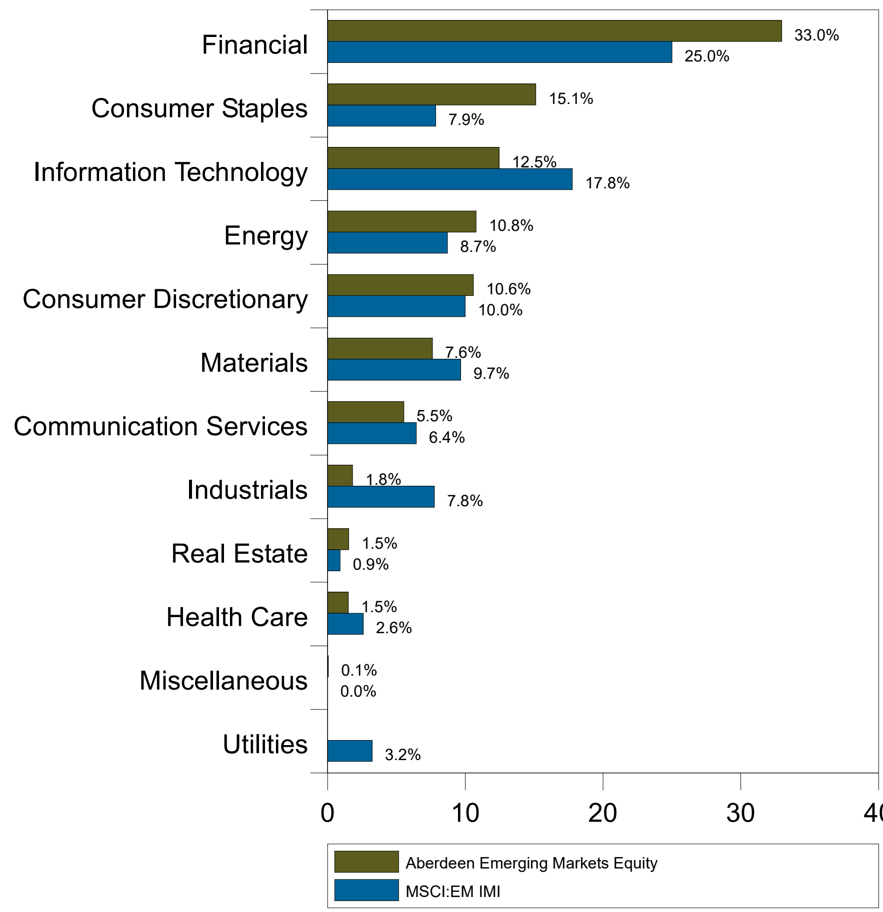
# Aberdeen – Emerging Markets Equity

## Index Evaluation

**Effective Sector Weights**
**vs MSCI:EM**
**for 7 Years Ended June 30, 2018**



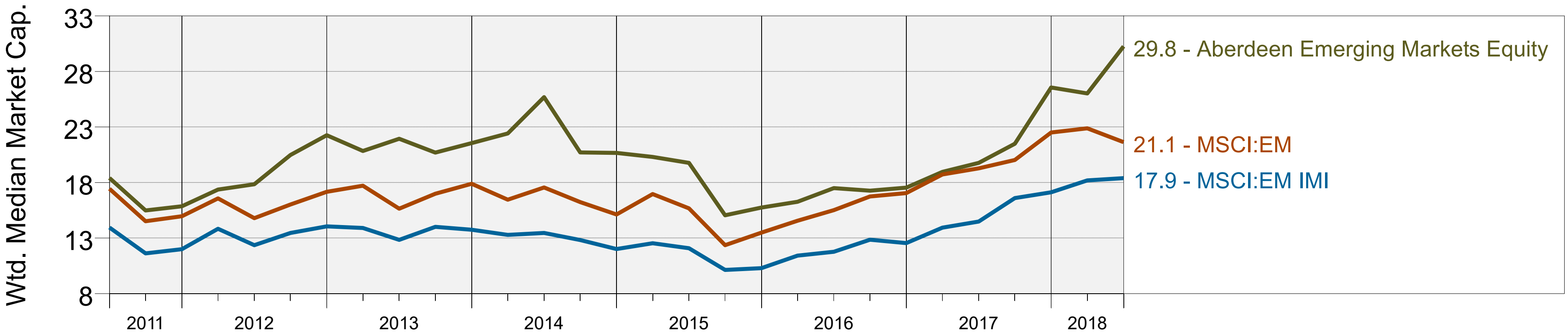

**Effective Sector Weights**
**vs MSCI:EM IMI**
**for 7 Years Ended June 30, 2018**



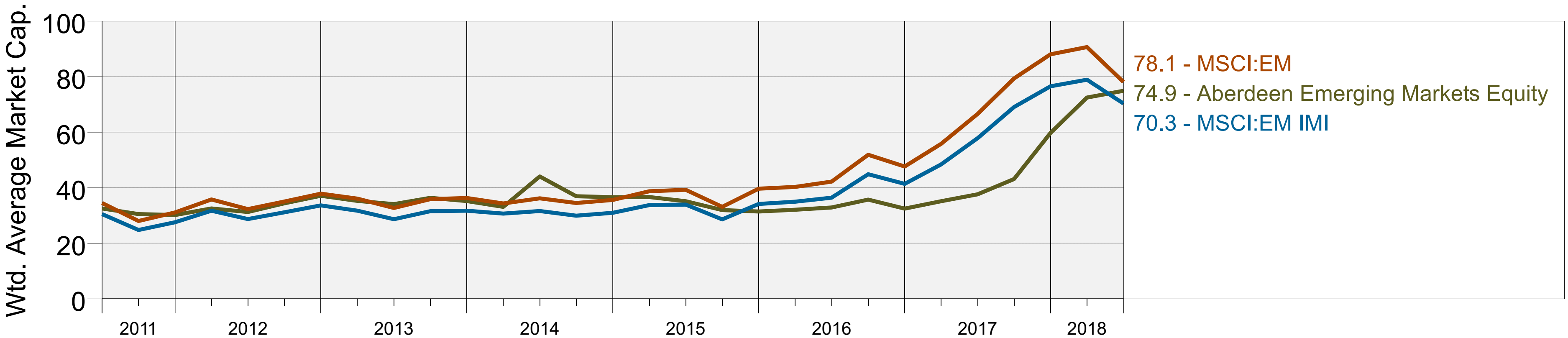
# Aberdeen – Emerging Markets Equity

## Index Evaluation

**Wtd. Median Market Cap.**
**for 7 Years Ended June 30, 2018**



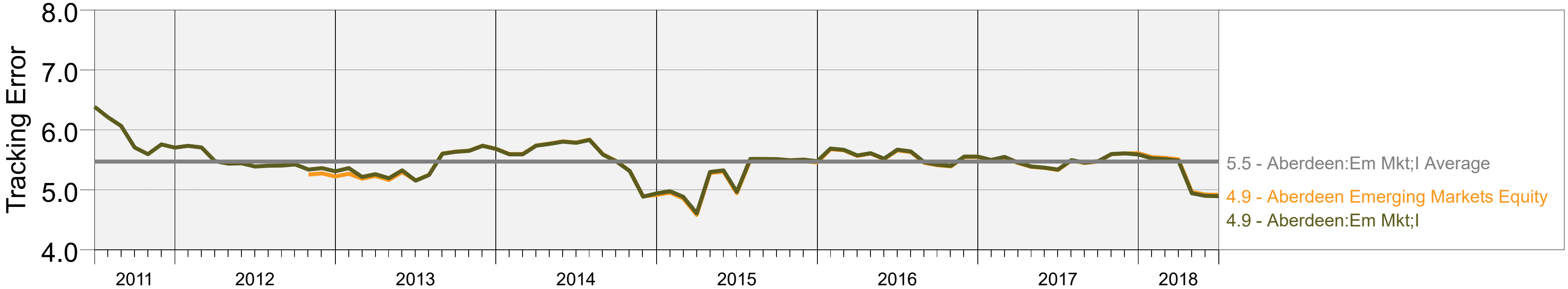

**Wtd. Average Market Cap.**
**for 7 Years Ended June 30, 2018**



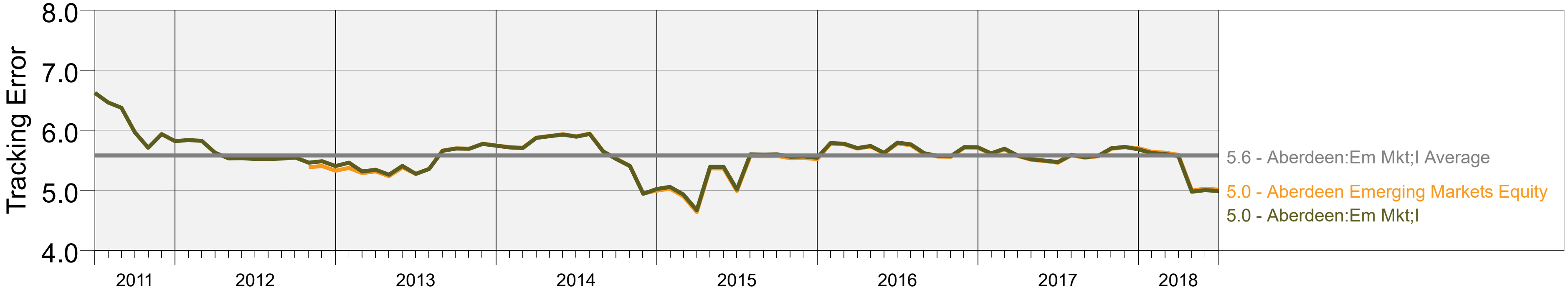
# Aberdeen – Emerging Markets Equity

## Index Evaluation

**Rolling 36 Month Tracking Error Relative To MSCI:EM for 7 Years Ended June 30, 2018**



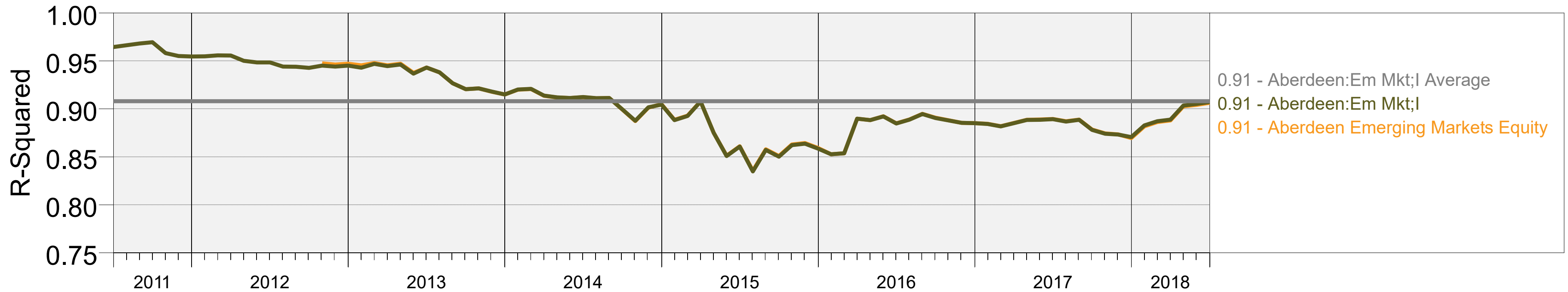

**Rolling 36 Month Tracking Error Relative To MSCI:EM IMI for 7 Years Ended June 30, 2018**



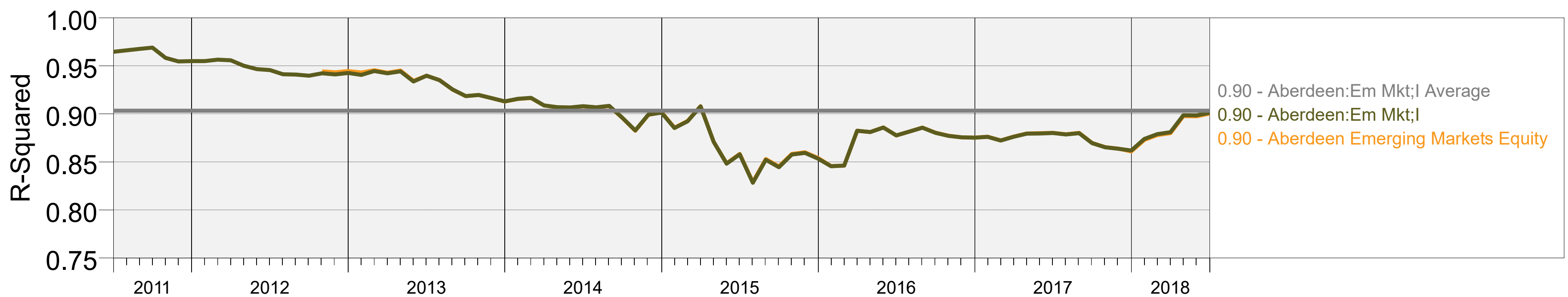
# Aberdeen – Emerging Markets Equity

## Index Evaluation

**Rolling 36 Month R-Squared Relative To MSCI:EM for 7 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To MSCI:EM IMI for 7 Years Ended June 30, 2018**



# DFA – Emerging Markets All Cap Core Strategy

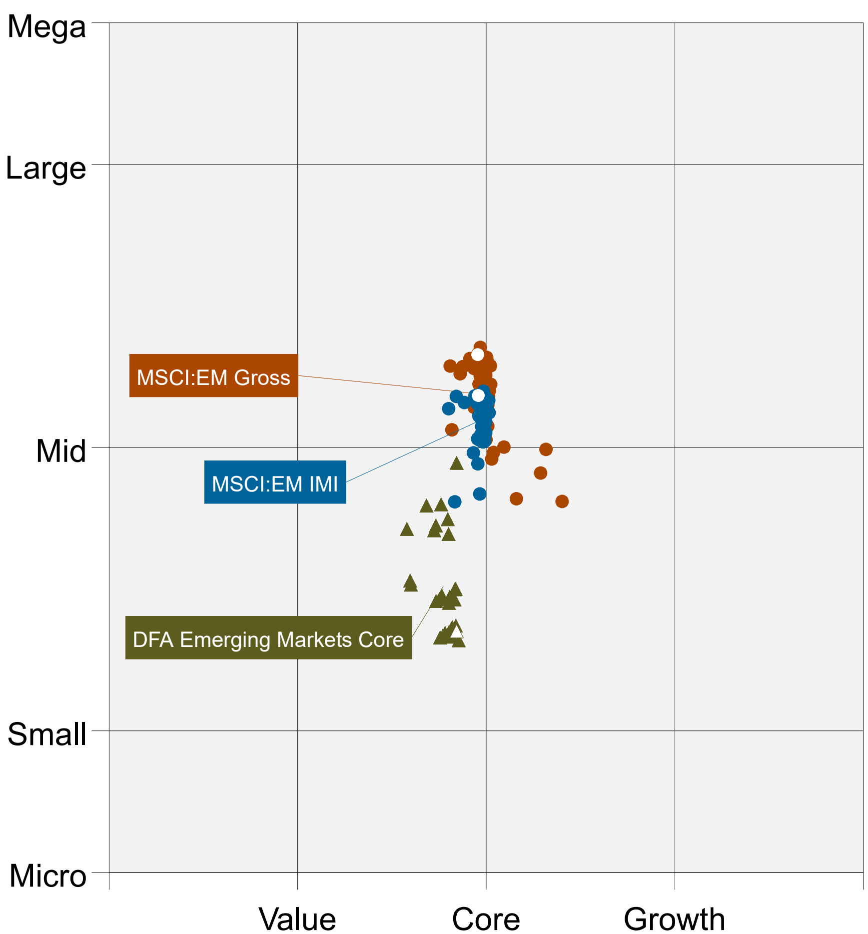
## Index Evaluation

- Current Index: MSCI Emerging Markets Index.
- Callan Recommendation: No changes.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.
  - The strategy invests in a broad cross-section of equities across all market capitalizations in emerging markets and offers diversifications across and within countries.
    - *Roughly 28% of securities have capitalization between under $3.5B (as of June 30, 2018)*
    - *Over 5000 holdings (as of June 30, 2018)*
  - Holdings-based analytics (style map, sectors, portfolio characteristics) demonstrate consistency between the portfolio and the MSCI Emerging Markets IMI Index.
    - *Number of holdings indicate a significant exposure to small companies*
  - Returns-based analytics (tracking error, R-Squared) show similar consistency between the portfolio and both MSCI Emerging Markets Index and MSCI Emerging Markets IMI Index.

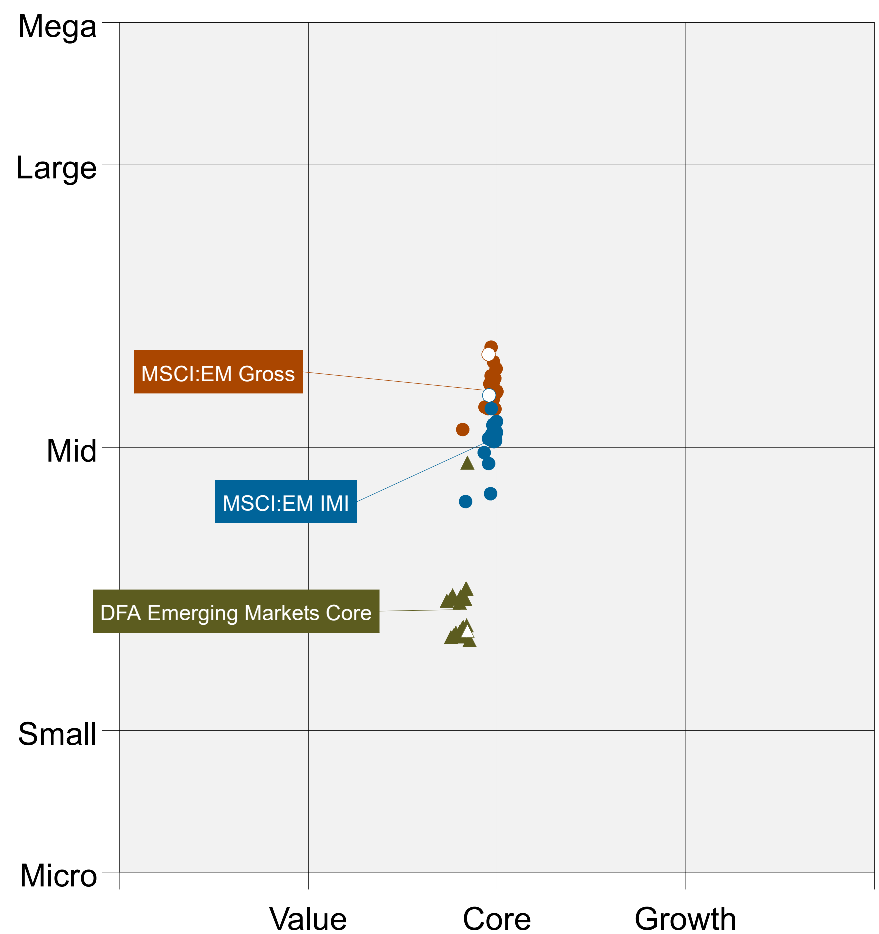
# DFA – Emerging Markets All Cap Core Strategy

## Index Evaluation

**International Equity Style Map**
**for 15 Years Ended June 30, 2018**



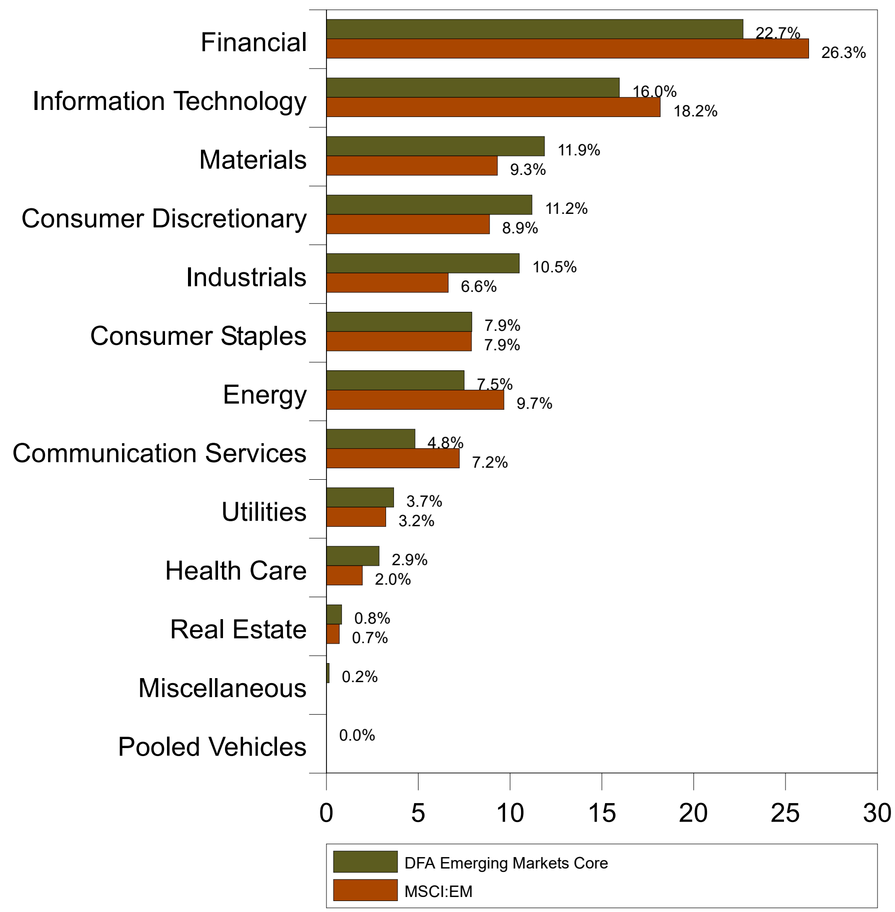

**International Equity Style Map**
**for 5 Years Ended June 30, 2018**



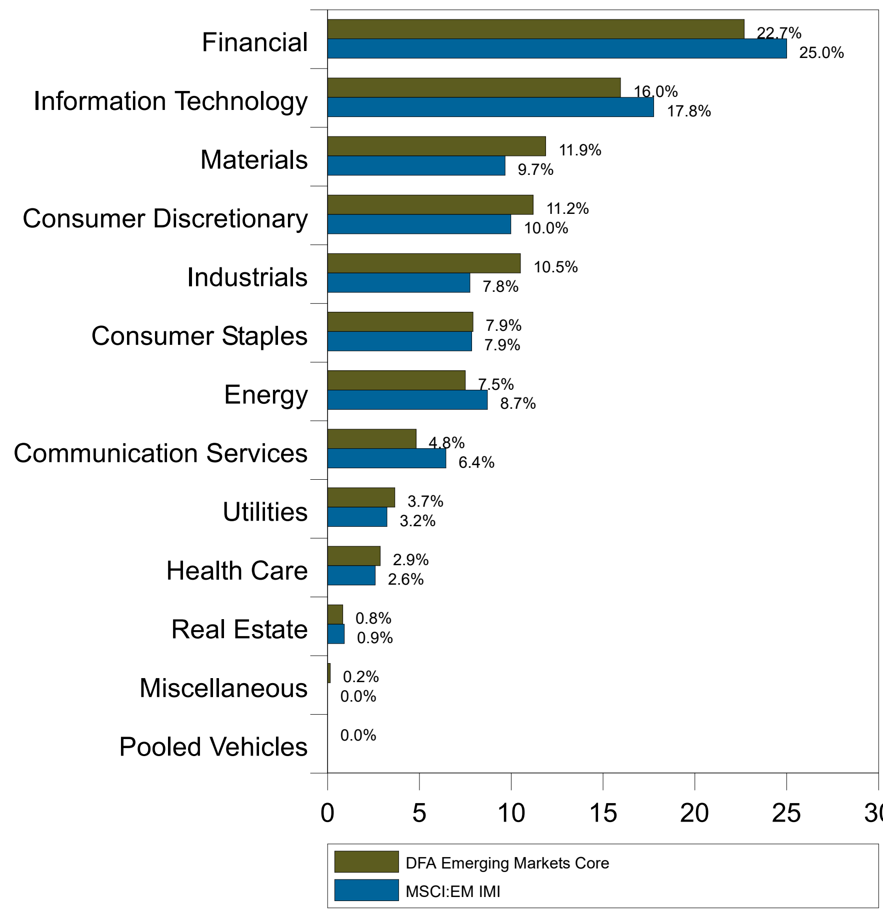
# DFA – Emerging Markets All Cap Core Strategy

## Index Evaluation

### Effective Sector Weights vs MSCI:EM for 7 Years Ended June 30, 2018



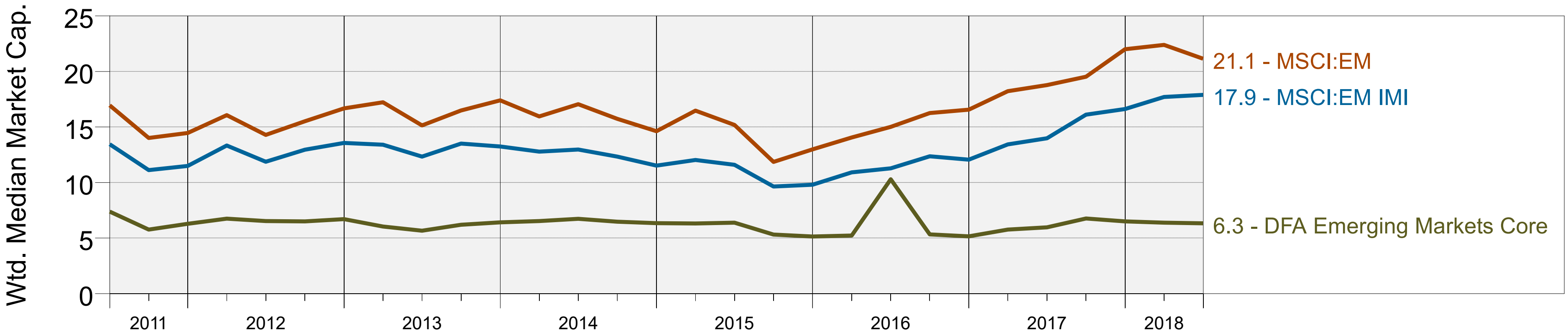

### Effective Sector Weights vs MSCI:EM IMI for 7 Years Ended June 30, 2018



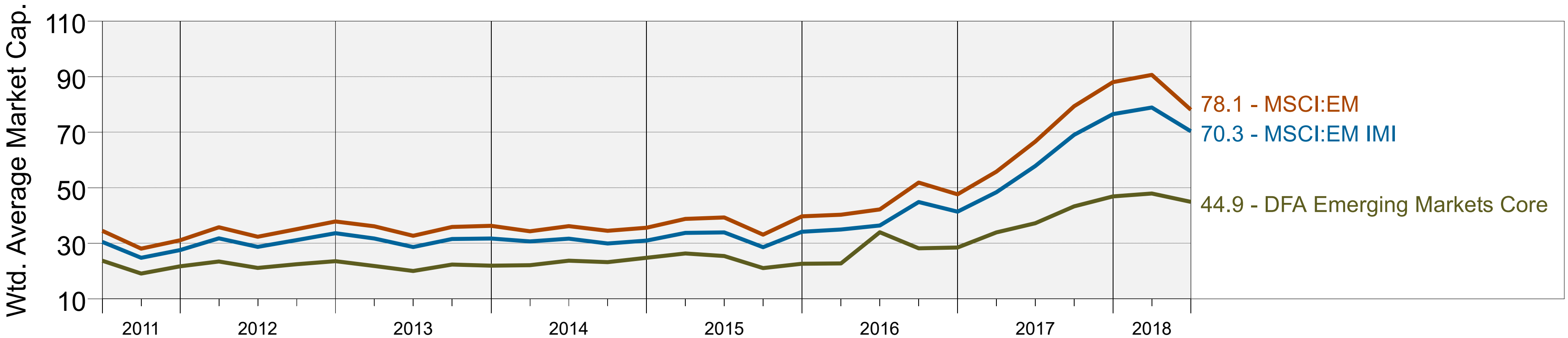
# DFA – Emerging Markets All Cap Core Strategy

## Index Evaluation

**Wtd. Median Market Cap.**
**for 7 Years Ended June 30, 2018**



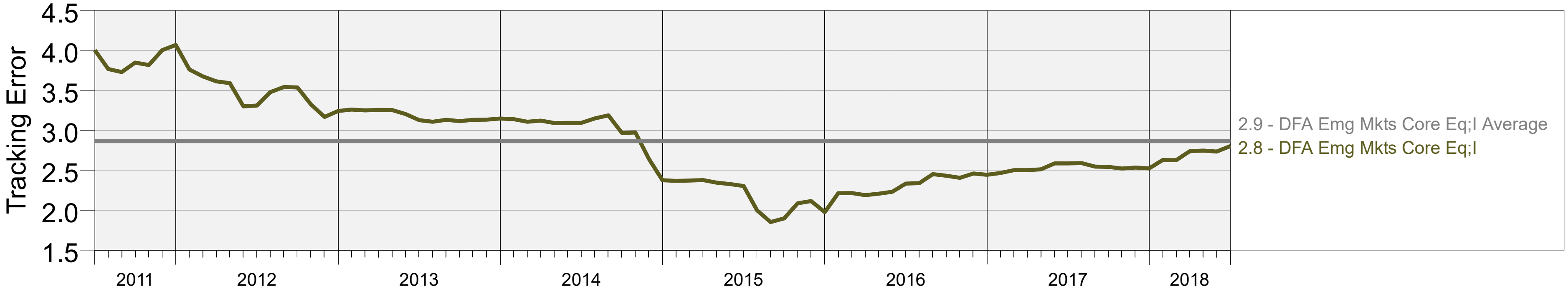

**Wtd. Average Market Cap.**
**for 7 Years Ended June 30, 2018**



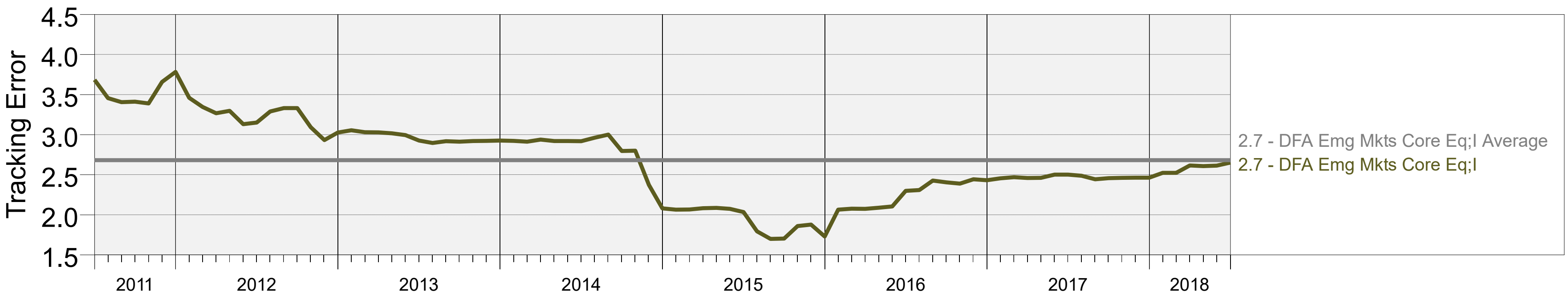
# DFA – Emerging Markets All Cap Core Strategy

## Index Evaluation

### Rolling 36 Month Tracking Error Relative To MSCI:EM for 7 Years Ended June 30, 2018



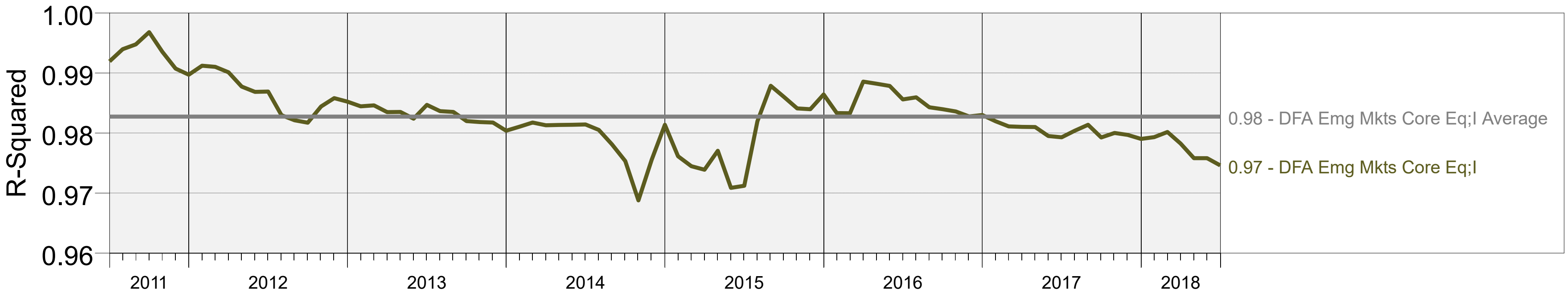

### Rolling 36 Month Tracking Error Relative To MSCI:EM IMI for 7 Years Ended June 30, 2018



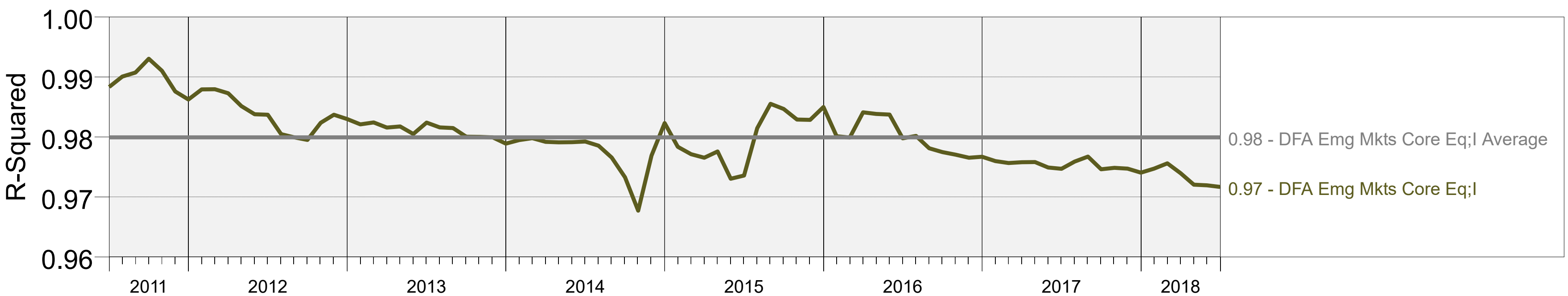
# DFA – Emerging Markets All Cap Core Strategy

## Index Evaluation

**Rolling 36 Month R-Squared Relative To MSCI:EM for 7 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To MSCI:EM IMI for 7 Years Ended June 30, 2018**



**Public Fixed Income**

Investment Managers Benchmarks

# Core Fixed Income

# BlackRock – Intermediate Credit Bond Index

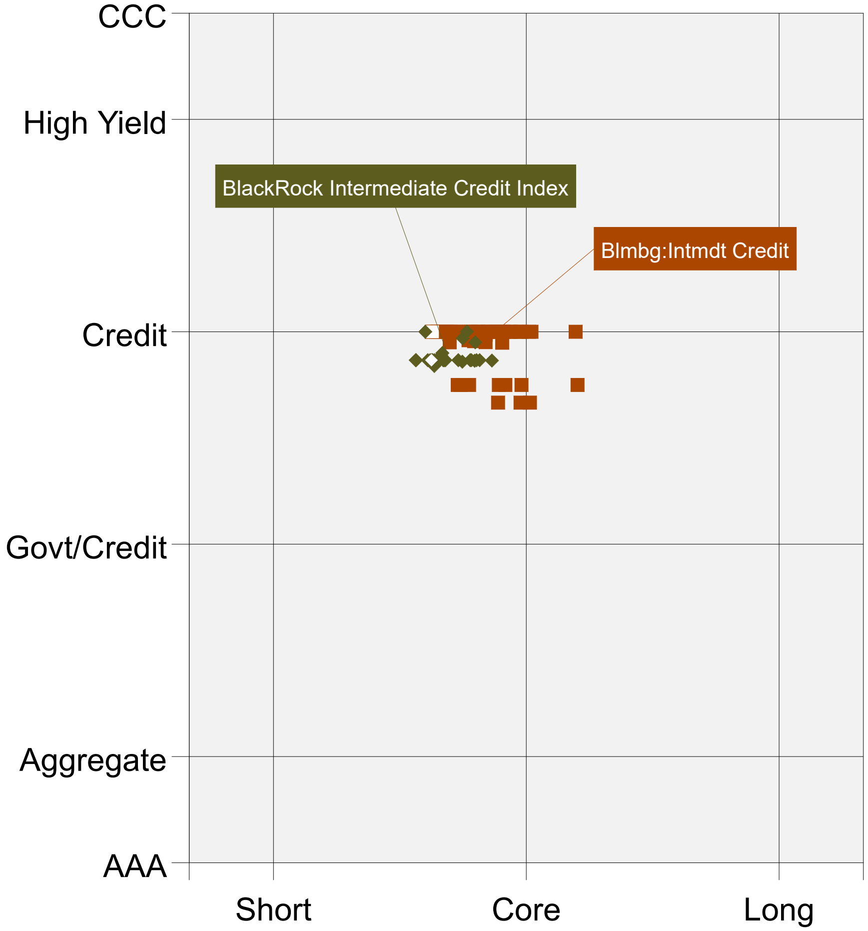
## Index Evaluation

- Current Index: Bloomberg Barclays Intermediate Credit Index.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

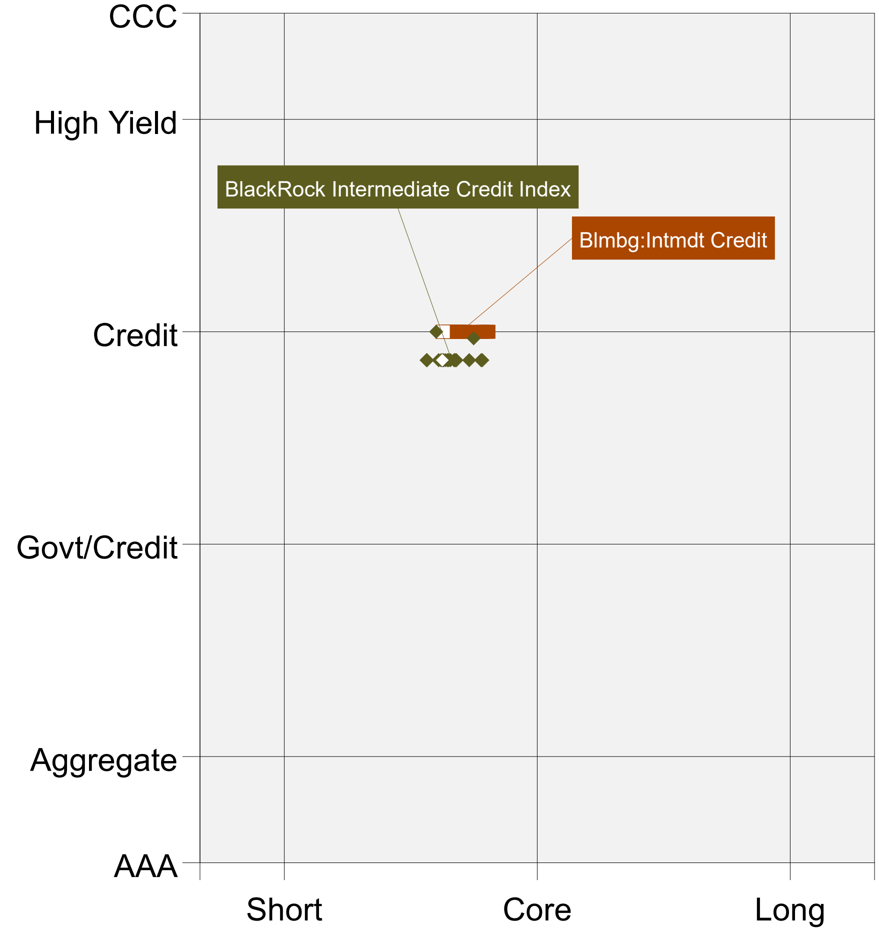
# BlackRock – Intermediate Credit Bond Index

## Index Evaluation

**Fixed Income Style Map**
**for 15 Years Ended June 30, 2018**



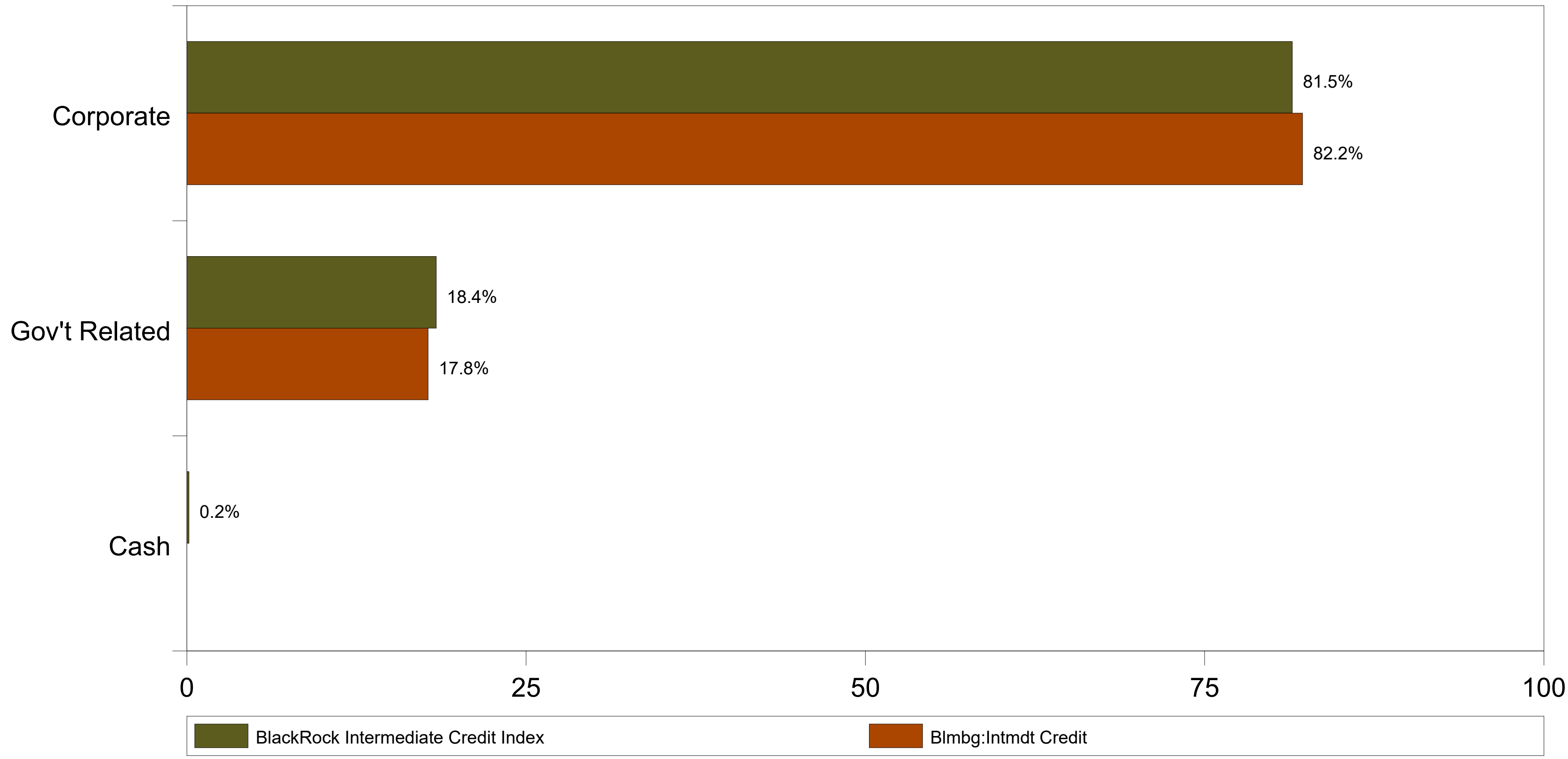

**Fixed Income Style Map**
**for 5 Years Ended June 30, 2018**



# BlackRock – Intermediate Credit Bond Index

## Index Evaluation

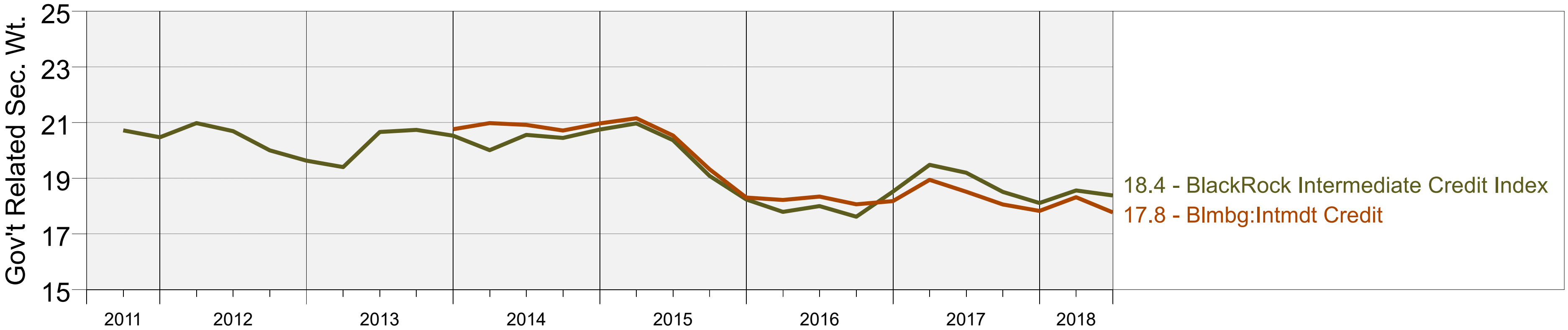
**Effective Sector Weights**
**vs Blmbg:Intmdt Credit**
**as of June 30, 2018**



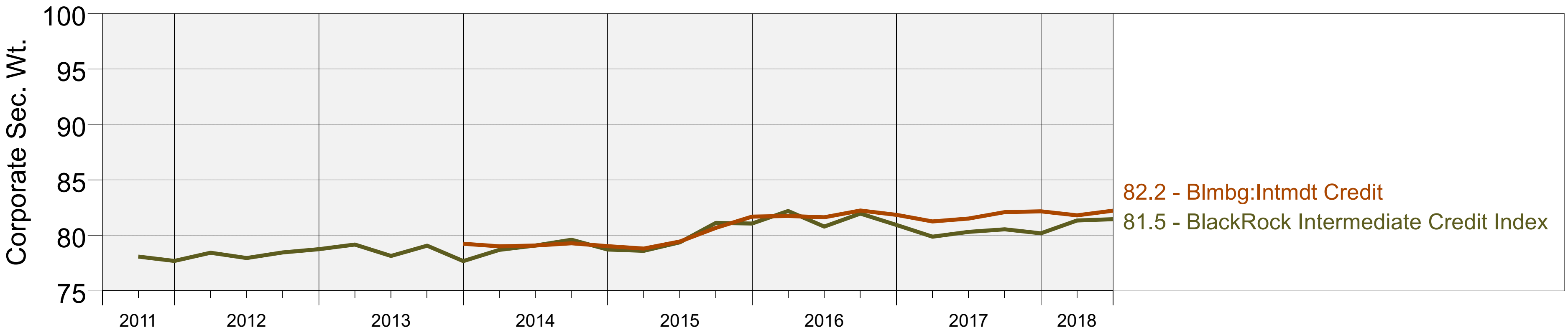
# BlackRock – Intermediate Credit Bond Index

## Index Evaluation

**Gov't Related Sec. Wt.**
**for 7 Years Ended June 30, 2018**



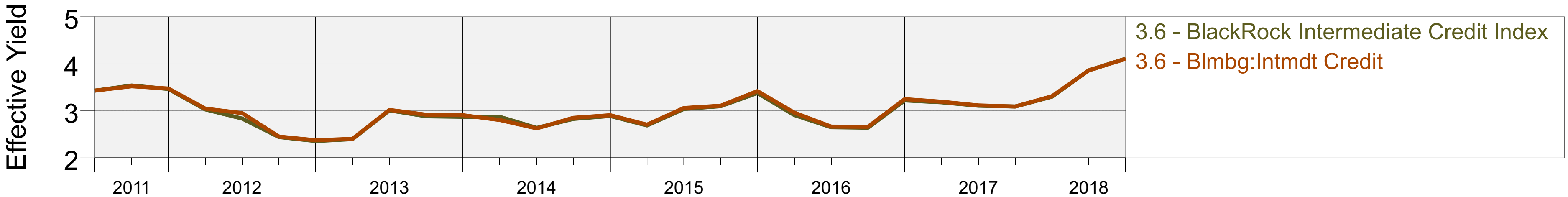

**Corporate Sec. Wt.**
**for 7 Years Ended June 30, 2018**



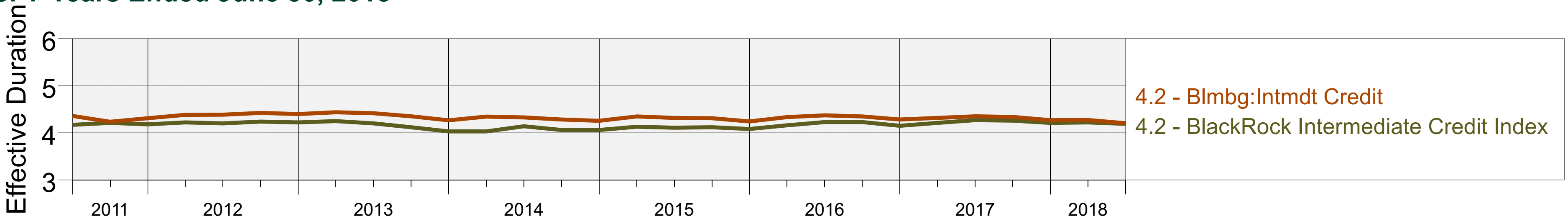
# BlackRock – Intermediate Credit Bond Index

## Index Evaluation

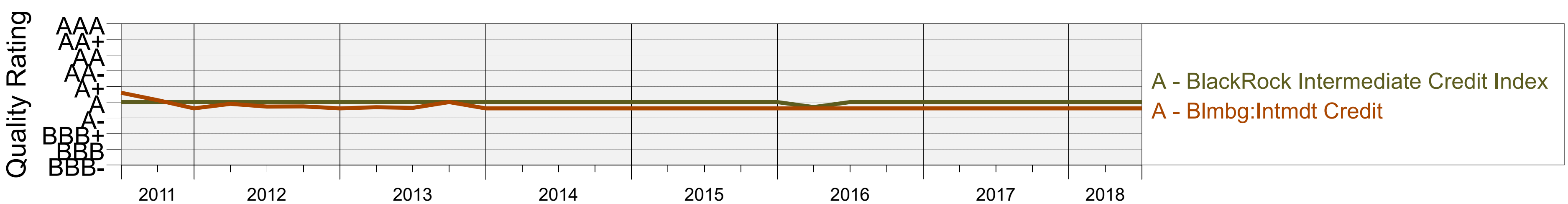
**Effective Yield**
**for 7 Years Ended June 30, 2018**




**Effective Duration**
**for 7 Years Ended June 30, 2018**



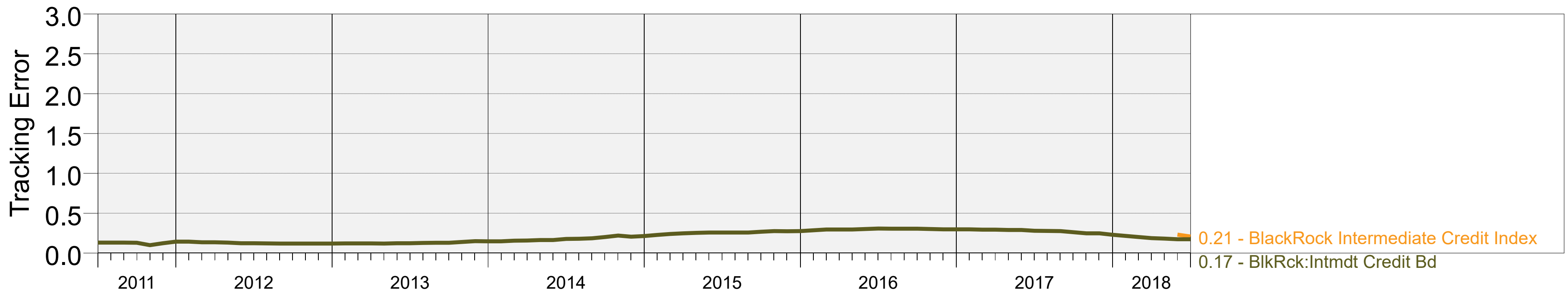

**Quality Rating**
**for 7 Years Ended June 30, 2018**



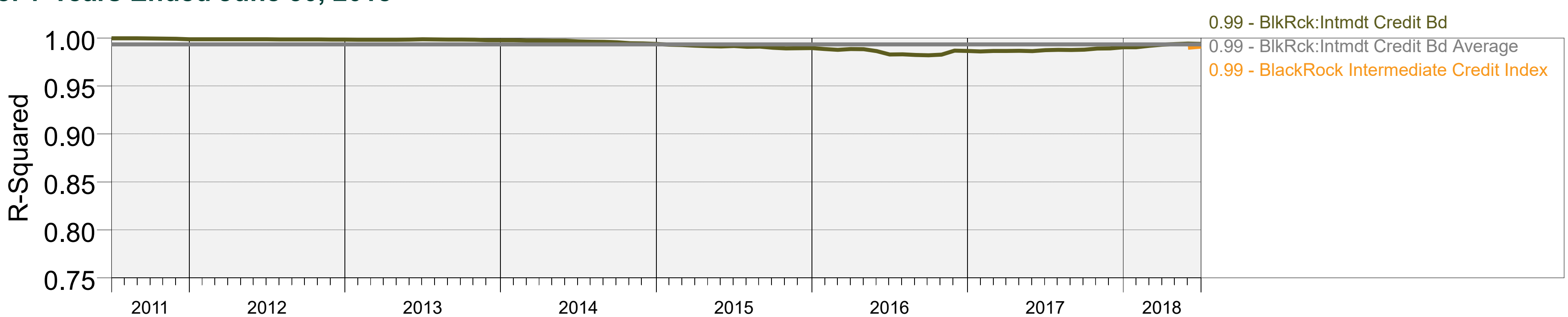
# BlackRock – Intermediate Credit Bond Index

## Index Evaluation

**Rolling 36 Month Tracking Error Relative To Blmbg:Intmdt Credit for 7 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To Blmbg:Intmdt Credit for 7 Years Ended June 30, 2018**



# SSgA – U.S. Treasury Inflation Protected Securities (TIPS)

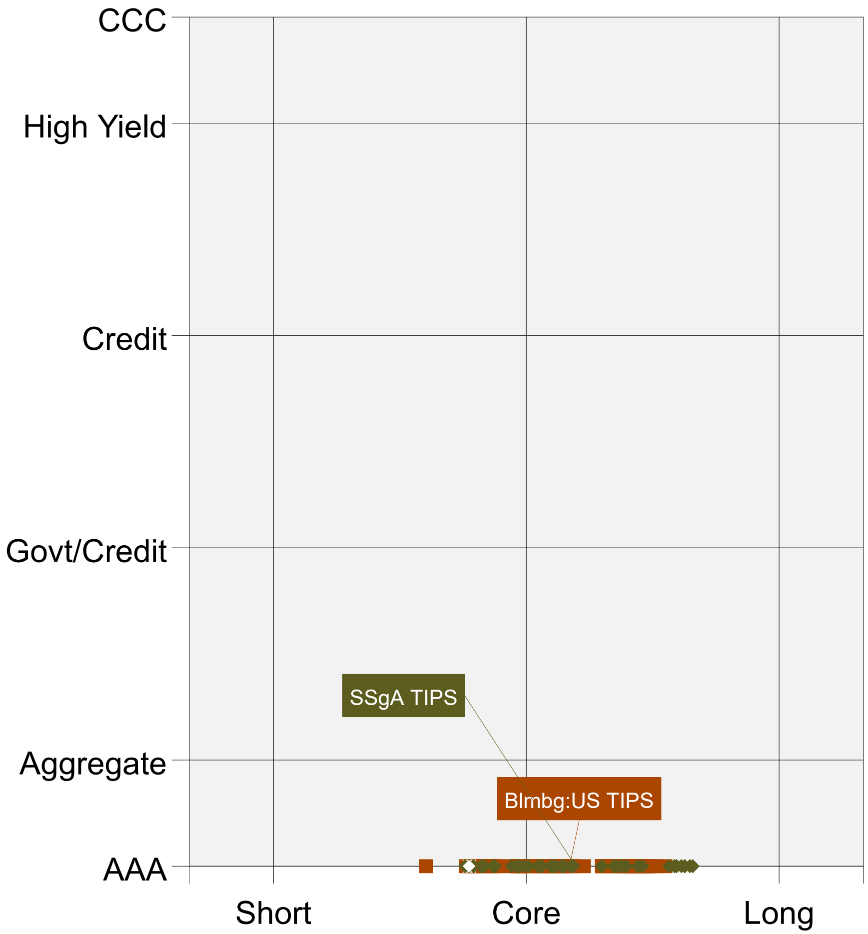
## Index Evaluation

- Current Index: Bloomberg Barclays U.S. TIPS Index.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

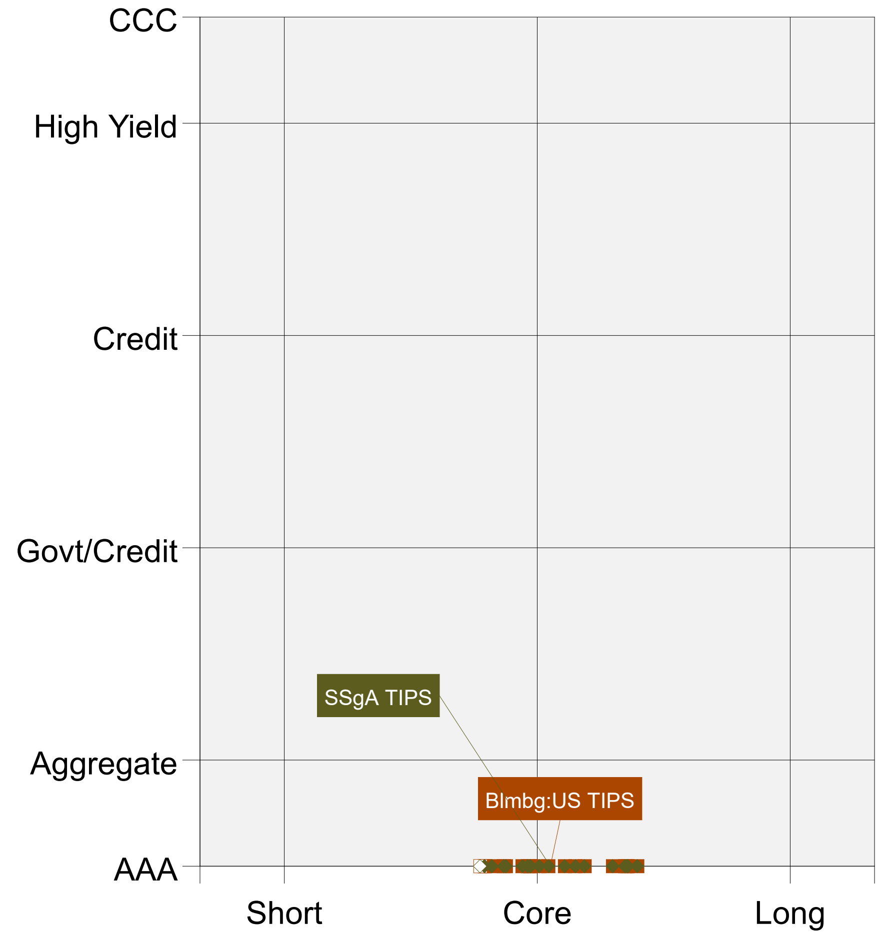
# SSgA – U.S. Treasury Inflation Protected Securities (TIPS)

## Index Evaluation

**Fixed Income Style Map**
**for 15 Years Ended June 30, 2018**



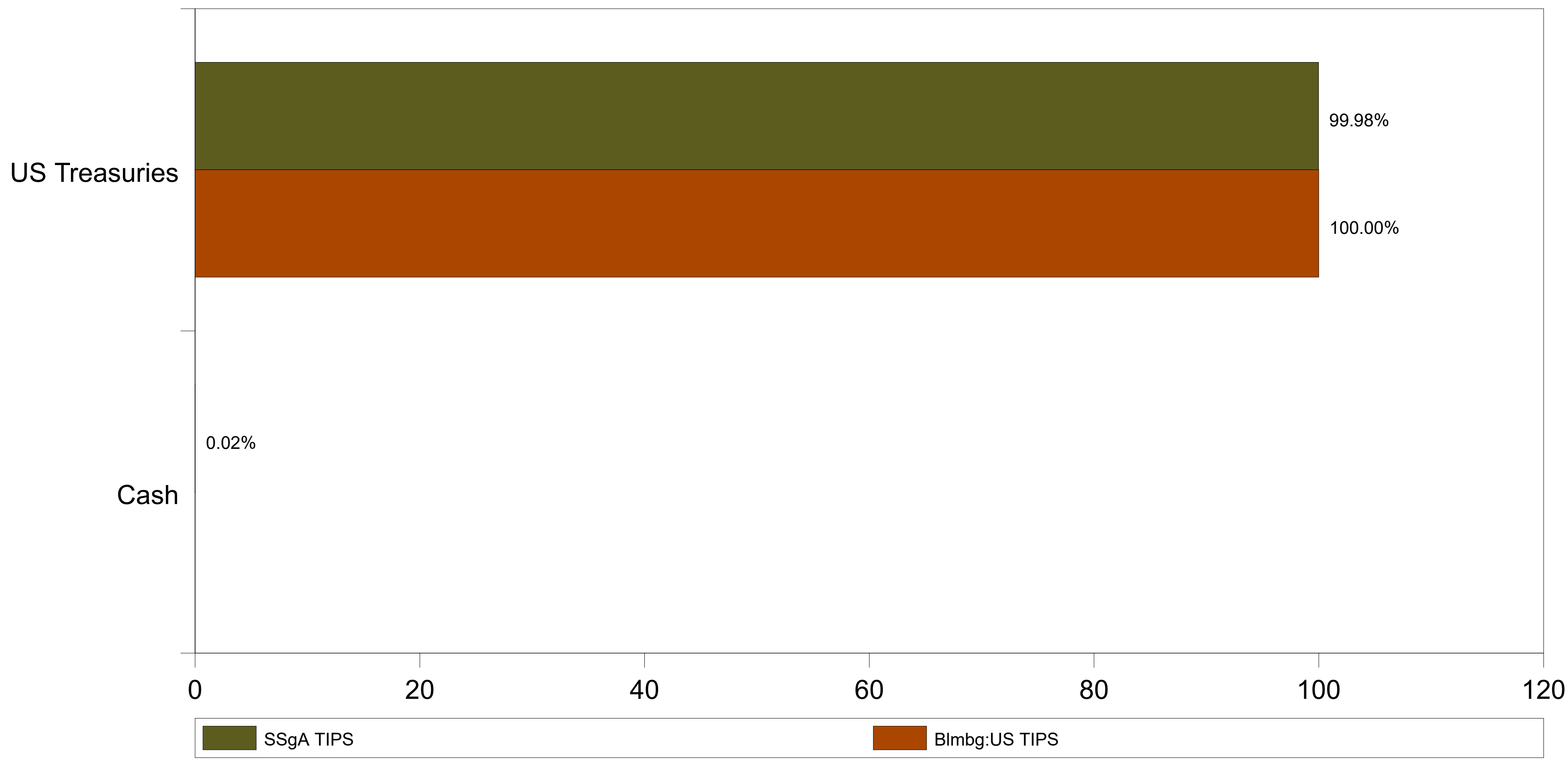

**Fixed Income Style Map**
**for 5 Years Ended June 30, 2018**



# SSgA – U.S. Treasury Inflation Protected Securities (TIPS)

## Index Evaluation

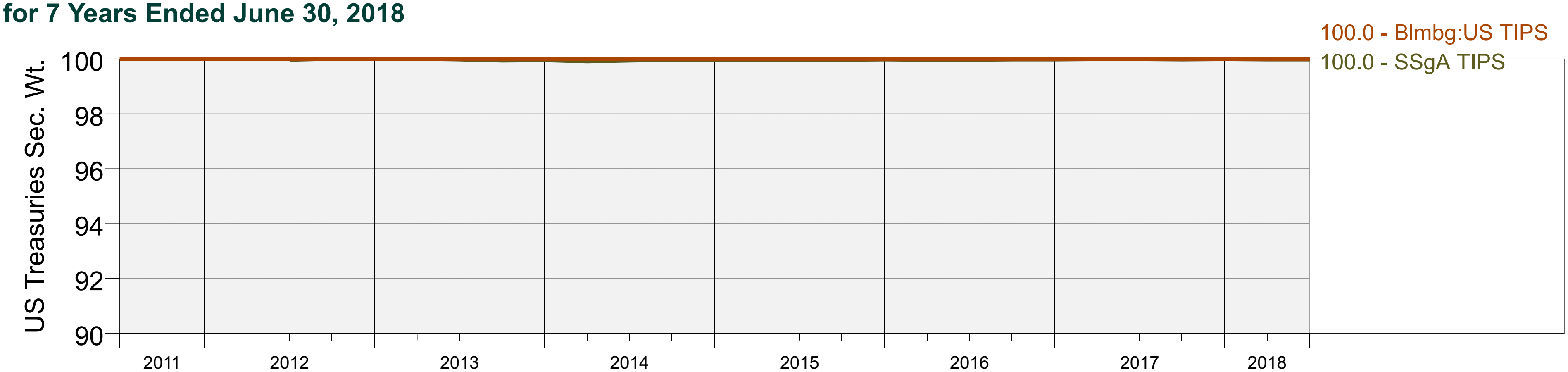
**Effective Sector Weights**
**vs Blmbg:US TIPS**
**as of June 30, 2018**



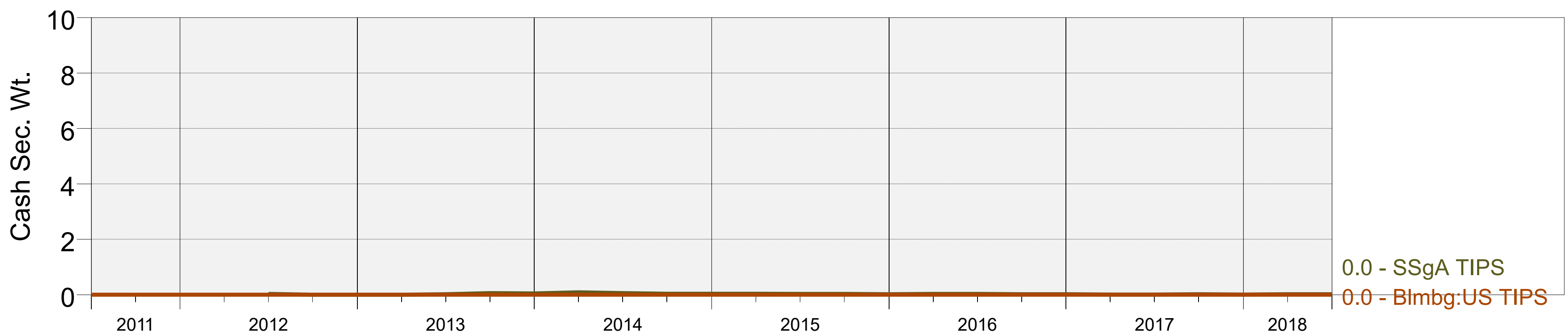
# SSgA – U.S. Treasury Inflation Protected Securities (TIPS)

## Index Evaluation

**US Treasuries Sec. Wt.**
**for 7 Years Ended June 30, 2018**



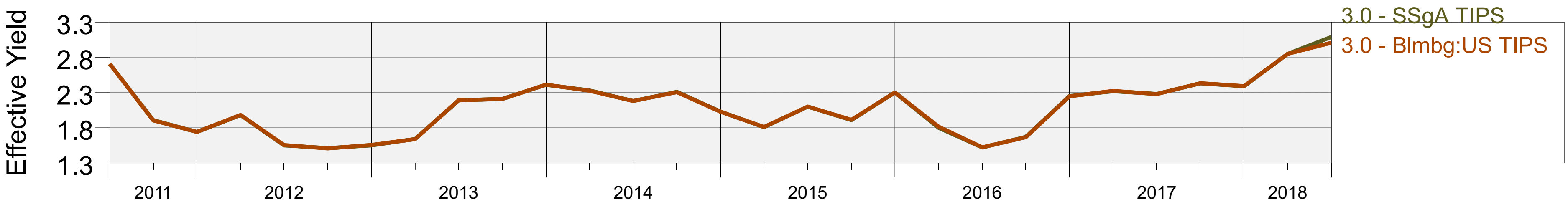

**Cash Sec. Wt.**
**for 7 Years Ended June 30, 2018**



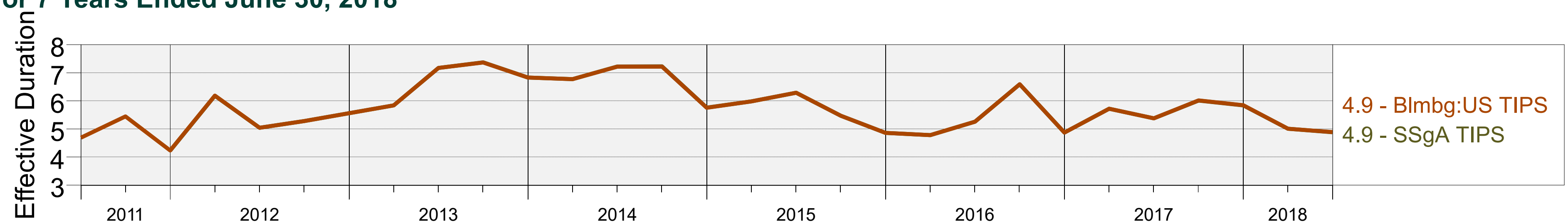
# SSgA – U.S. Treasury Inflation Protected Securities (TIPS)

## Index Evaluation

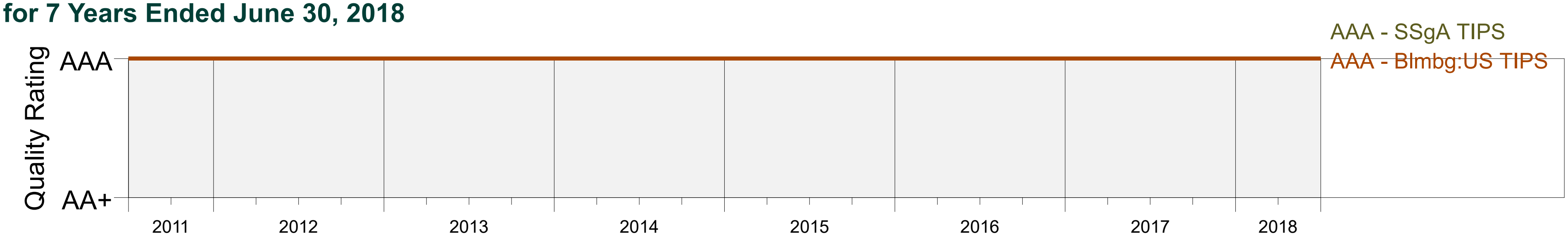
**Effective Yield**
**for 7 Years Ended June 30, 2018**




**Effective Duration**
**for 7 Years Ended June 30, 2018**

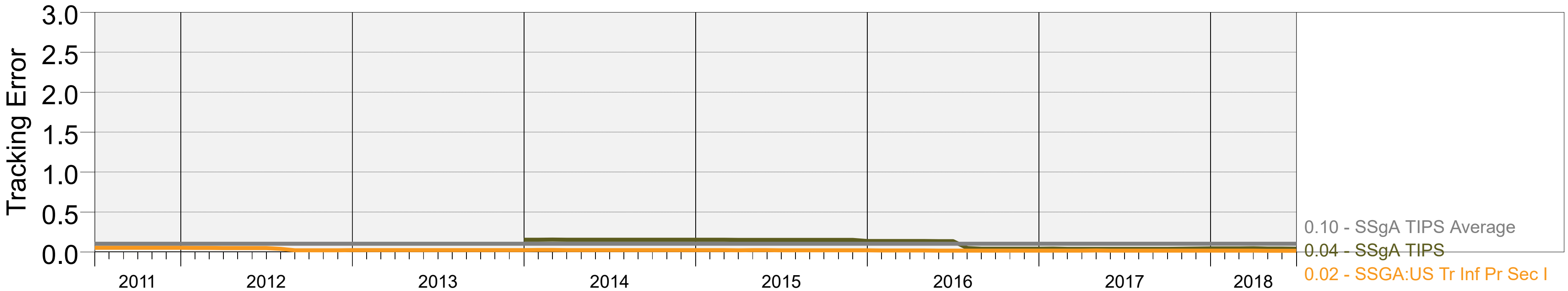



**Quality Rating**
**for 7 Years Ended June 30, 2018**

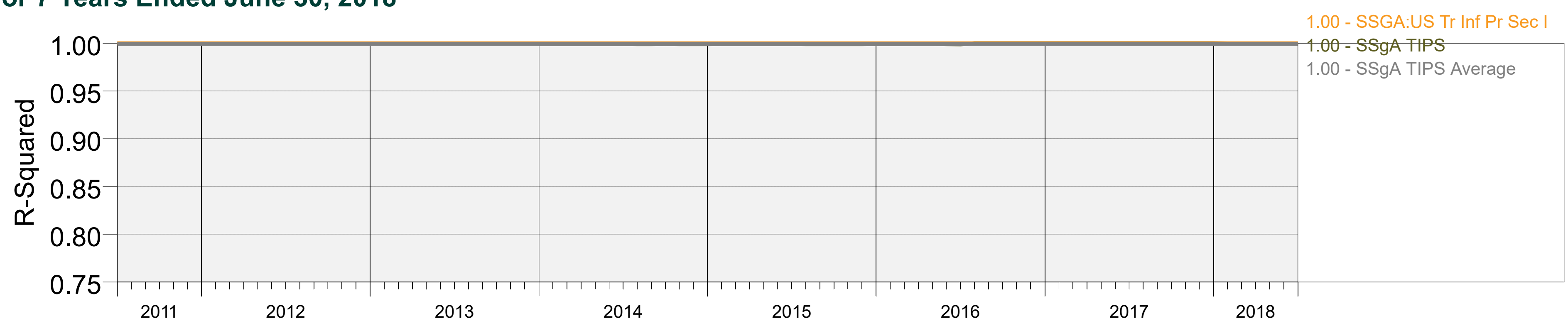


## Index Evaluation

**Rolling 36 Month Tracking Error Relative To**
**Blmbg:US TIPS**
**for 7 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To**
**Blmbg:US TIPS**
**for 7 Years Ended June 30, 2018**



# Schroders – MBS Strategy

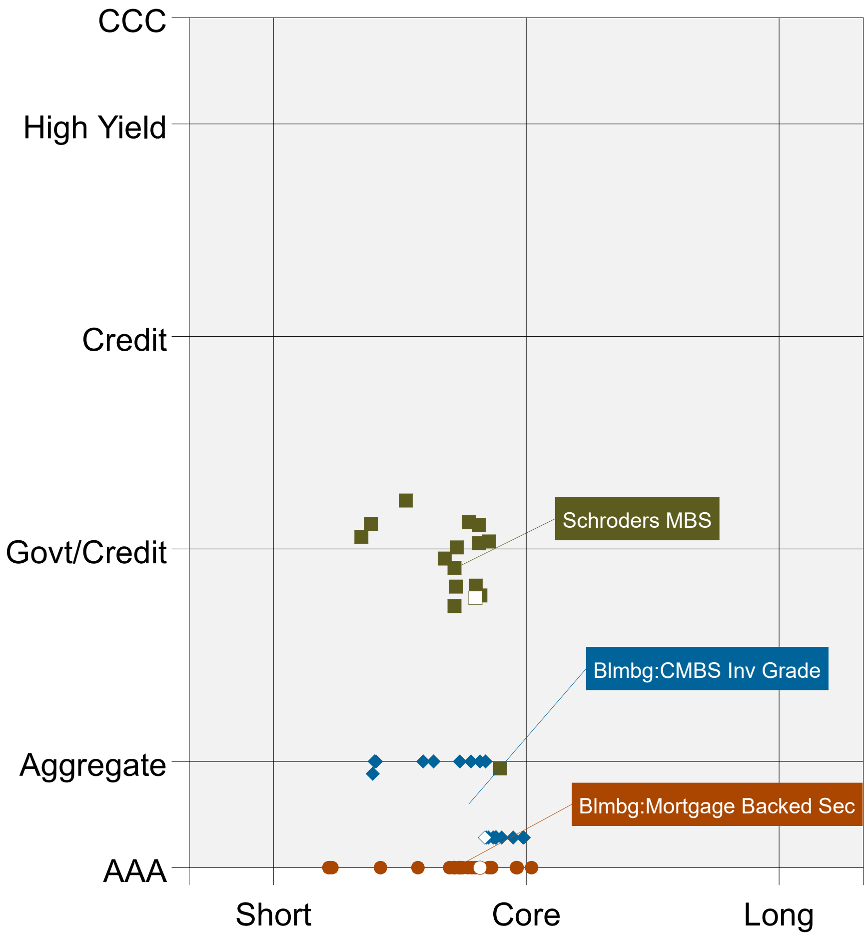
## Index Evaluation

- Current Index: Bloomberg Barclays CMBS Index.
- Callan Recommendation: Bloomberg Barclays U.S. Securitized Index.
- Rationale: The Bloomberg Barclays CMBS Index is 100% comprised of CMBS securities while the BB MBS Index is 100% comprised of agency MBS securities. The strategy itself tends to have a sizeable allocation to agency MBS (roughly 30%) and a smaller allocation to CMBS and ABS securities. Another big allocation for the strategy is non-agency RMBS which are not captured in any market index. Given the more diversified nature of this portfolio, a blended index such as the Bloomberg Barclays U.S. Securitized Bond Index may present a better fit in reflecting the opportunity set of this manager.

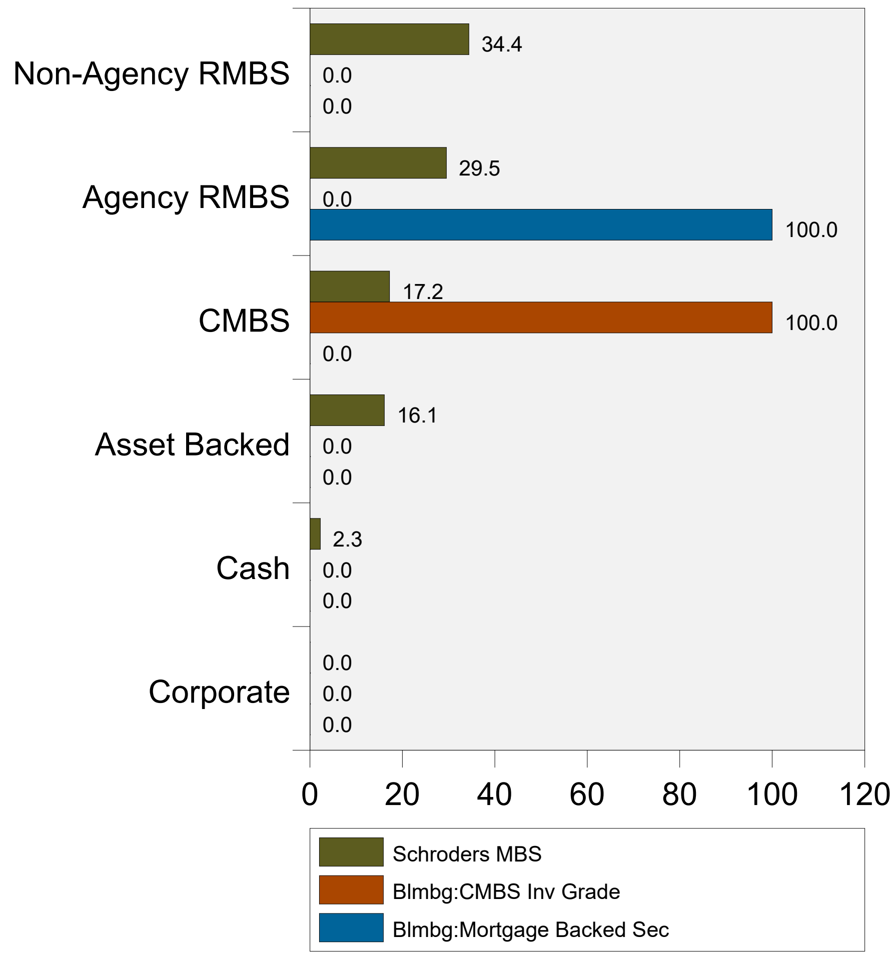
# Schroders – MBS Strategy

## Index Evaluation

### Fixed Income Style Map
### for 5 Years Ended June 30, 2018



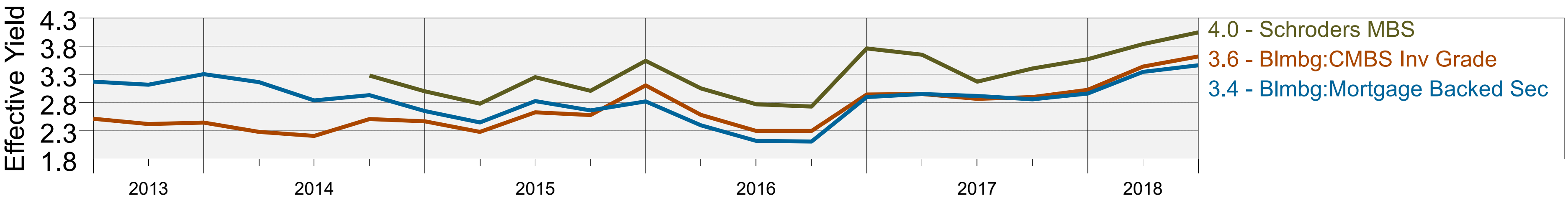

### Sector Distribution
### as of June 30, 2018



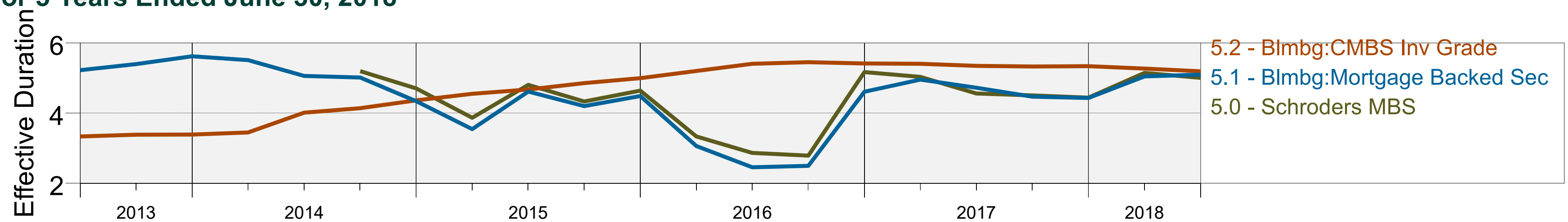
# Schroders – MBS Strategy

## Index Evaluation

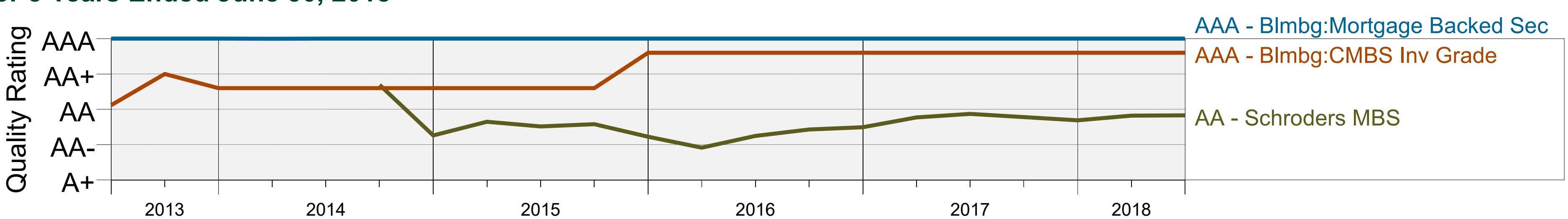
### Effective Yield
### for 5 Years Ended June 30, 2018




### Effective Duration
### for 5 Years Ended June 30, 2018



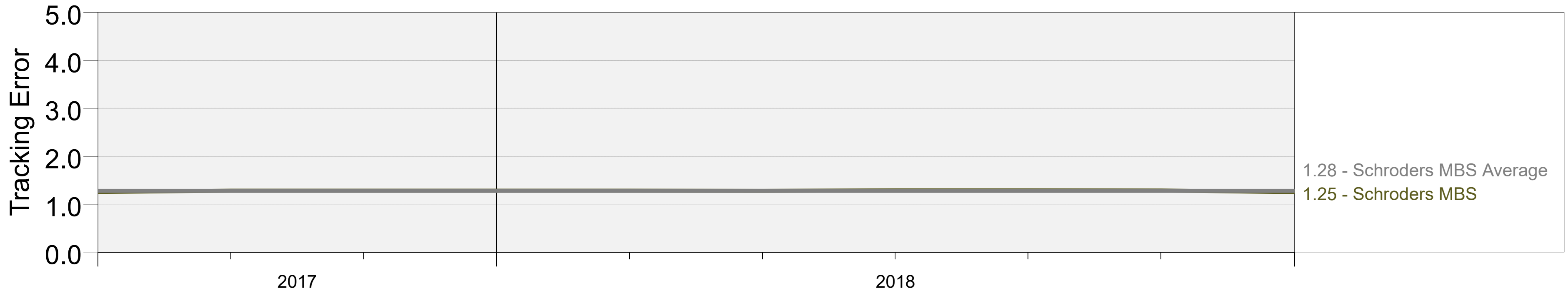

### Quality Rating
### for 5 Years Ended June 30, 2018



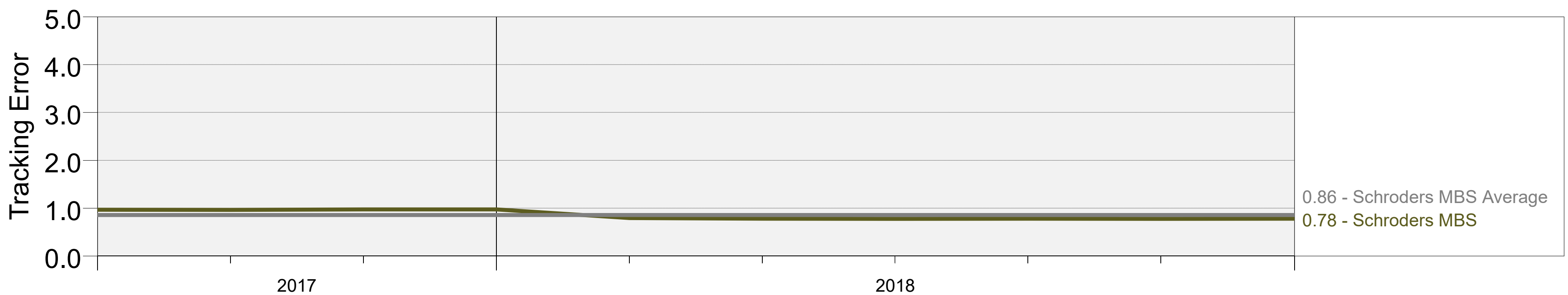
# Schroders – MBS Strategy

## Index Evaluation

**Rolling 36 Month Tracking Error Relative To**
**Blmbg:CMBS Inv Grade**
**for 9 Months Ended June 30, 2018**



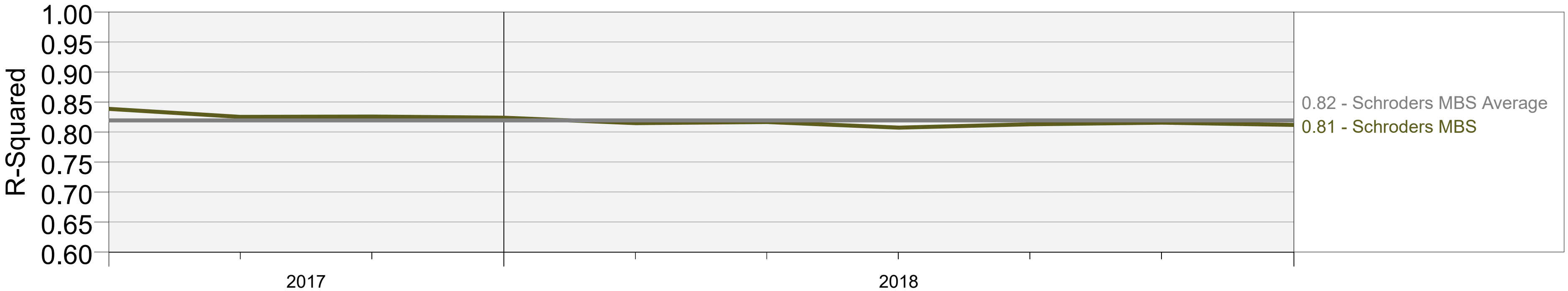

**Rolling 36 Month Tracking Error Relative To**
**Blmbg:Mortgage Backed Sec**
**for 9 Months Ended June 30, 2018**



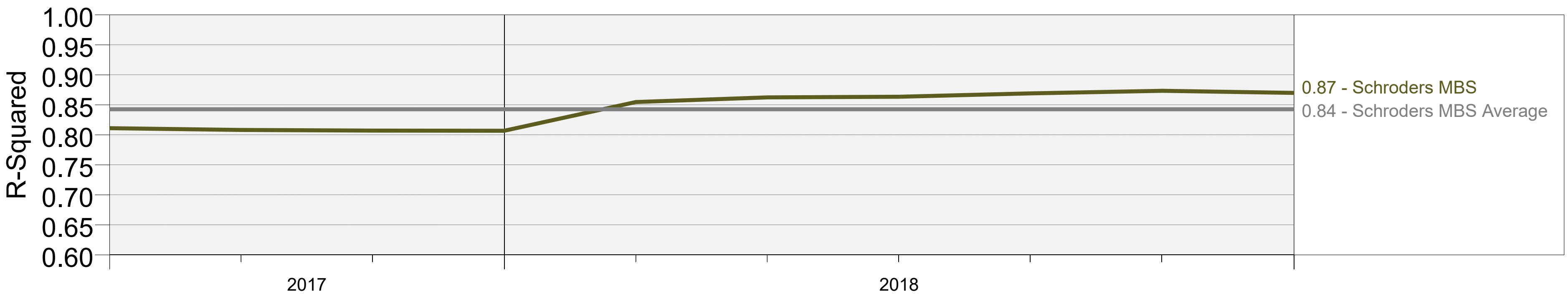
# Schroders – MBS Strategy

## Index Evaluation

**Rolling 36 Month R-Squared Relative To Blmbg:CMBS Inv Grade for 9 Months Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To Blmbg:Mortgage Backed Sec for 9 Months Ended June 30, 2018**



# Shenkman Capital – Bank Loan Strategy

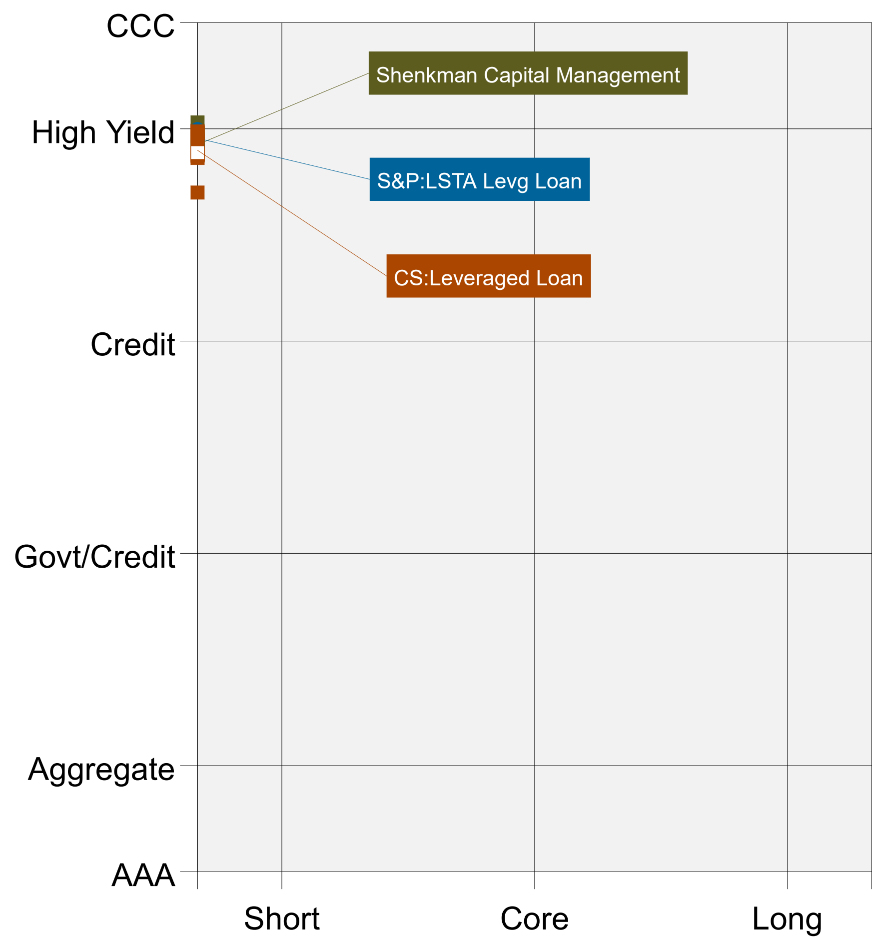
## Index Evaluation

- Current Index: Credit Suisse Leveraged Loan Index.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

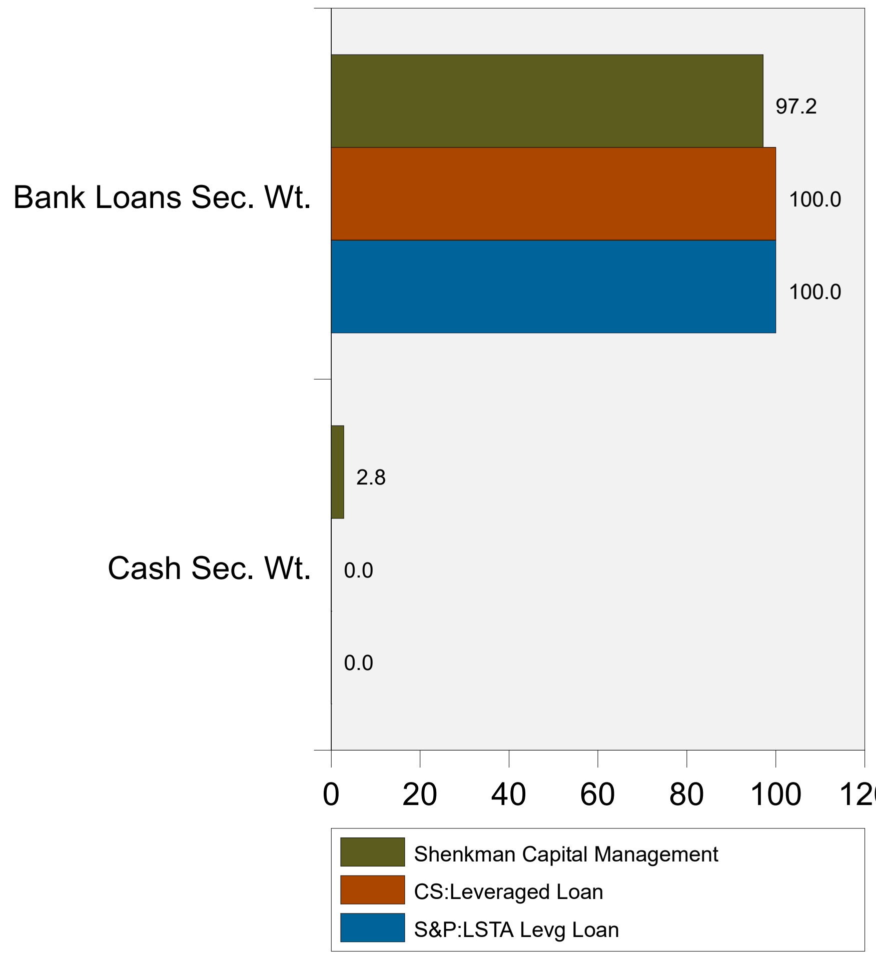
# Shenkman Capital – Bank Loan Strategy

## Index Evaluation

**Fixed Income Style Map**
**for 5 Years Ended June 30, 2018**



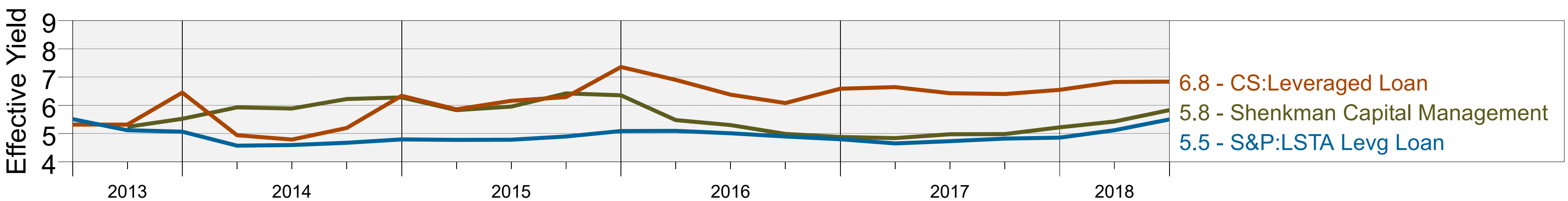

**Sector Distribution**
**as of June 30, 2018**



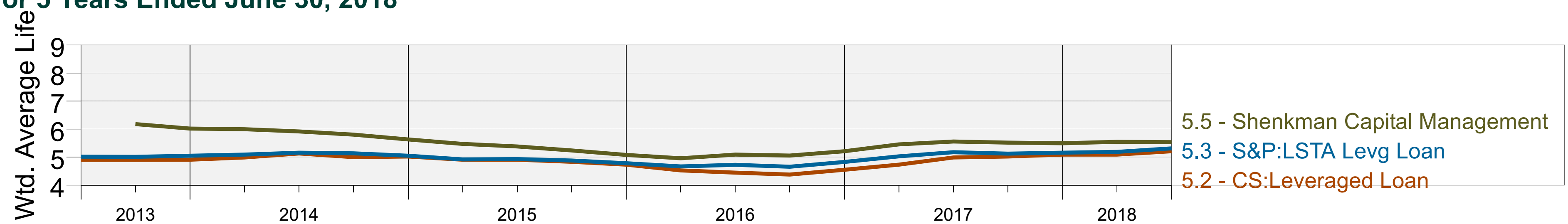
# Shenkman Capital – Bank Loan Strategy

## Index Evaluation

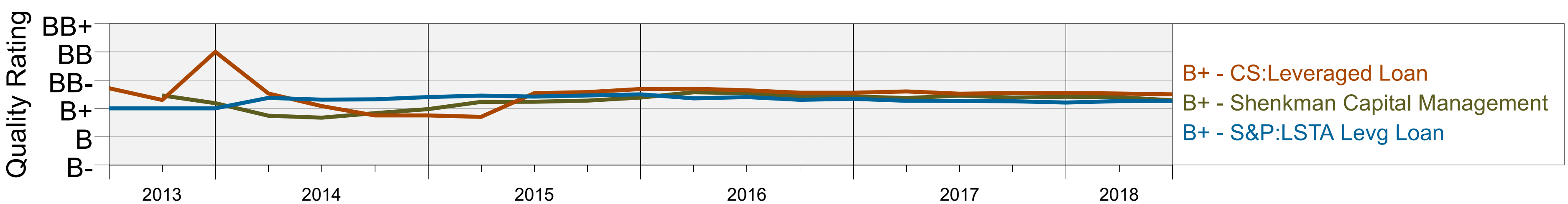
**Effective Yield**
**for 5 Years Ended June 30, 2018**




**Wtd. Average Life**
**for 5 Years Ended June 30, 2018**



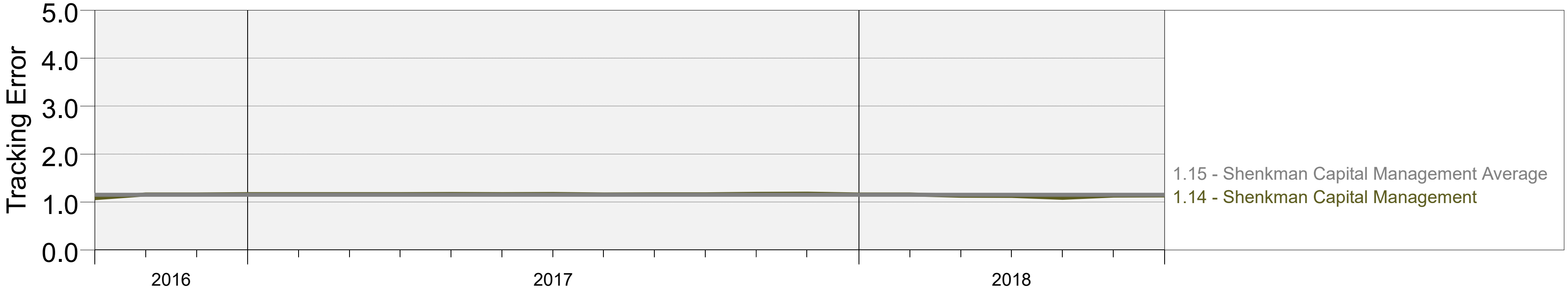

**Quality Rating**
**for 5 Years Ended June 30, 2018**



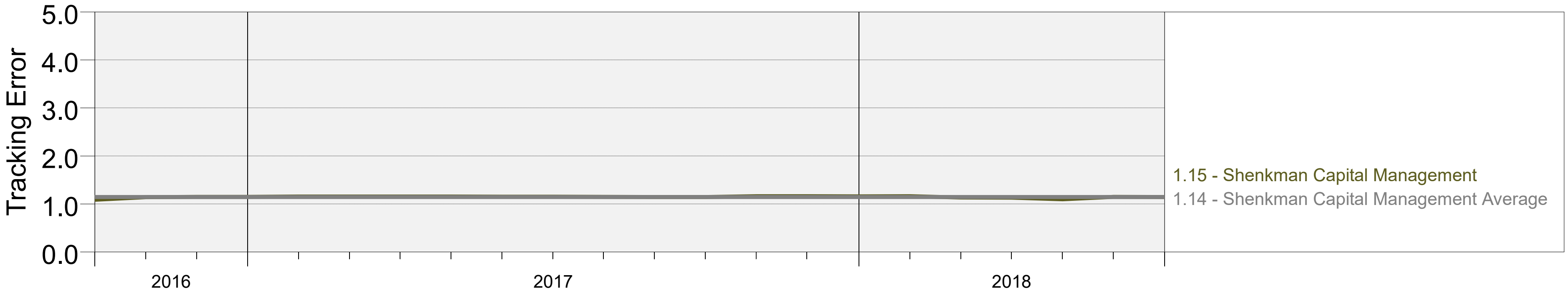
# Shenkman Capital – Bank Loan Strategy

## Index Evaluation

### Rolling 36 Month Tracking Error Relative To
### CS:Leveraged Loan
### for 1 3/4 Years Ended June 30, 2018



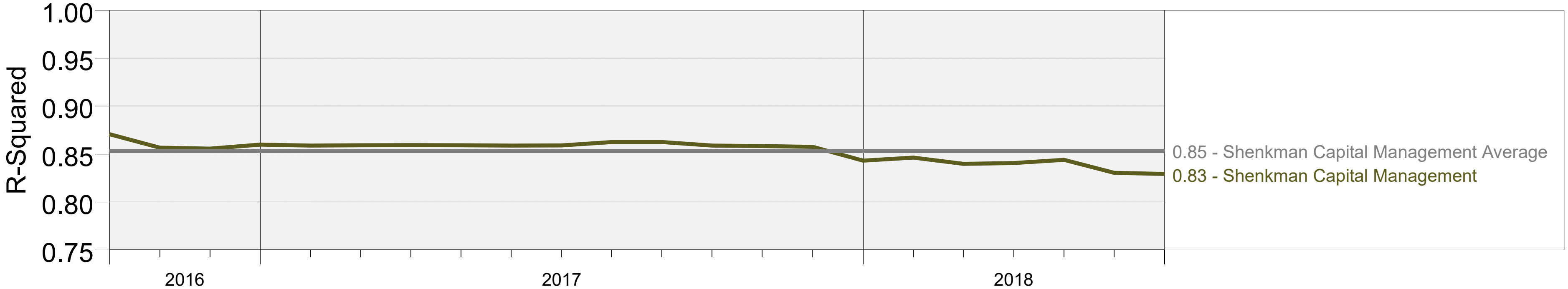

### Rolling 36 Month Tracking Error Relative To
### S&P:LSTA Levg Loan
### for 1 3/4 Years Ended June 30, 2018



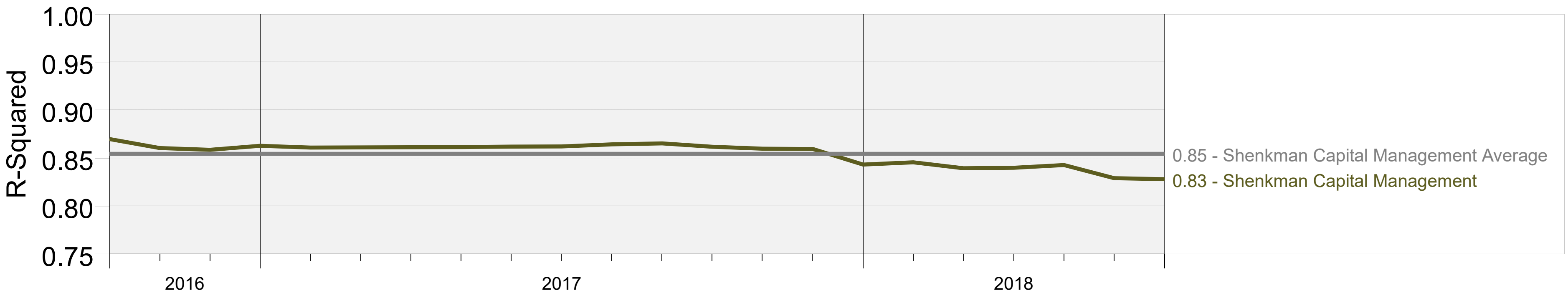
# Shenkman Capital – Bank Loan Strategy

## Index Evaluation

**Rolling 36 Month R-Squared Relative To
CS:Leveraged Loan
for 1 3/4 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To
S&P:LSTA Levg Loan
for 1 3/4 Years Ended June 30, 2018**



# Invesco – Stable Value

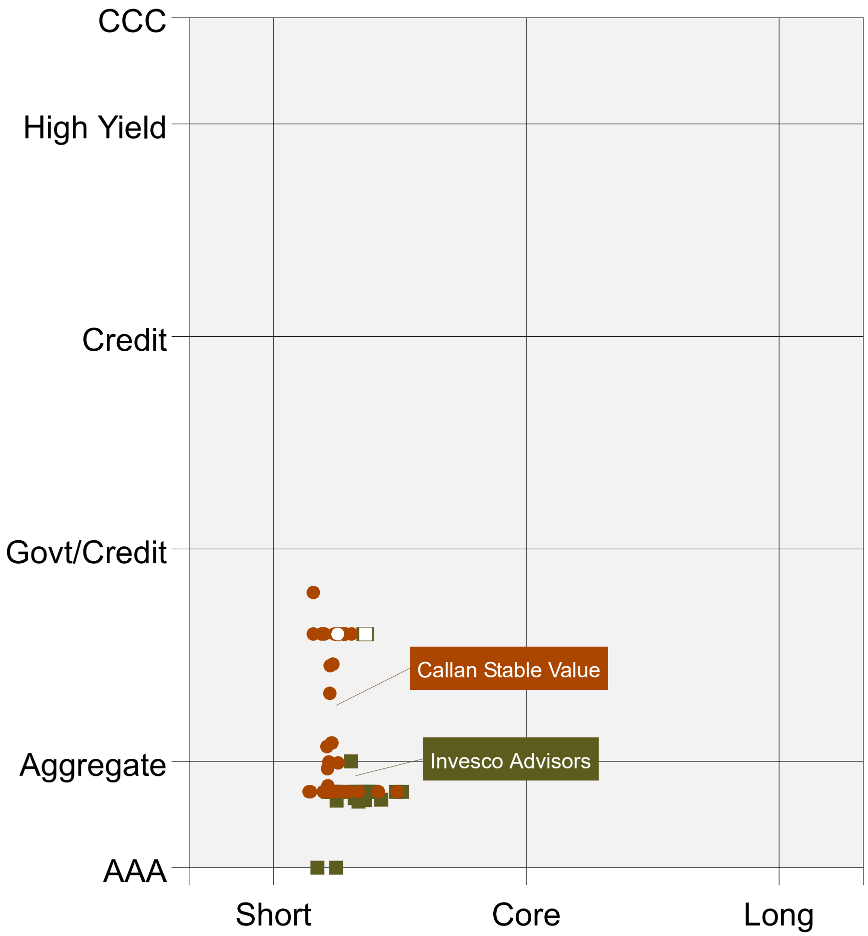
## Index Evaluation

- Current Index: 90-Day Treasury Bills + 1%.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

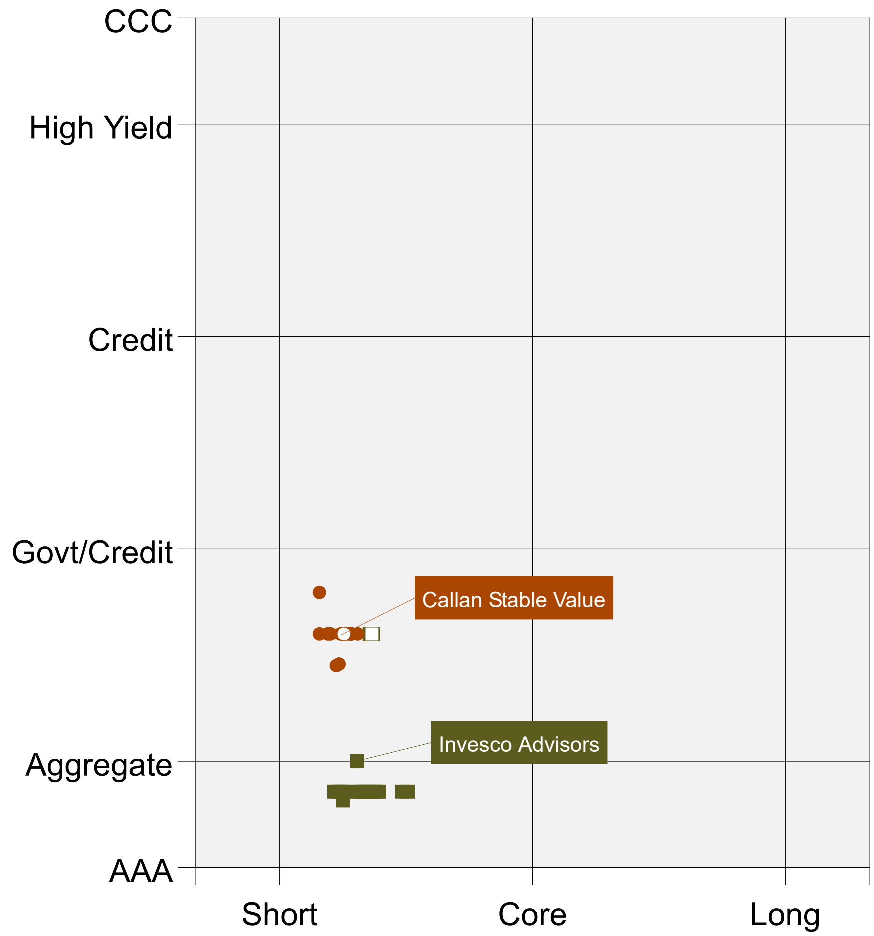
# Invesco – Stable Value

## Index Evaluation

**Fixed Income Style Map**
**for 10 Years Ended June 30, 2018**



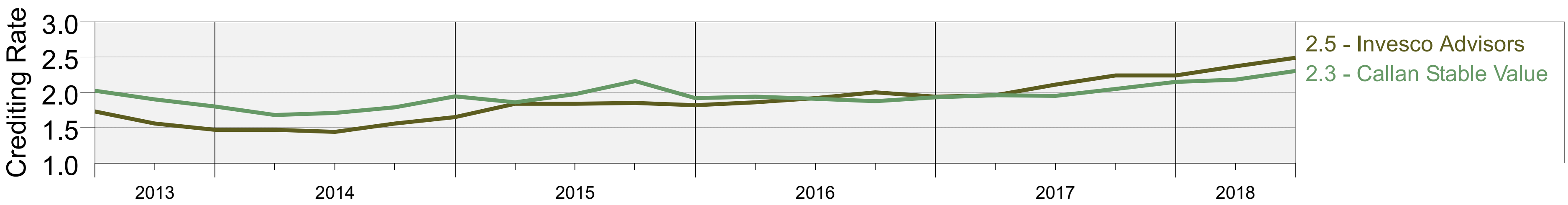

**Fixed Income Style Map**
**for 5 Years Ended June 30, 2018**



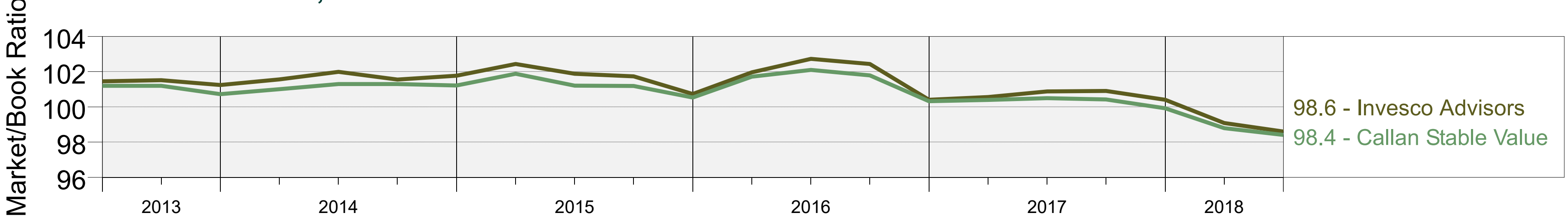
# Invesco – Stable Value

## Index Evaluation

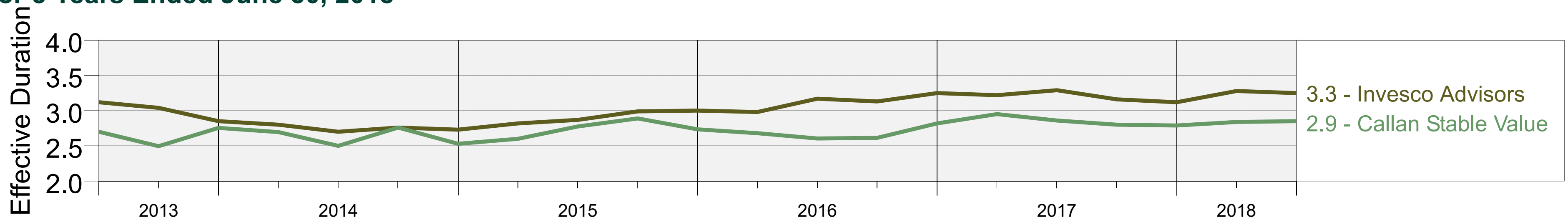
**Crediting Rate**
**for 5 Years Ended June 30, 2018**




**Market/Book Ratio**
**for 5 Years Ended June 30, 2018**



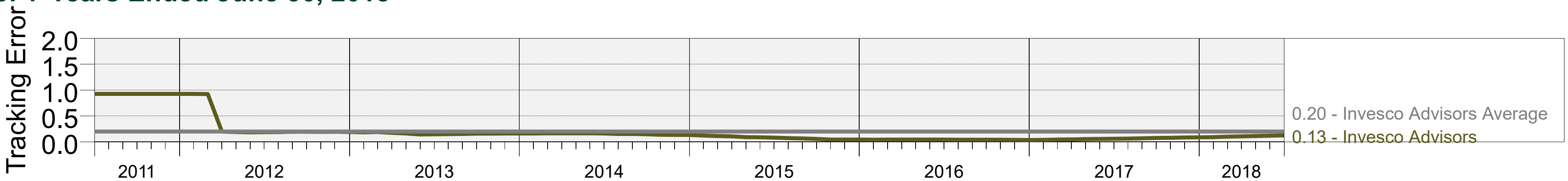

**Effective Duration**
**for 5 Years Ended June 30, 2018**



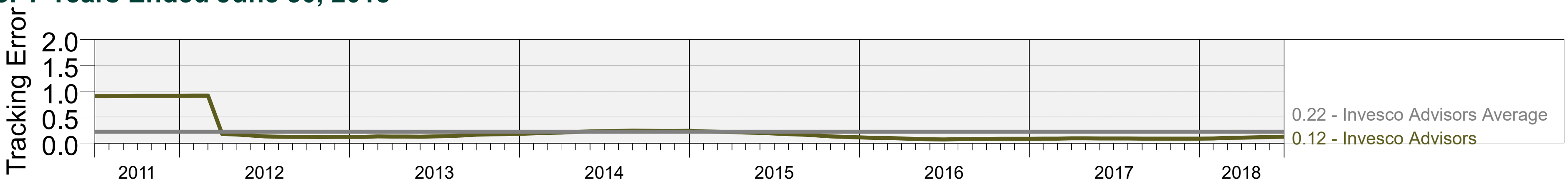
# Invesco – Stable Value

## Index Evaluation

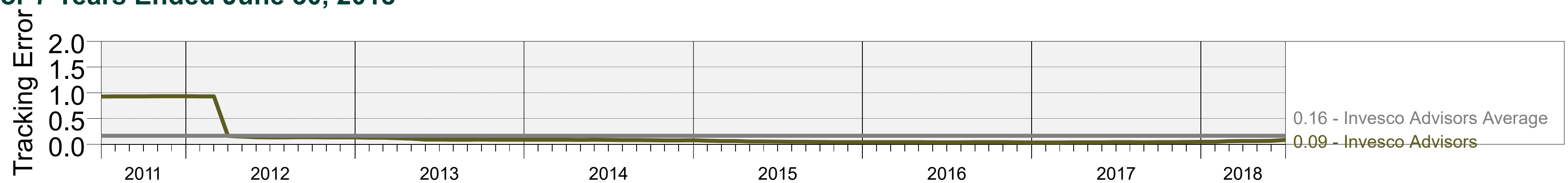
**Rolling 36 Month Tracking Error Relative To**
**90 Day T-Bill + 1%**
**for 7 Years Ended June 30, 2018**




**Rolling 36 Month Tracking Error Relative To**
**US Treas: Const Mat 5 Yr**
**for 7 Years Ended June 30, 2018**



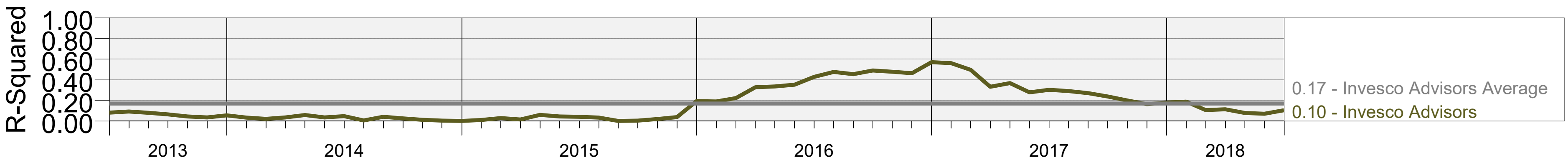

**Rolling 36 Month Tracking Error Relative To**
**Callan Stable Value**
**for 7 Years Ended June 30, 2018**



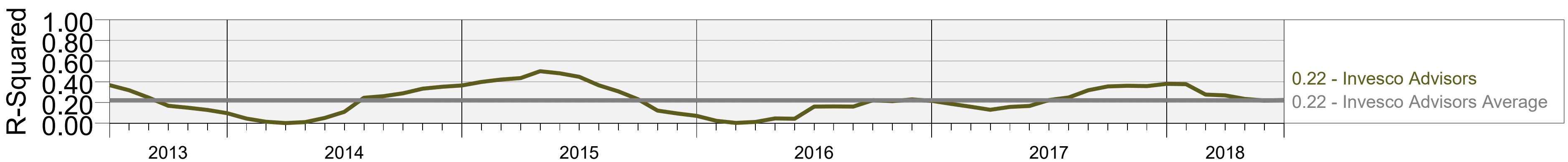
# Invesco – Stable Value

## Index Evaluation

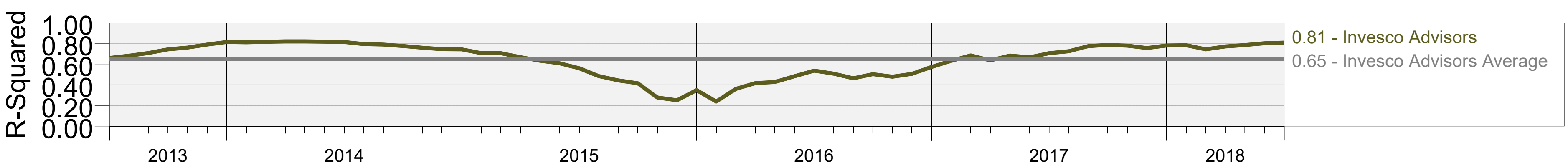
### Rolling 36 Month R-Squared Relative To 90 Day T-Bill + 1% for 5 Years Ended June 30, 2018




### Rolling 36 Month R-Squared Relative To US Treas: Const Mat 5 Yr for 5 Years Ended June 30, 2018




### Rolling 36 Month R-Squared Relative To Callan Stable Value for 5 Years Ended June 30, 2018



# Non-Core Fixed Income

# PGIM – U.S. Higher Quality High Yield

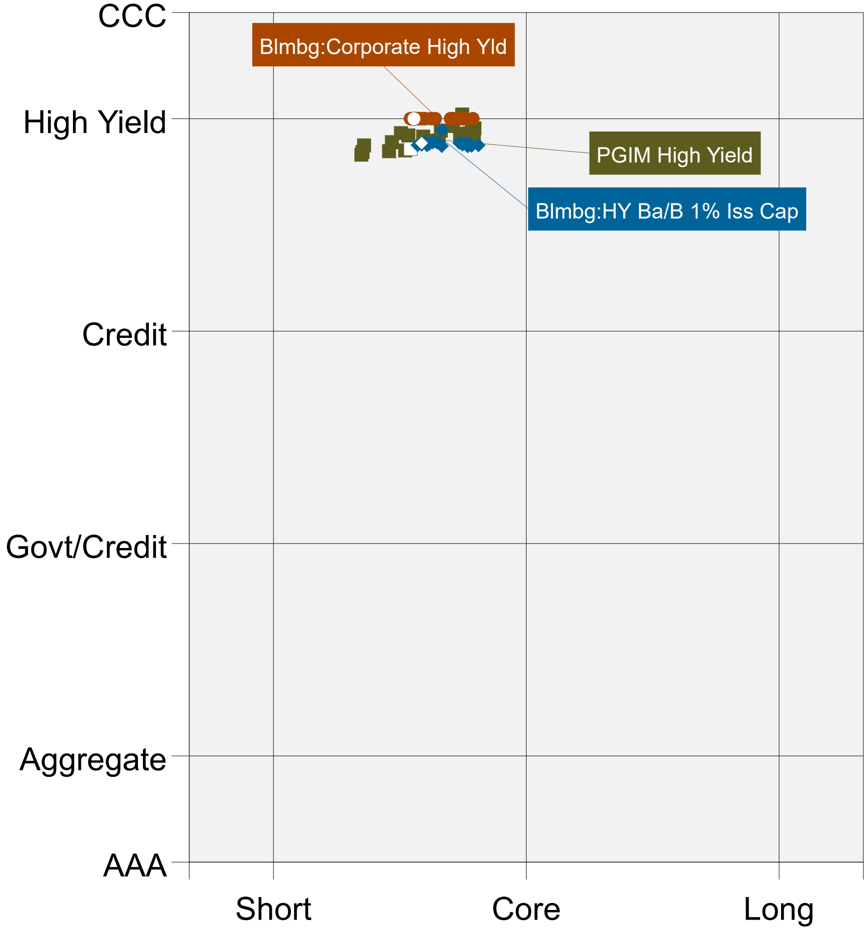
## Index Evaluation

- Current Index: Bloomberg Barclays High Yield Ba/B 1% Issuer Capped Index.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

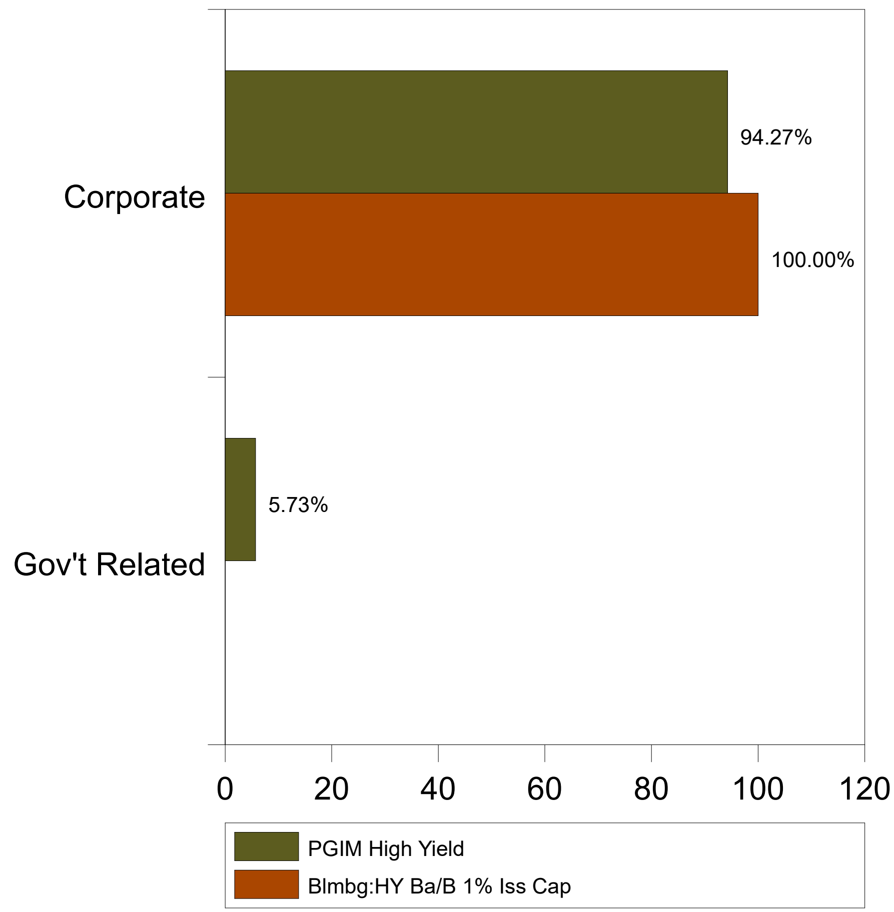
# PGIM – U.S. Higher Quality High Yield

## Index Evaluation

**Fixed Income Style Map**
**for 5 Years Ended June 30, 2018**



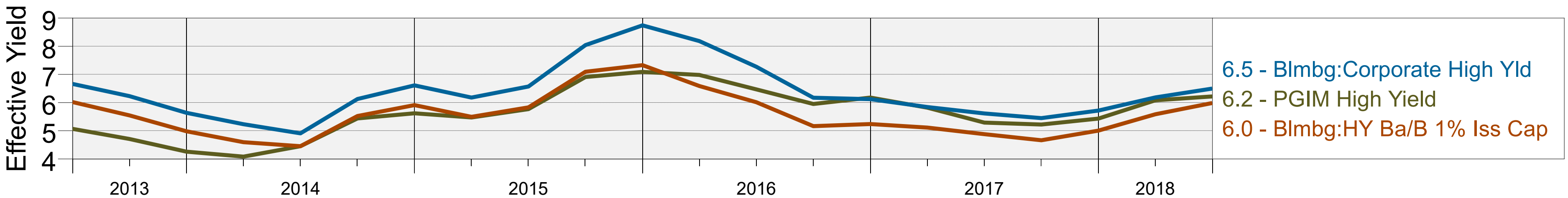

**Effective Sector Weights**
**vs Blmbg:HY Ba/B 1% Iss Cap**
**as of June 30, 2018**



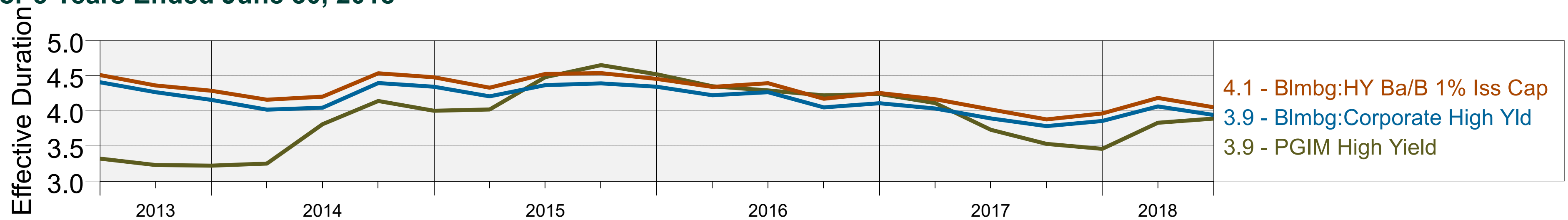
# PGIM – U.S. Higher Quality High Yield

## Index Evaluation

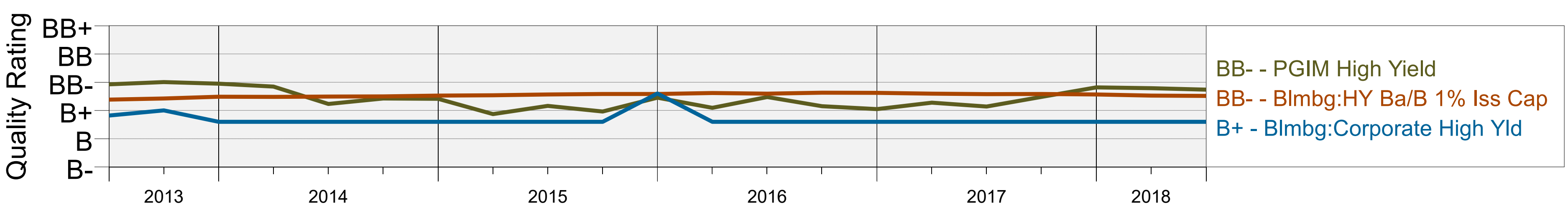
**Effective Yield**
**for 5 Years Ended June 30, 2018**




**Effective Duration**
**for 5 Years Ended June 30, 2018**



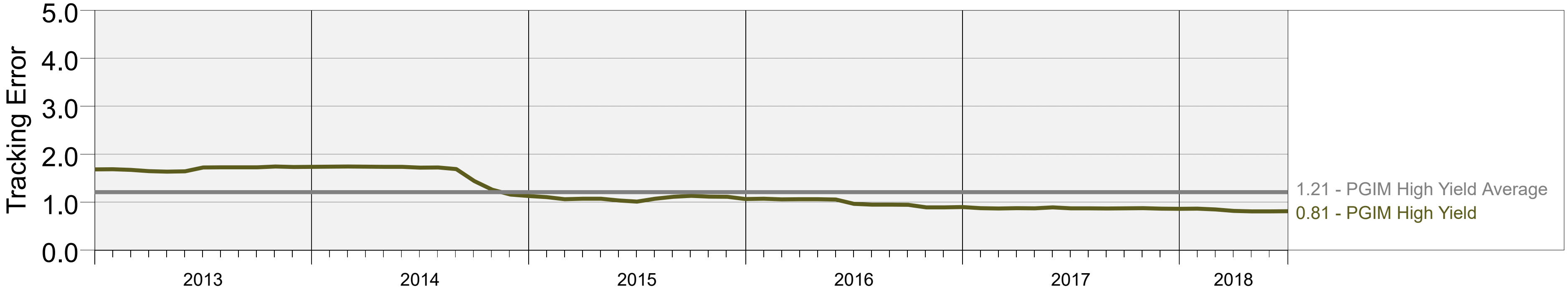

**Quality Rating**
**for 5 Years Ended June 30, 2018**



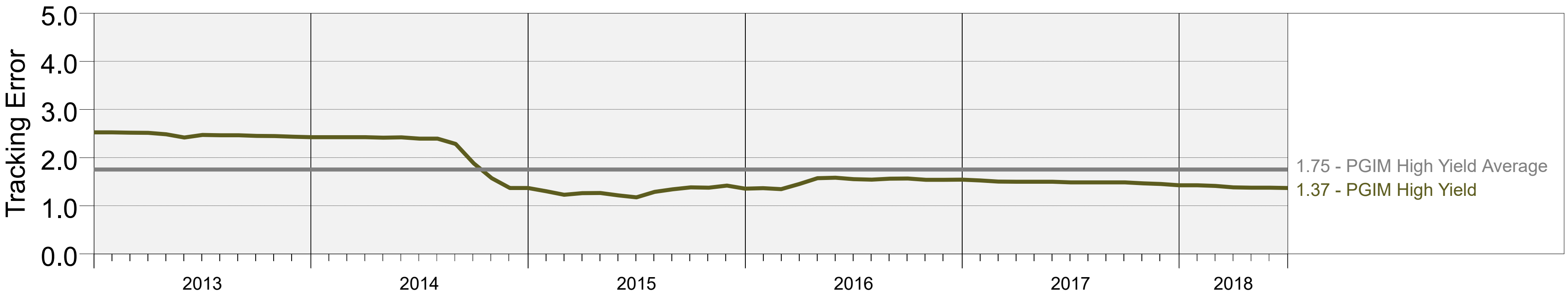
# PGIM – U.S. Higher Quality High Yield

## Index Evaluation

### Rolling 36 Month Tracking Error Relative To Blmbg:HY Ba/B 1% Iss Cap for 5 1/2 Years Ended June 30, 2018



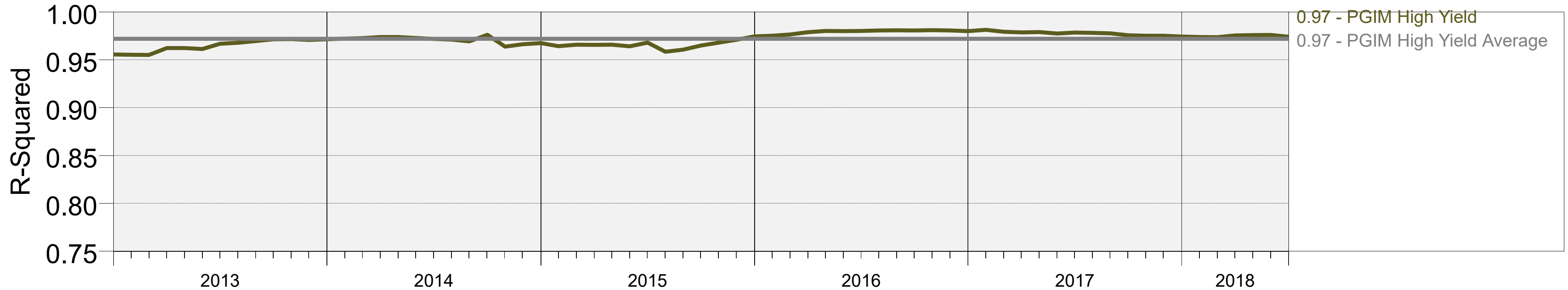

### Rolling 36 Month Tracking Error Relative To Blmbg:Corporate High Yld for 5 1/2 Years Ended June 30, 2018



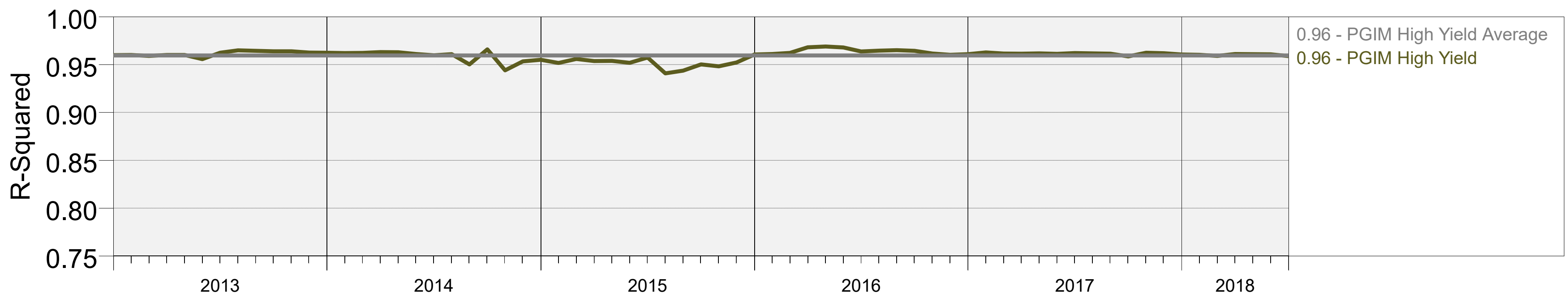
# PGIM – U.S. Higher Quality High Yield

## Index Evaluation

**Rolling 36 Month R-Squared Relative To**
**Blmbg:HY Ba/B 1% Iss Cap**
**for 5 1/2 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To**
**Blmbg:Corporate High Yld**
**for 5 1/2 Years Ended June 30, 2018**



# Wellington – Emerging Market Debt

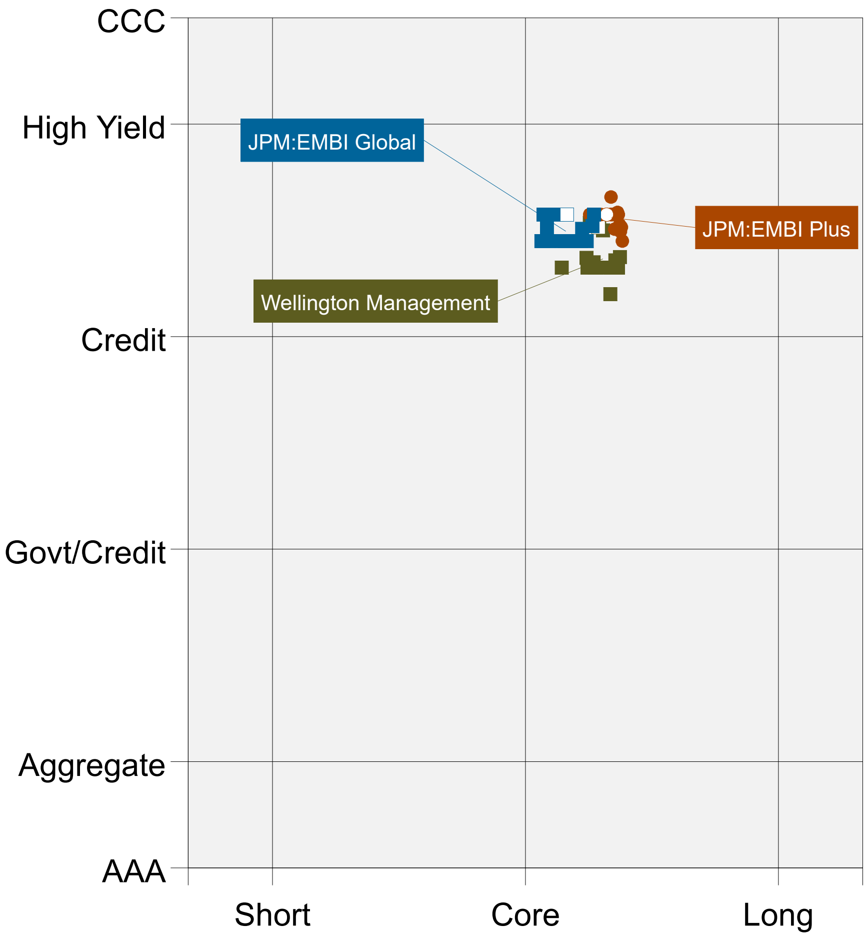
## Index Evaluation

- Current Index: J.P. Morgan EMBI Plus Index.
- Callan Recommendation: J.P. Morgan EMBI Global Diversified Index.
- Rationale: This strategy is typically benchmarked to either the JPMorgan EMBI Plus or the JPMorgan EMBI Global Diversified Index. The JPMorgan EMBI Global Diversified index is similar to the JPMorgan EMBI Plus index but includes quasi sovereigns which are securities owned or backed by the national government. The two indices track each other closely when looking at characteristics such as effective yield, effective duration and average quality. The strategy displays a somewhat tighter tracking error and correlation with the EMBI Global Diversified Index than the EMBI Plus Index.

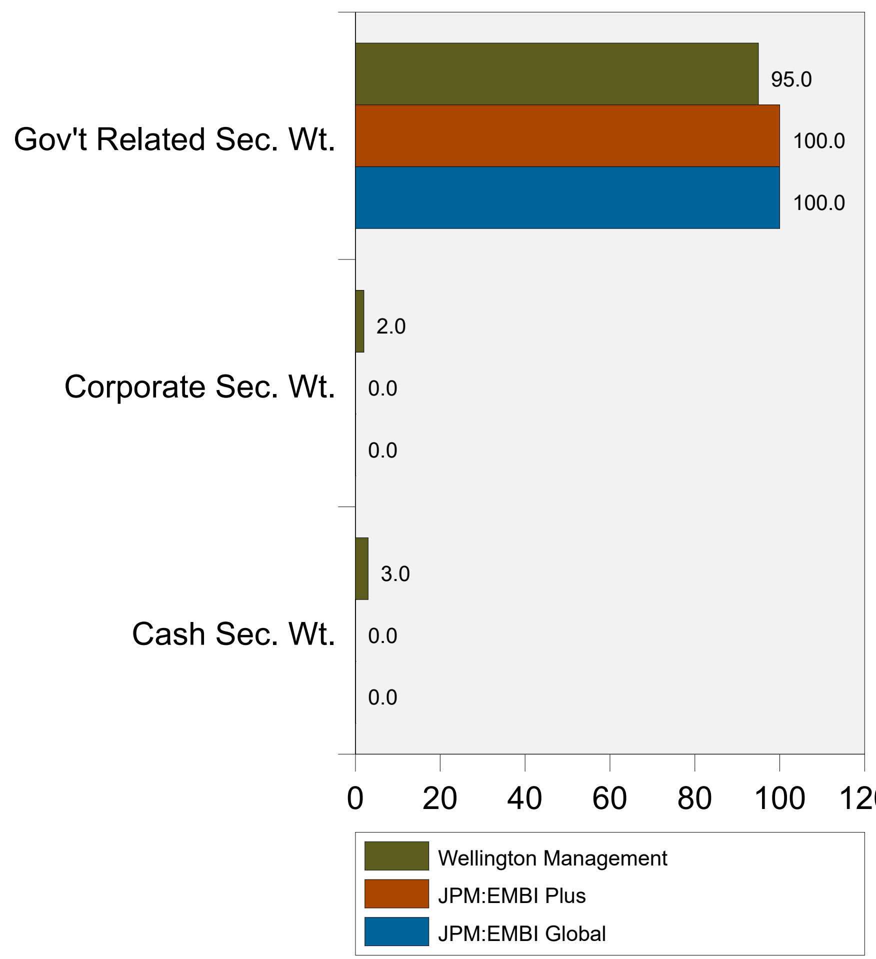
# Wellington – Emerging Market Debt

## Index Evaluation

**Fixed Income Style Map**
**for 5 Years Ended June 30, 2018**

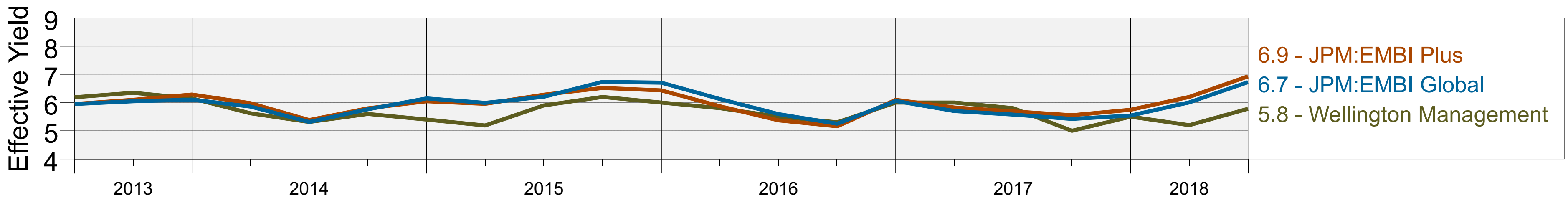



**Sector Distribution**
**as of June 30, 2018**

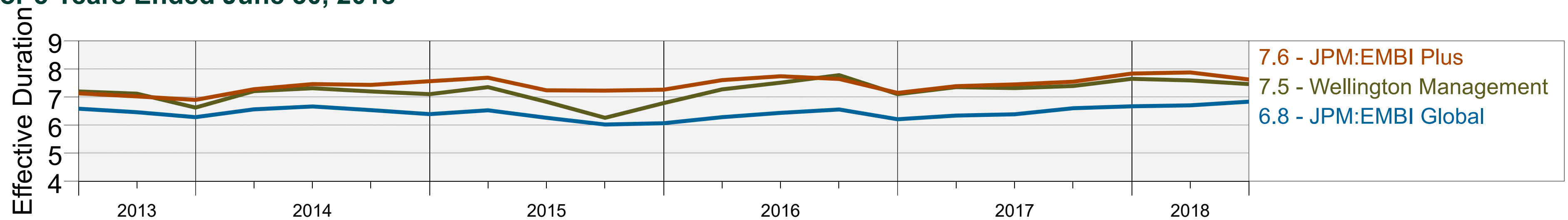


## Index Evaluation

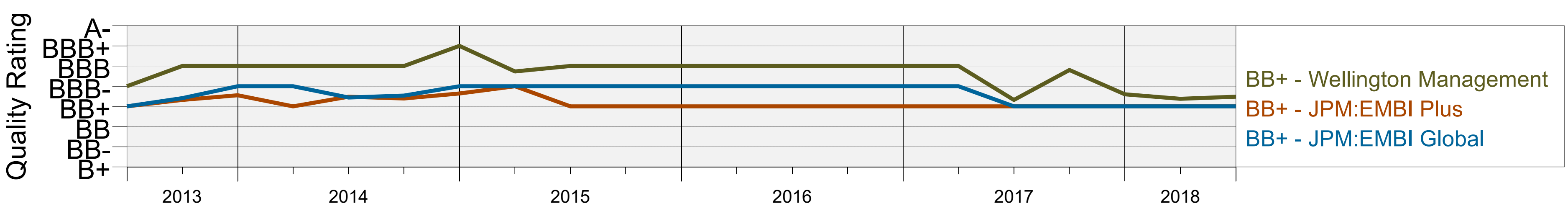
**Effective Yield**
**for 5 Years Ended June 30, 2018**




**Effective Duration**
**for 5 Years Ended June 30, 2018**



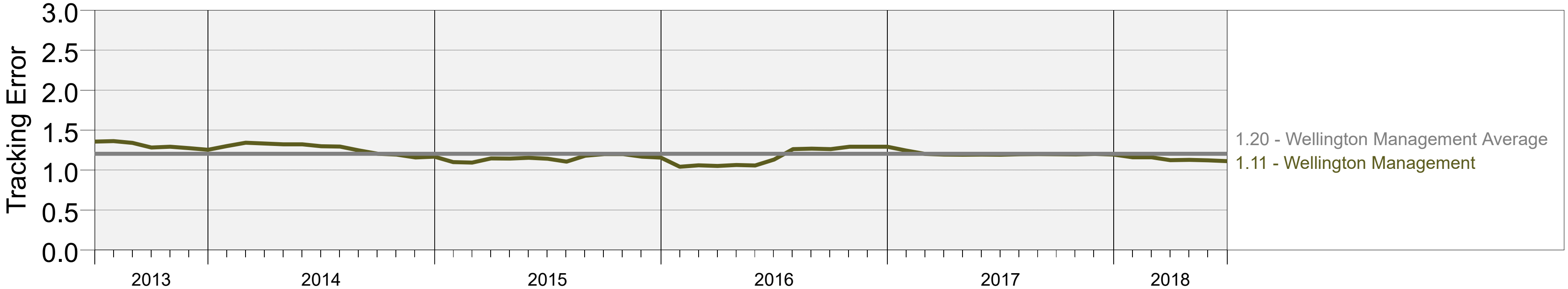

**Quality Rating**
**for 5 Years Ended June 30, 2018**



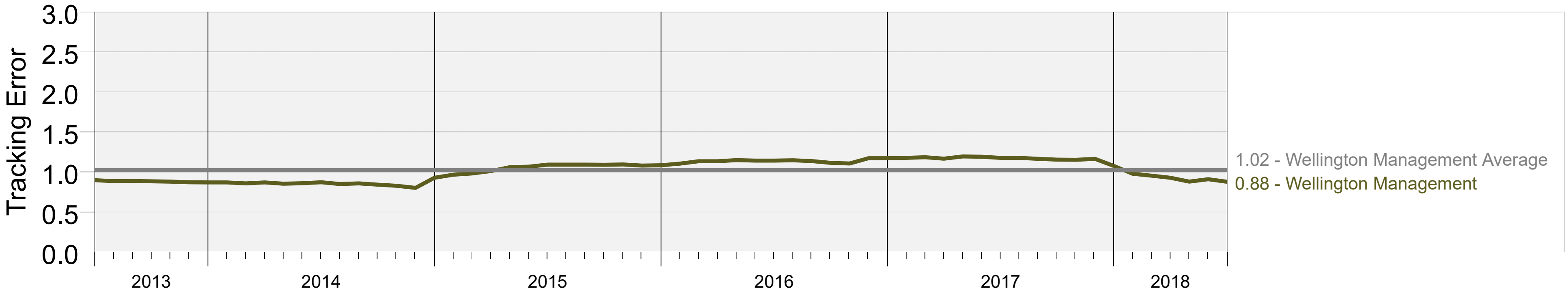
# Wellington – Emerging Market Debt

## Index Evaluation

**Rolling 36 Month Tracking Error Relative To**
**JPM:EMBI Plus**
**for 5 Years Ended June 30, 2018**



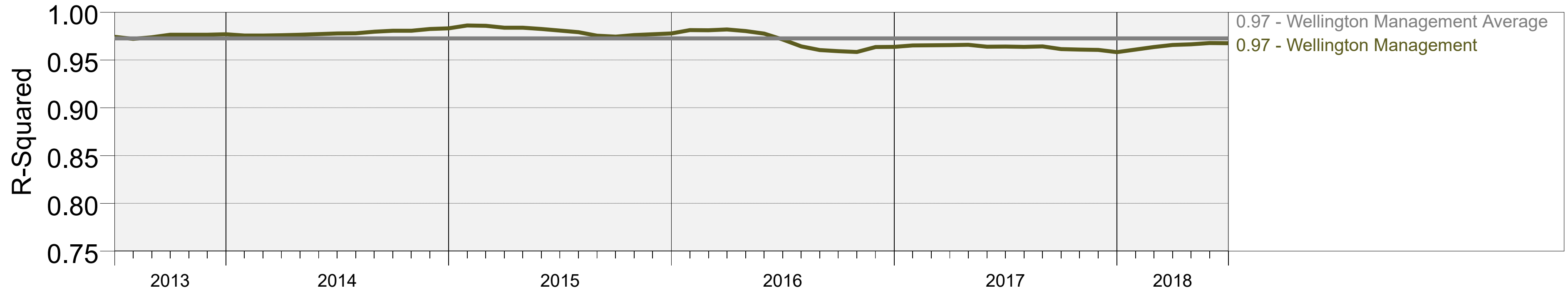

**Rolling 36 Month Tracking Error Relative To**
**JPM:EMBI Global**
**for 5 Years Ended June 30, 2018**



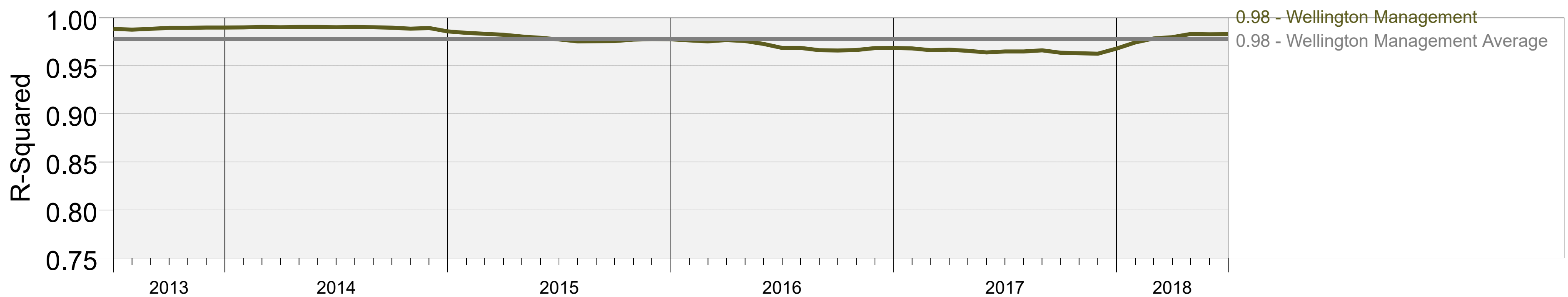
# Wellington – Emerging Market Debt

## Index Evaluation

**Rolling 36 Month R-Squared Relative To**
**JPM:EMBI Plus**
**for 5 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To**
**JPM:EMBI Global**
**for 5 Years Ended June 30, 2018**



# Stone Harbor – Emerging Market Debt

## Index Evaluation

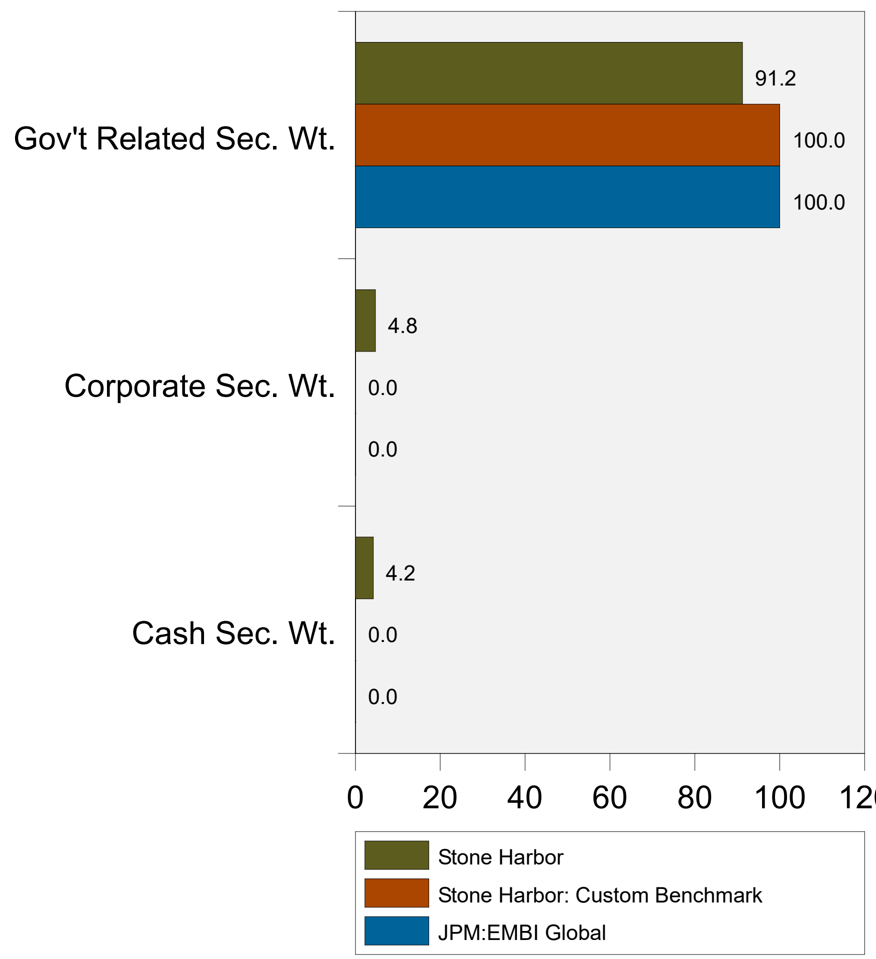
- Current Index: Custom Blend (50% J.P. Morgan EMBI Global Diversified, 50% J.P. Morgan GBI-EM Global Diversified).
- Callan Recommendation: Change to 50% JPMorgan GBI-EM Global Diversified, 40% JPMorgan EMBI Global Diversified Index, 10% JPMorgan CEMBI.
- Rationale: The strategy invests in both U.S. dollar denominated and local currency emerging markets debt. The majority of the portfolio assets are invested in sovereign and quasi-sovereign securities with a small allocation to corporate EM debt. Given this style, a blended benchmark is the best approach as there is no market index that represents both U.S. dollar denominated EM debt and local currency EM debt.

# Stone Harbor – Emerging Market Debt

## Index Evaluation

### Fixed Income Style Map
### for 5 Years Ended June 30, 2018

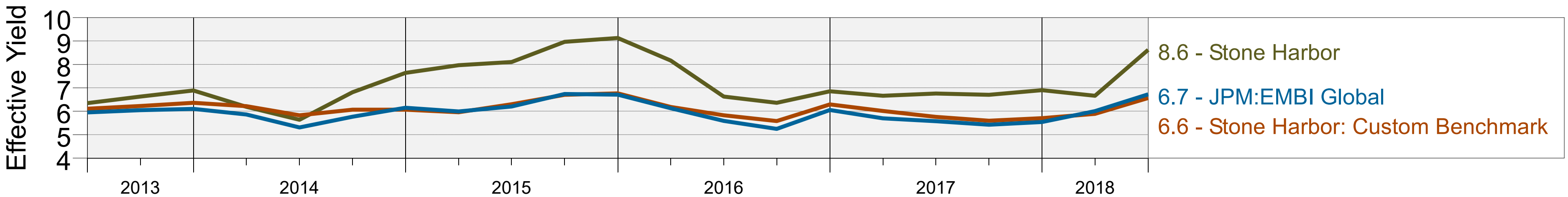

### Sector Distribution
### as of June 30, 2018



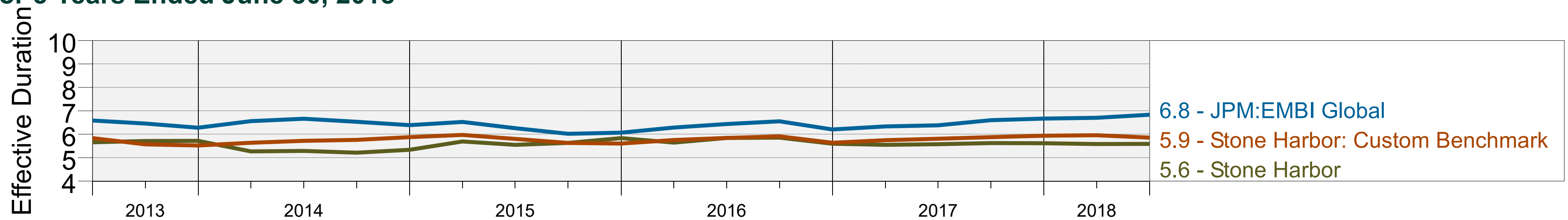
# Stone Harbor – Emerging Market Debt

## Index Evaluation

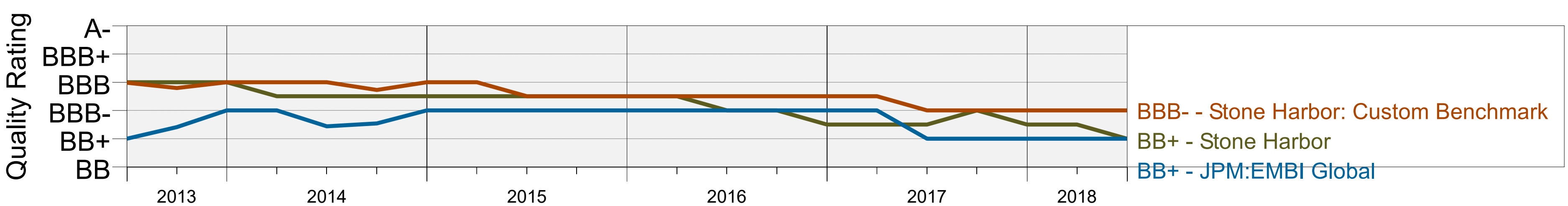
### Effective Yield
### for 5 Years Ended June 30, 2018




### Effective Duration
### for 5 Years Ended June 30, 2018



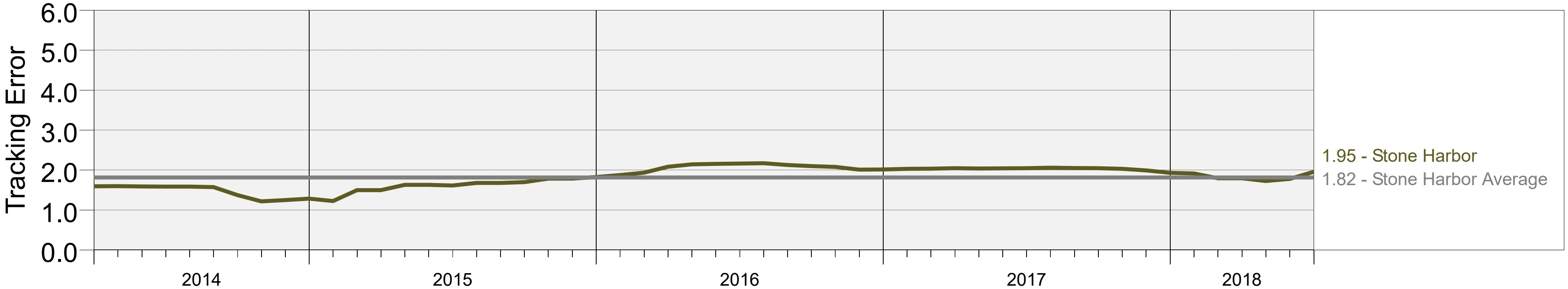

### Quality Rating
### for 5 Years Ended June 30, 2018



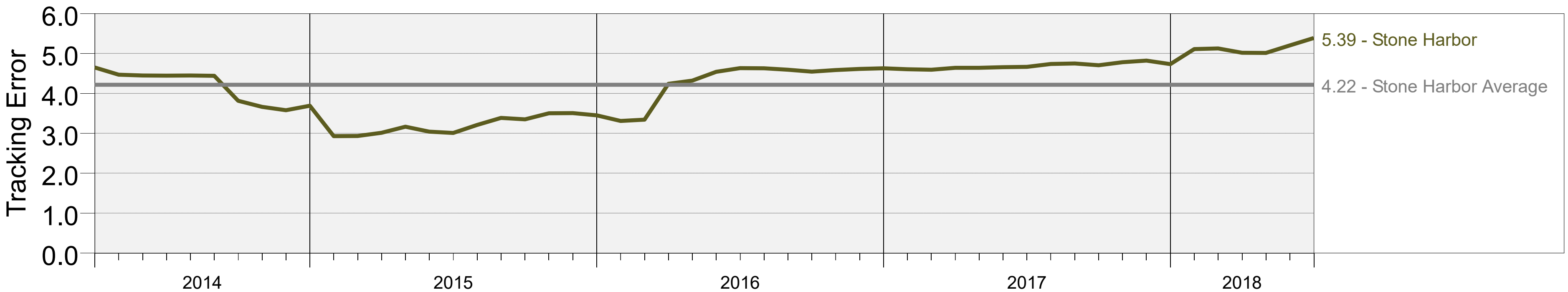
# Stone Harbor – Emerging Market Debt

## Index Evaluation

**Rolling 36 Month Tracking Error Relative To Stone Harbor: Custom Benchmark for 4 1/4 Years Ended June 30, 2018**



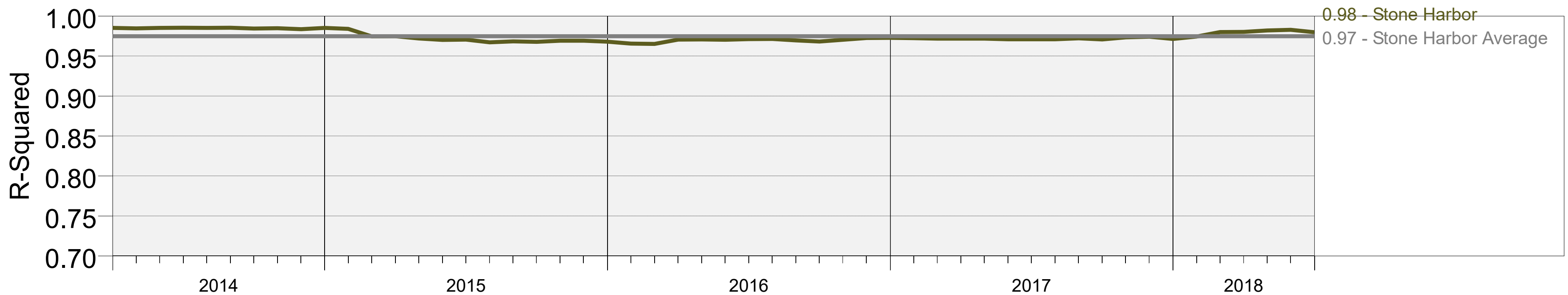

**Rolling 36 Month Tracking Error Relative To JPM:EMBI Global for 4 1/4 Years Ended June 30, 2018**



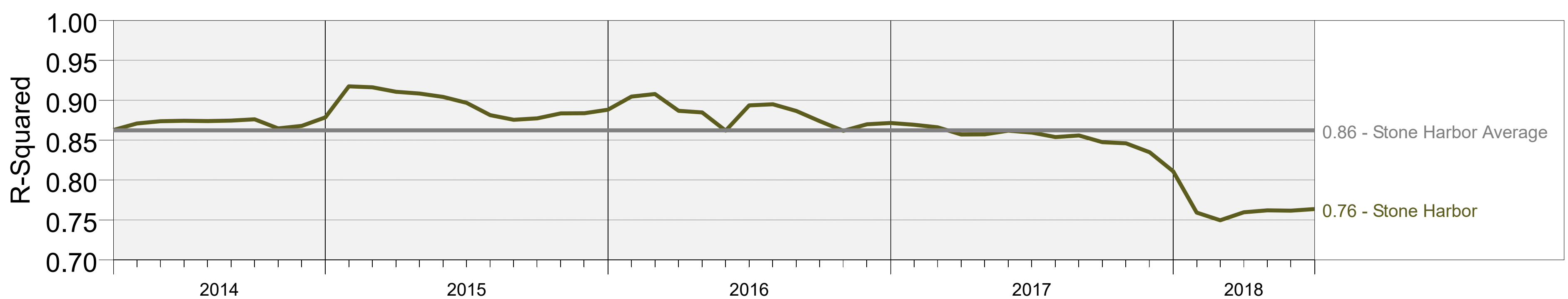
# Stone Harbor – Emerging Market Debt

## Index Evaluation

**Rolling 36 Month R-Squared Relative To Stone Harbor: Custom Benchmark for 4 1/4 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To JPM:EMBI Global for 4 1/4 Years Ended June 30, 2018**



# Advent – Global Convertibles

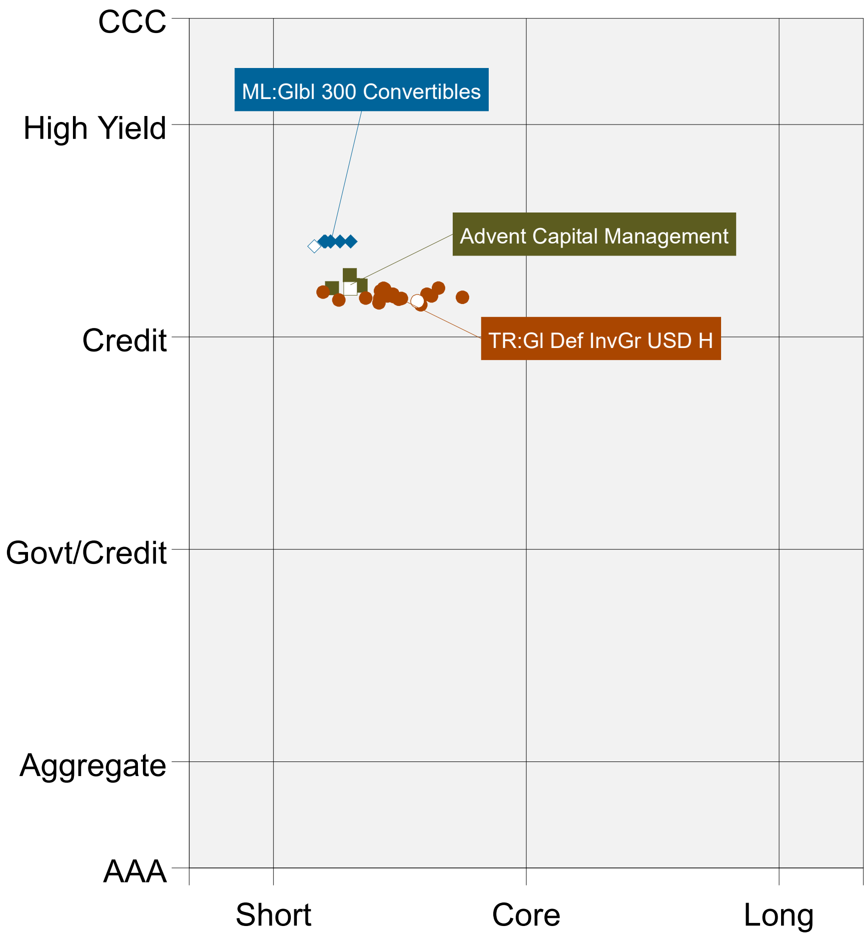
## Index Evaluation

- Current Index: Thomson Reuters Global Defensive Investment Grade USD Hedged Index.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

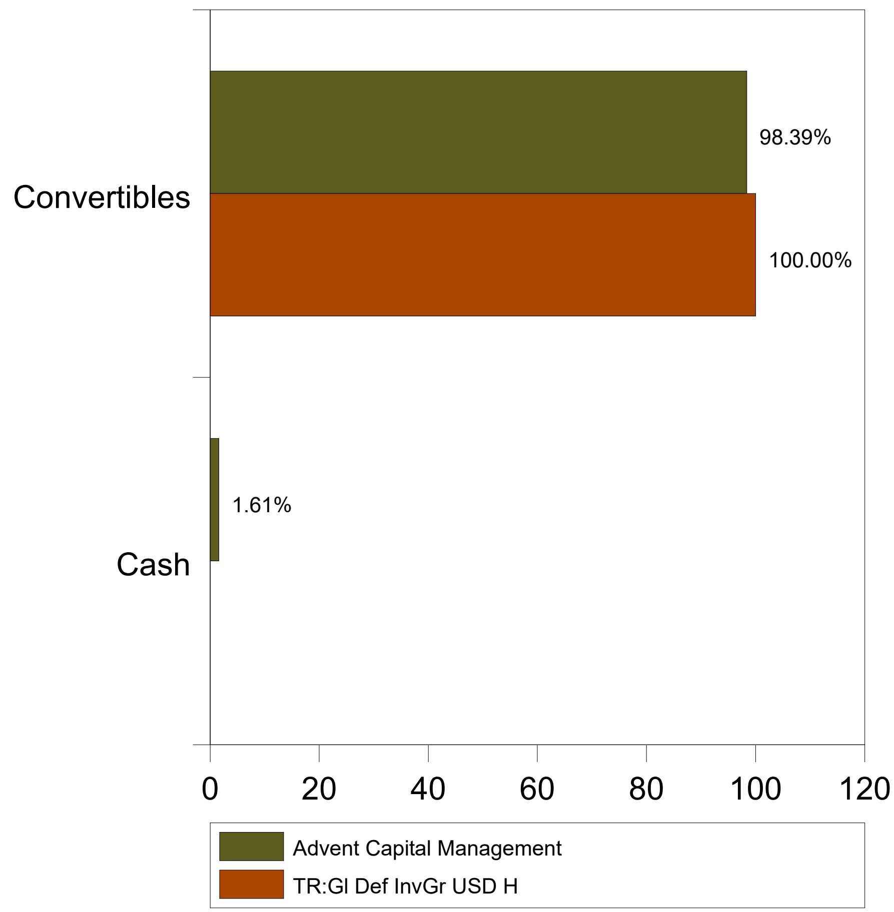
# Advent – Global Convertibles

## Index Evaluation

### Fixed Income Style Map
### for 4 3/4 Years Ended June 30, 2018



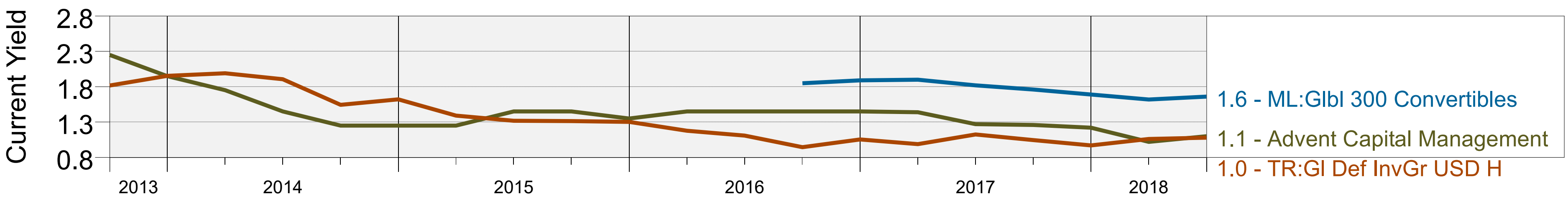

### Effective Sector Weights
### vs TR:Gl Def InvGr USD H
### as of June 30, 2018



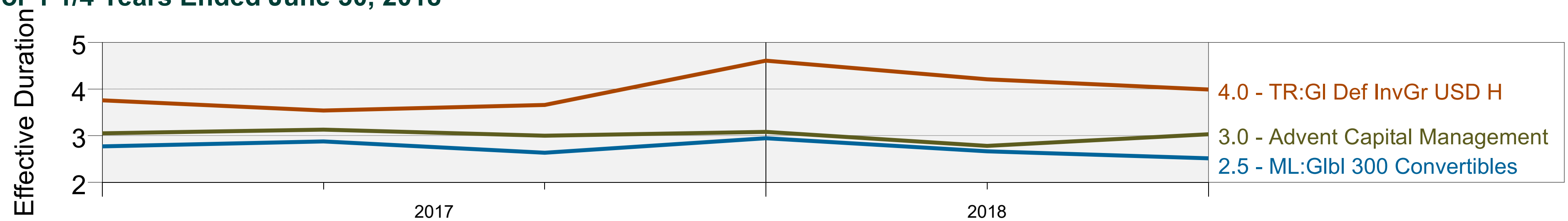
# Advent – Global Convertibles

## Index Evaluation

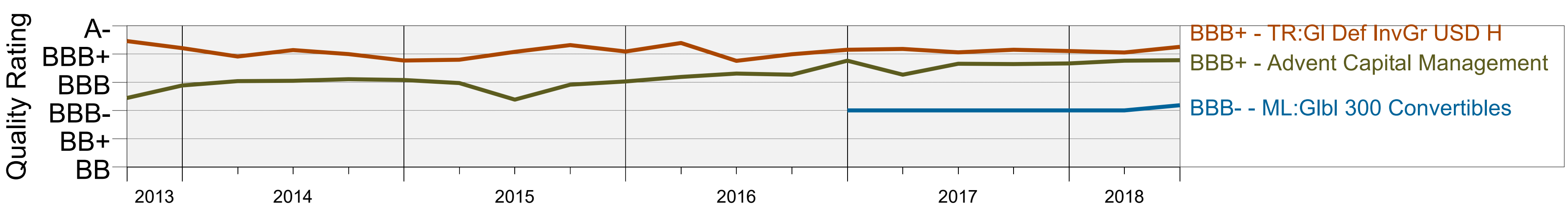
**Current Yield**
**for 4 3/4 Years Ended June 30, 2018**




**Effective Duration**
**for 1 1/4 Years Ended June 30, 2018**



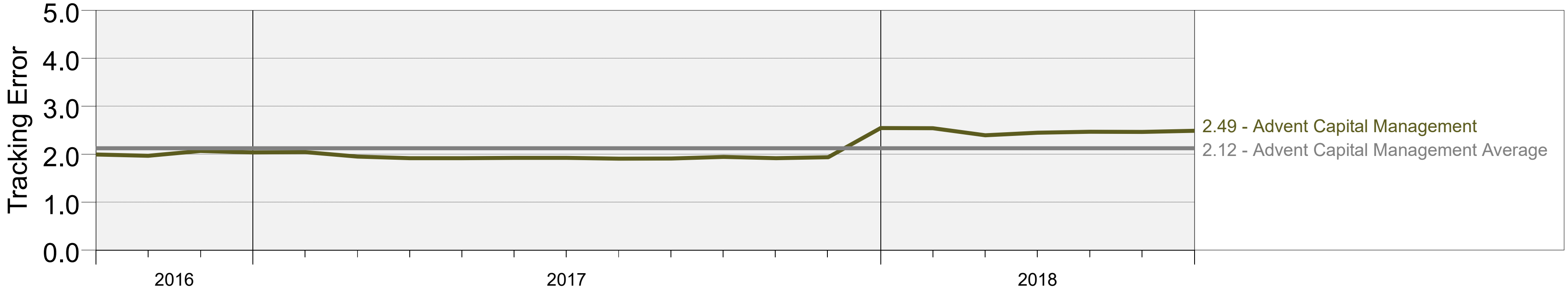

**Quality Rating**
**for 4 3/4 Years Ended June 30, 2018**



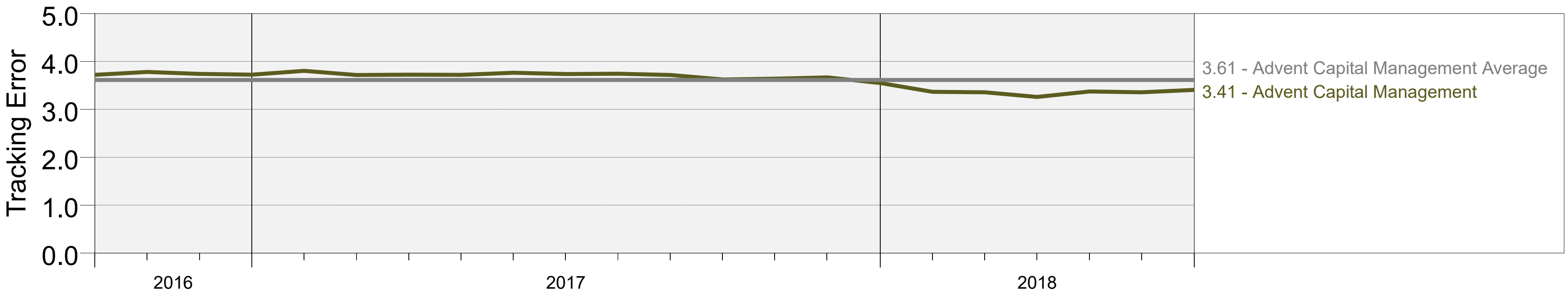
# Advent – Global Convertibles

## Index Evaluation

**Rolling 36 Month Tracking Error Relative To**
**TR:Gl Def InvGr USD H**
**for 1 3/4 Years Ended June 30, 2018**



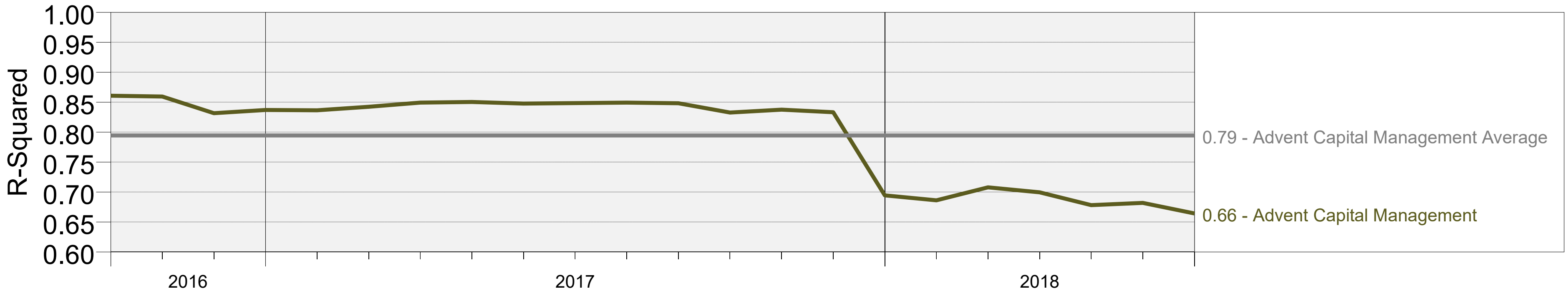

**Rolling 36 Month Tracking Error Relative To**
**ML:Glbl 300 Convertibles**
**for 1 3/4 Years Ended June 30, 2018**



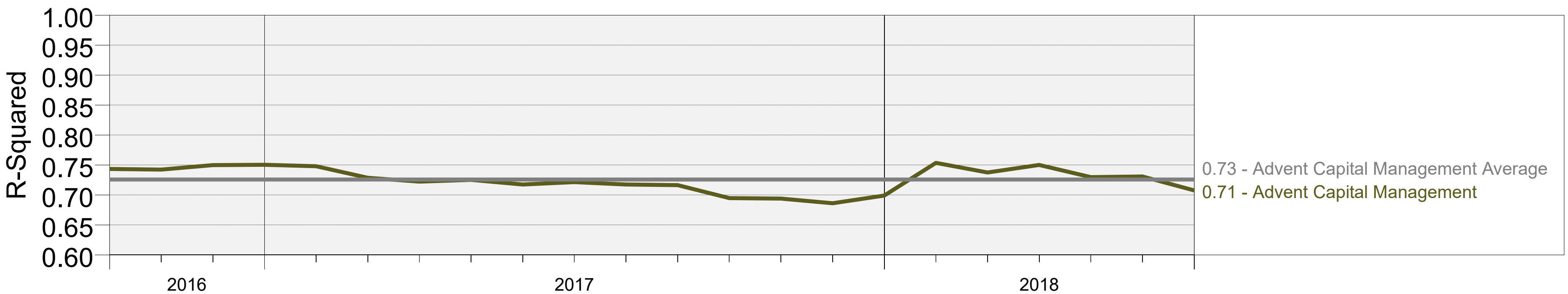
# Advent – Global Convertibles

## Index Evaluation

**Rolling 36 Month R-Squared Relative To**
**TR:Gl Def InvGr USD H**
**for 1 3/4 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To**
**ML:Glbl 300 Convertibles**
**for 1 3/4 Years Ended June 30, 2018**



# Ferox – Salar Fund (Convertibles Strategy)

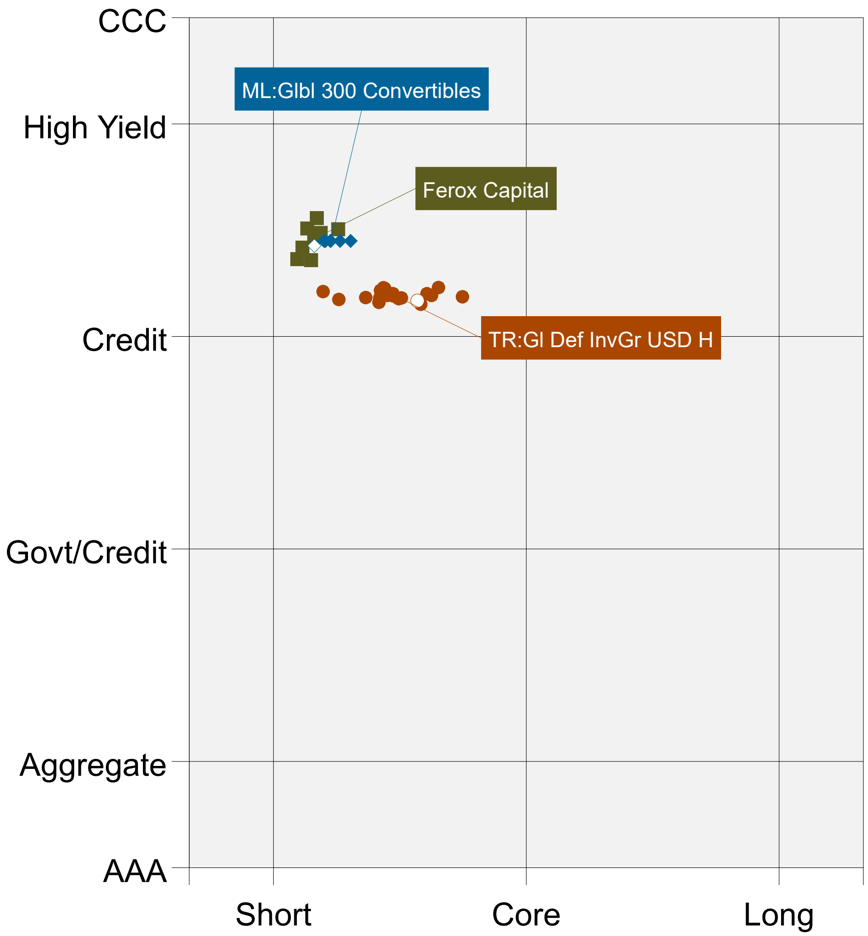
## Index Evaluation

- Current Index: Thomson Reuters Global Defensive Investment Grade USD Hedged Index.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

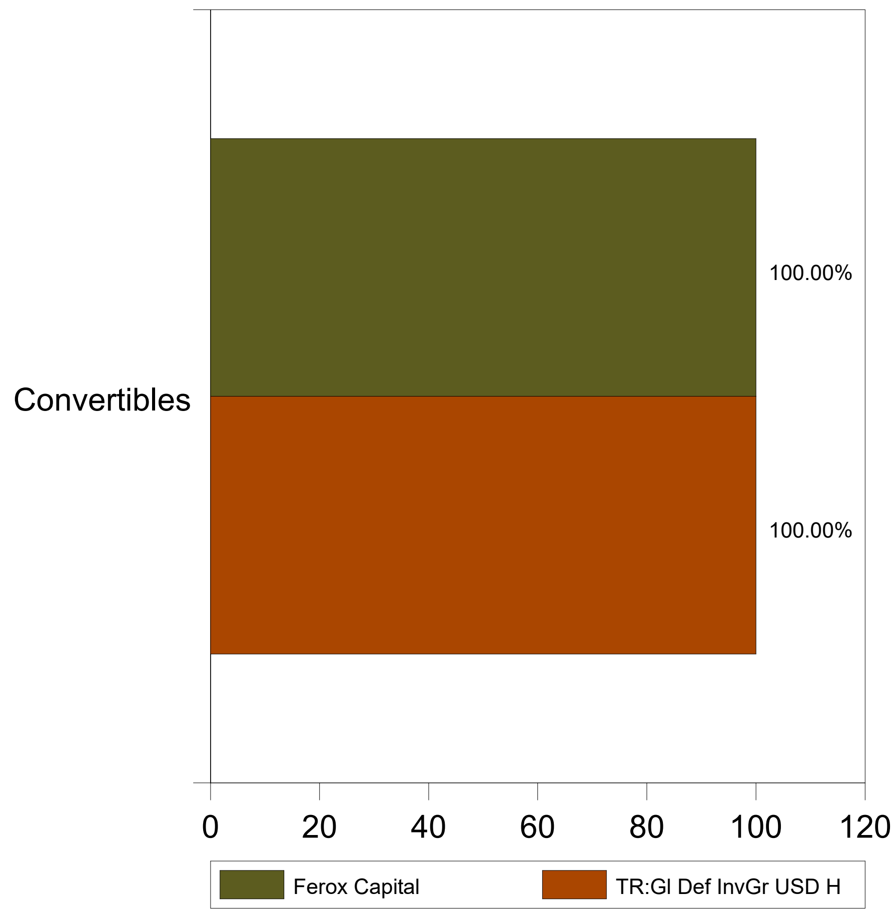
# Ferox – Salar Fund (Convertibles Strategy)

## Index Evaluation

**Fixed Income Style Map**
**for 4 3/4 Years Ended June 30, 2018**



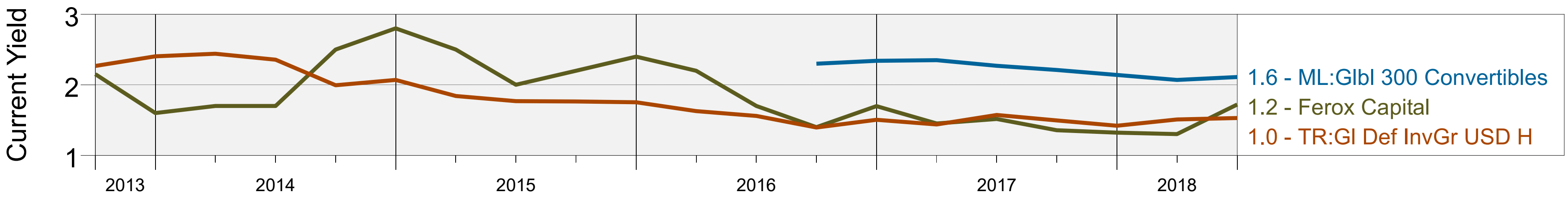

**Effective Sector Weights**
**vs TR:Gl Def InvGr USD H**
**as of June 30, 2018**



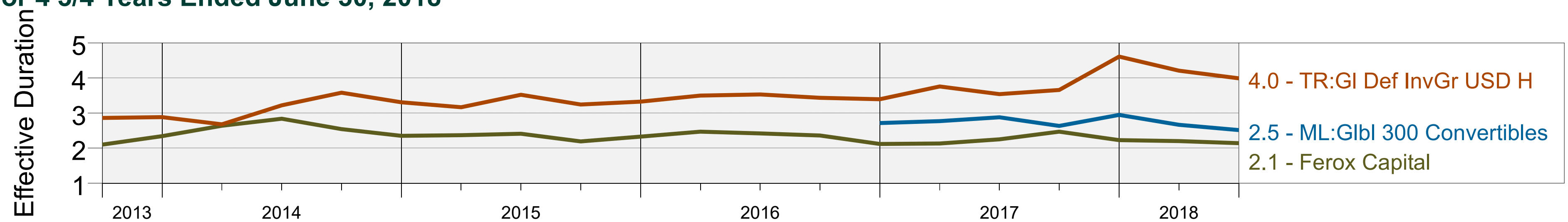
# Ferox – Salar Fund (Convertibles Strategy)

## Index Evaluation

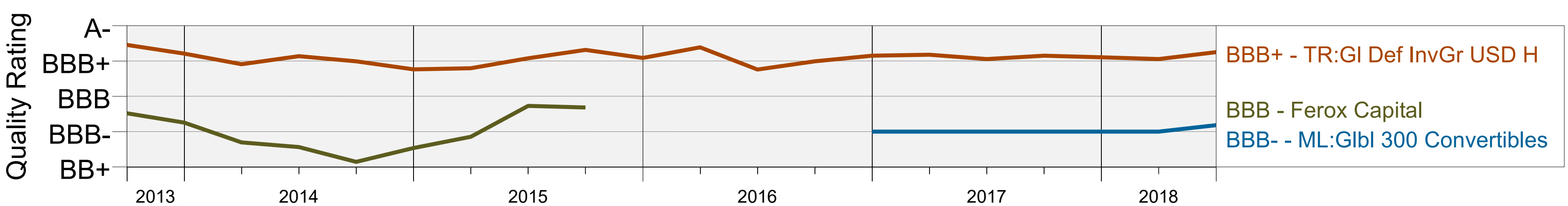
**Current Yield**
**for 4 3/4 Years Ended June 30, 2018**




**Effective Duration**
**for 4 3/4 Years Ended June 30, 2018**



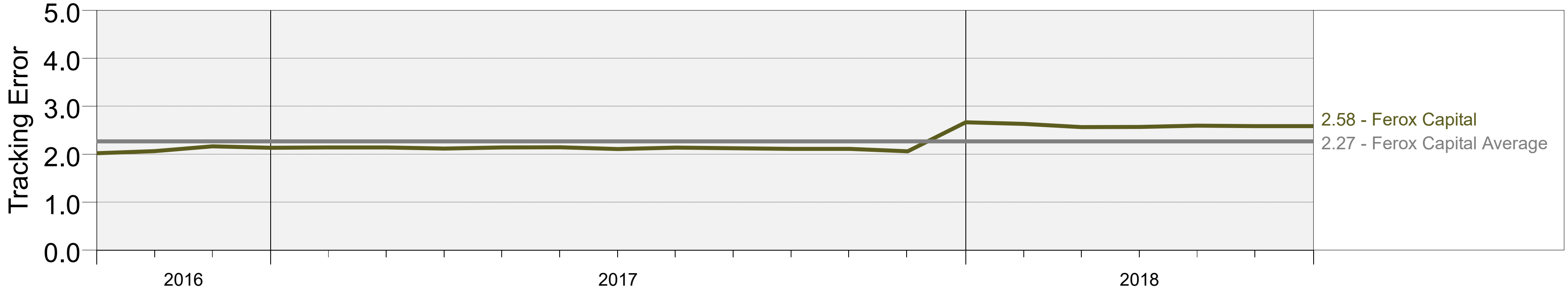

**Quality Rating**
**for 4 3/4 Years Ended June 30, 2018**



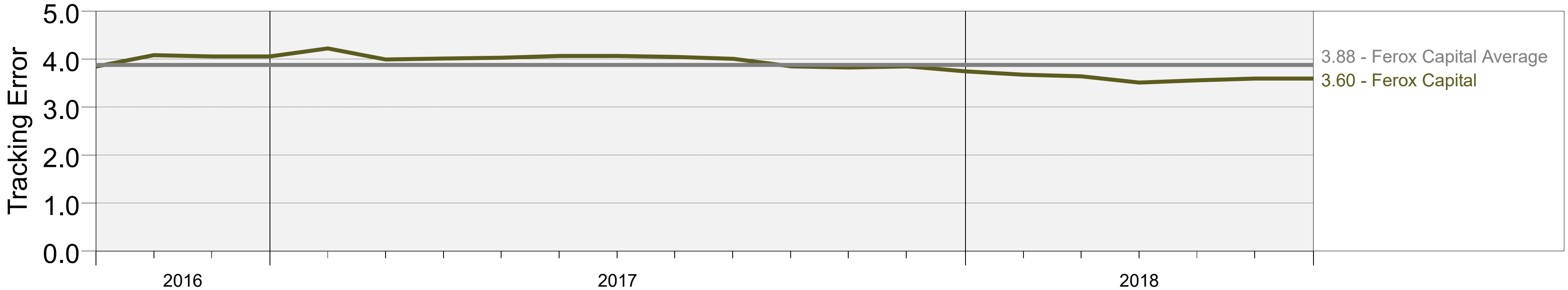
# Ferox – Salar Fund (Convertibles Strategy)

## Index Evaluation

**Rolling 36 Month Tracking Error Relative To
TR:Gl Def InvGr USD H
for 1 3/4 Years Ended June 30, 2018**



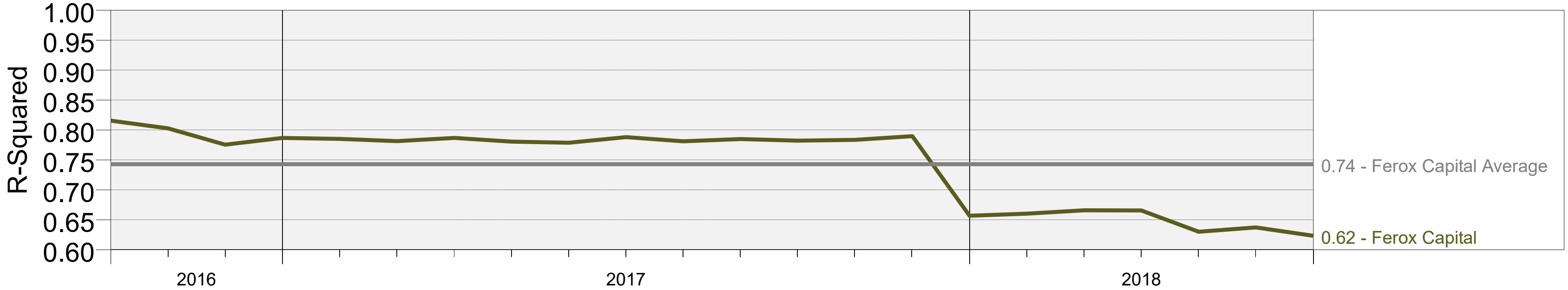

**Rolling 36 Month Tracking Error Relative To
ML:Glbl 300 Convertibles
for 1 3/4 Years Ended June 30, 2018**



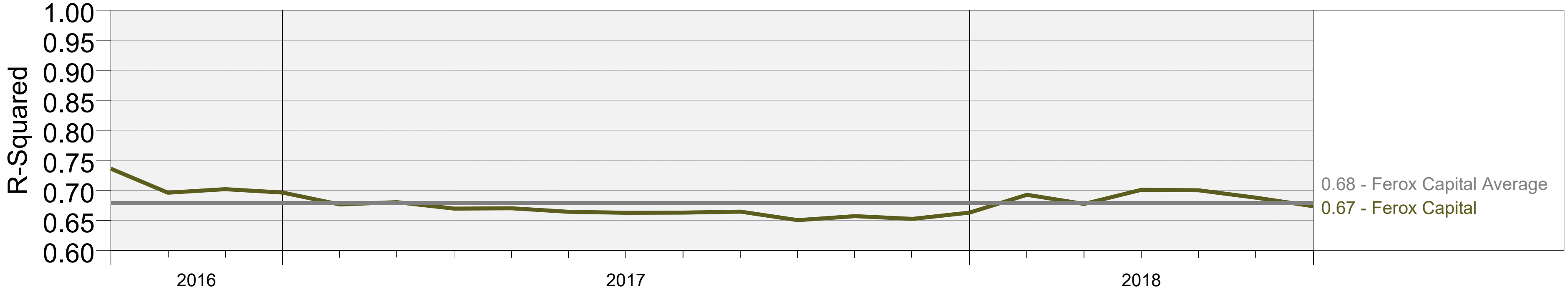
# Ferox – Salar Fund (Convertibles Strategy)

## Index Evaluation

**Rolling 36 Month R-Squared Relative To**
**TR:Gl Def InvGr USD H**
**for 1 3/4 Years Ended June 30, 2018**




**Rolling 36 Month R-Squared Relative To**
**ML:Glbl 300 Convertibles**
**for 1 3/4 Years Ended June 30, 2018**



# Alternatives

# Hedge Fund of Funds

# Blackstone Partners Offshore – Hedge Fund of Funds

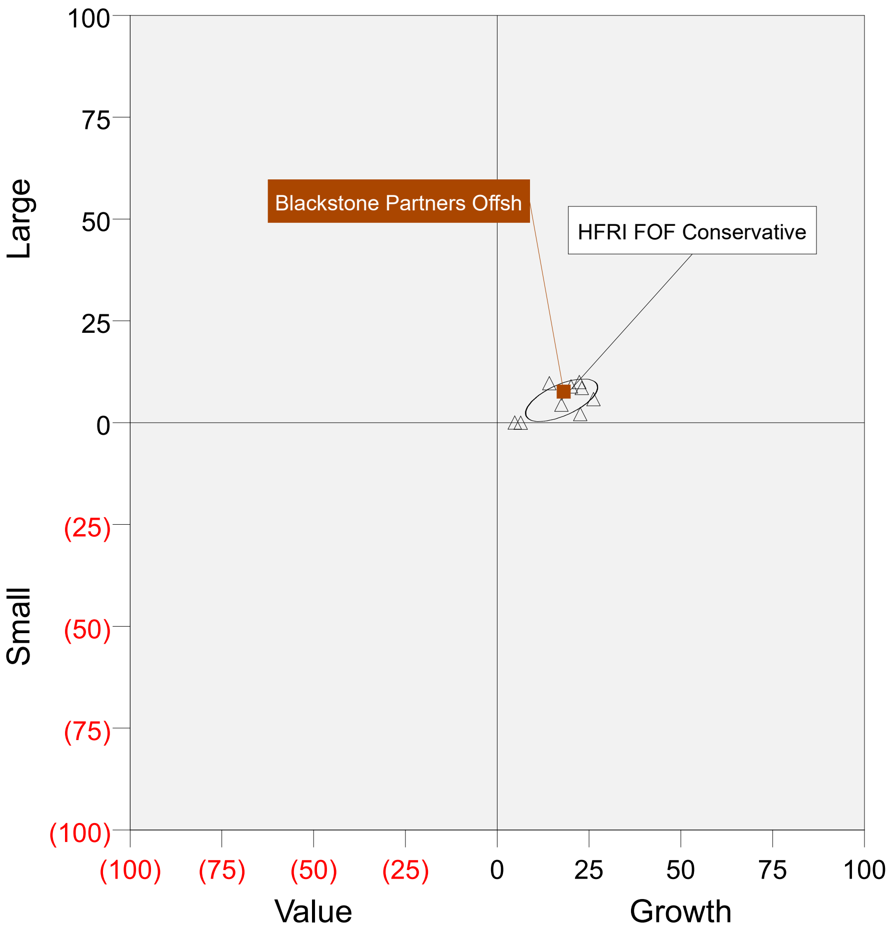
## Returns-Based Index Evaluation Summary

- Current Index: HFRI Conservative FoF.
- Callan Recommendation: JLARC is using the appropriate index and should maintain the HFRI Conservative FoF Index.
- Rationale:
  - Using regression analysis based on monthly returns for 5 and 15 years, Blackstone is comfortably within both the Conservative and Diversified peer groups. However, the Conservative peer group exhibits less dispersion.
    - *An argument can be made for either group. But the Conservative group is more concentrated, and better represents the returns*
  - 3-Year Tracking Error relative to the HFRI Conservative FoF Index peaked at 1.93 in 2011, but is between 1.01 and 0.73 since 2012. That is a tighter range compared to other HFRI indices.
    - *Tracking Error relative to the HFRI Diversified Index peaked at 1.82 in 2011, and has a range of 0.97 to 1.78, since 2012.*
    - *Tracking Error relative to the HFRI Market Defensive Index peaked at 8.57 in 2011, and has a range of 3.14 to 4.82, since 2012.*
    - *Tracking Error relative to the HFRI FoF Index was above 2.0 in 2011, and has a range of 2.03 to 1.06, since 2012.*
  - 3-Year R-Squared relative to the HFRI Conservative FoF Index has the tightest range compared to the other HFRI indices, between 0.98 to 0.82.
    - *R Squared relative to the HFRI Diversified Index has a range of 0.98 to 0.73, since 2011.*
    - *R Squared relative to the HFRI Market Defensive Index has a range of 0.35 to 0.01, since 2011.*
    - *R Squared relative to the HFRI FoF Index has a range of 0.98 to 0.78, since 2011.*
  - 3-Year Correlation relative to the HFRI Conservative FoF Index has the tightest range compared to the other HFRI indices, between 0.99 to 0.91.
    - *Correlation relative to the HFRI Diversified Index has a range of 0.99 to 0.86, since 2011.*
    - *Correlation relative to the HFRI Market Defensive Index has a range of 0.59 to -0.34, since 2011.*
  - Blackstone’s Returns-based Strategy Exposures are more similar to the HFRI Conservative Index than the HFRI Diversified Index, using Credit Suisse Strategy Exposure weights.

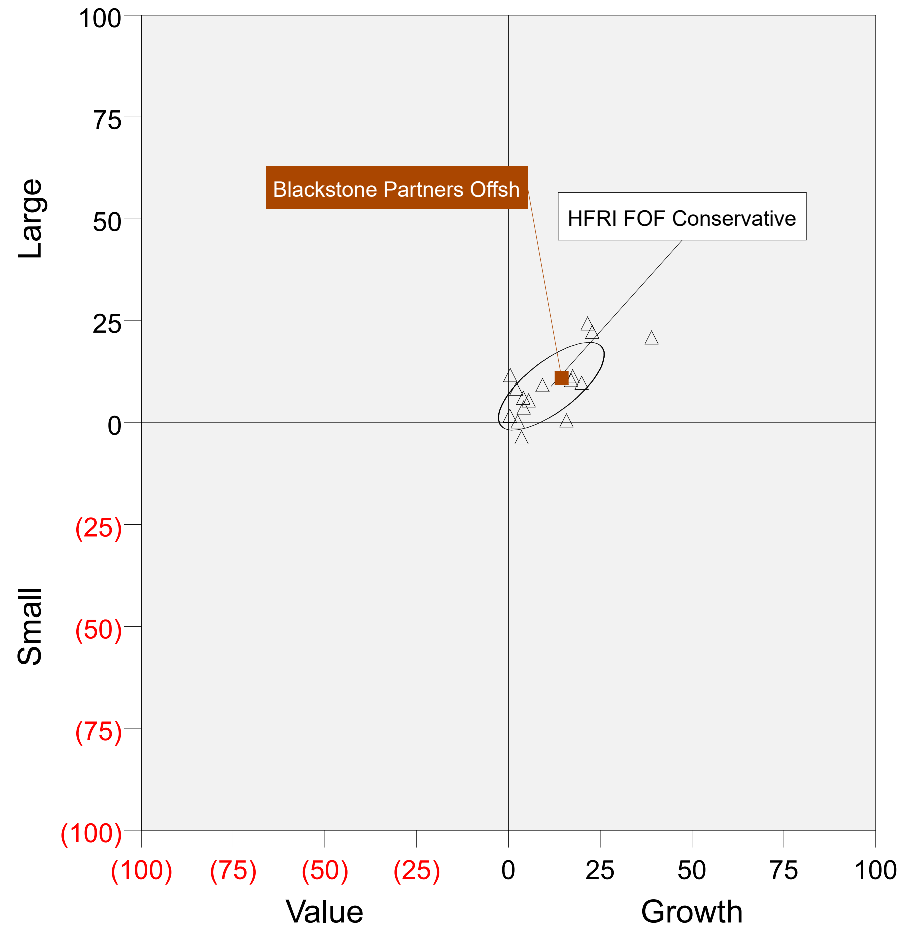
# Blackstone Partners Offshore – Hedge Fund of Funds

## Index Evaluation

**Return Based Style Map**
**for 15 Years Ended June 30, 2018**




**Return Based Style Map**
**for 5 Years Ended June 30, 2018**

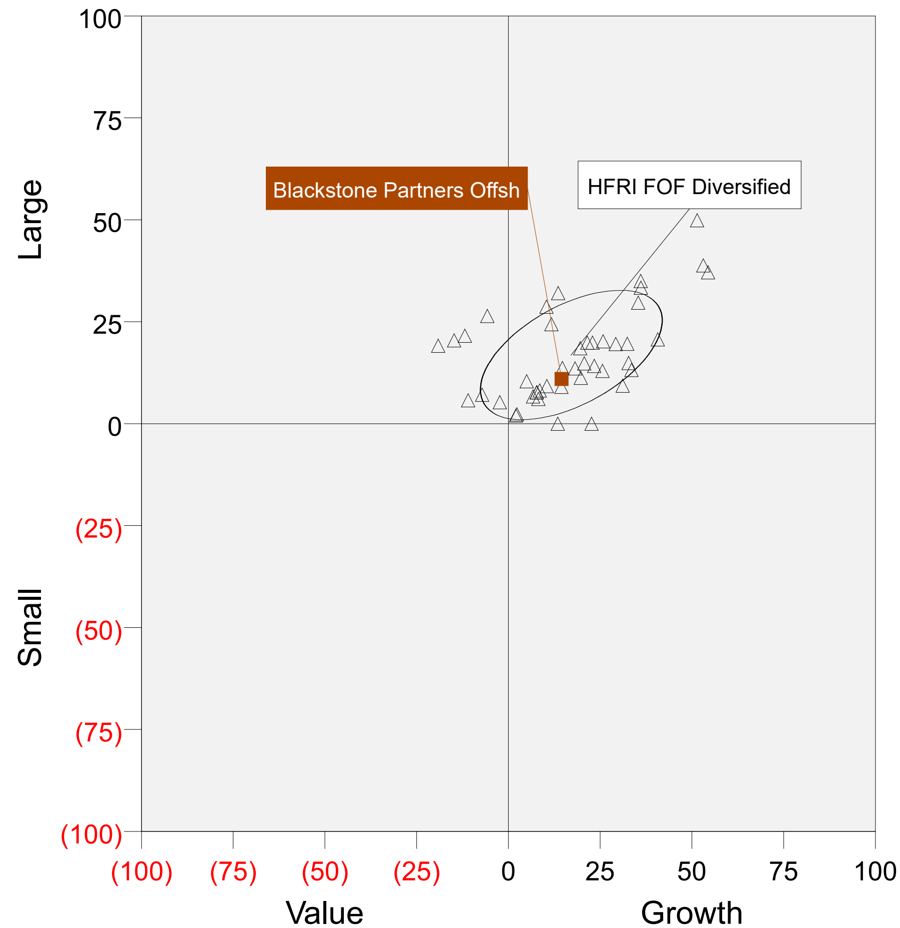


# Blackstone Partners Offshore – Hedge Fund of Funds

## Index Evaluation

**Return Based Style Map**
**for 15 Years Ended June 30, 2018**

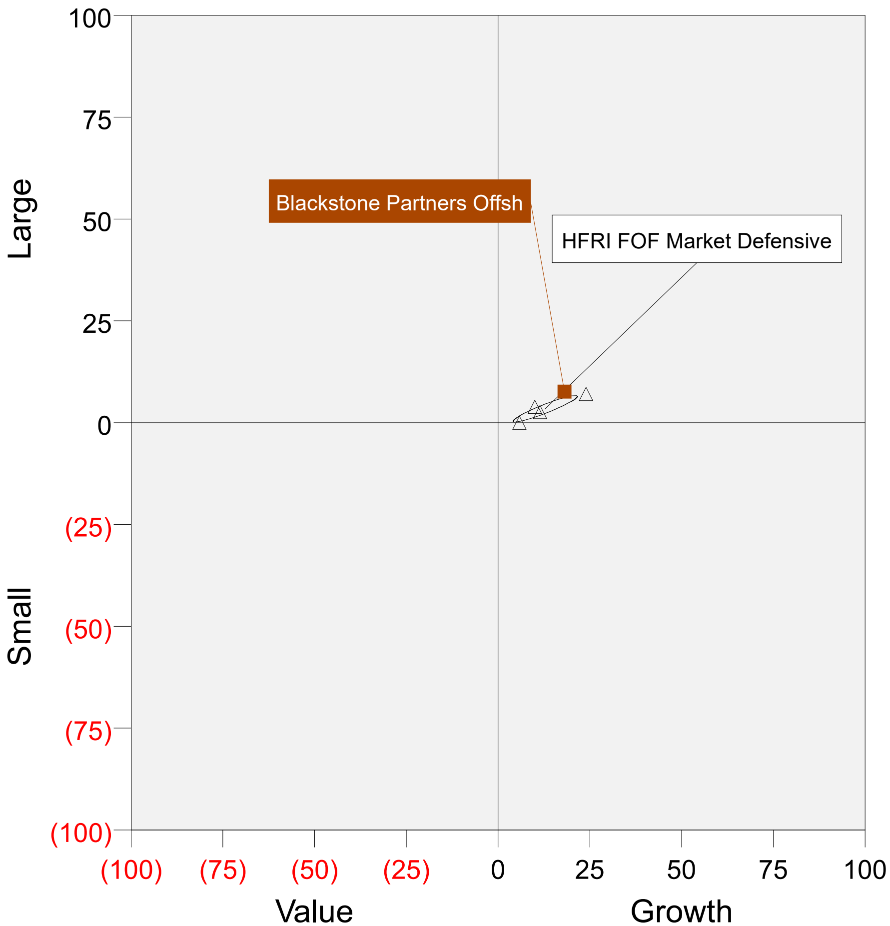

**Return Based Style Map**
**for 5 Years Ended June 30, 2018**



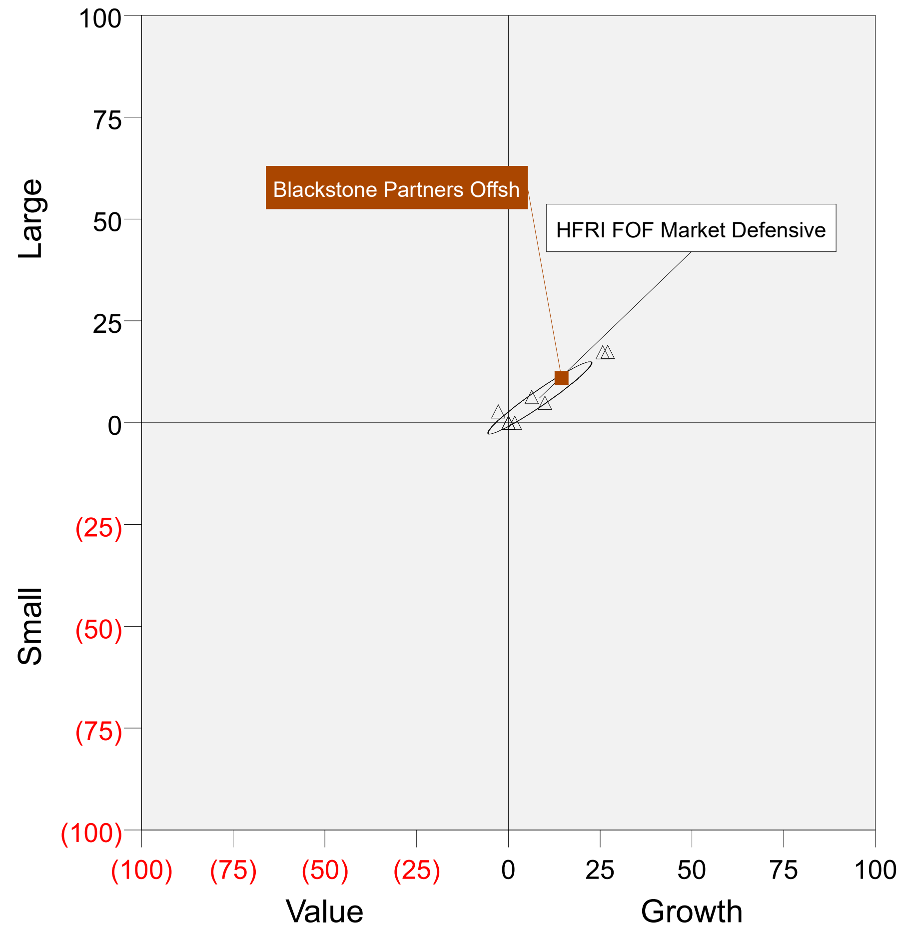
# Blackstone Partners Offshore – Hedge Fund of Funds

## Index Evaluation

**Return Based Style Map**
**for 15 Years Ended June 30, 2018**



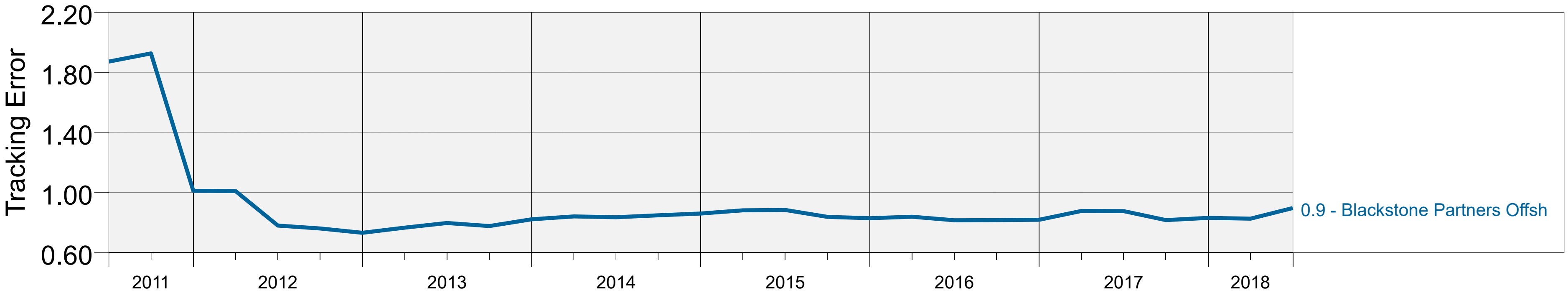

**Return Based Style Map**
**for 5 Years Ended June 30, 2018**



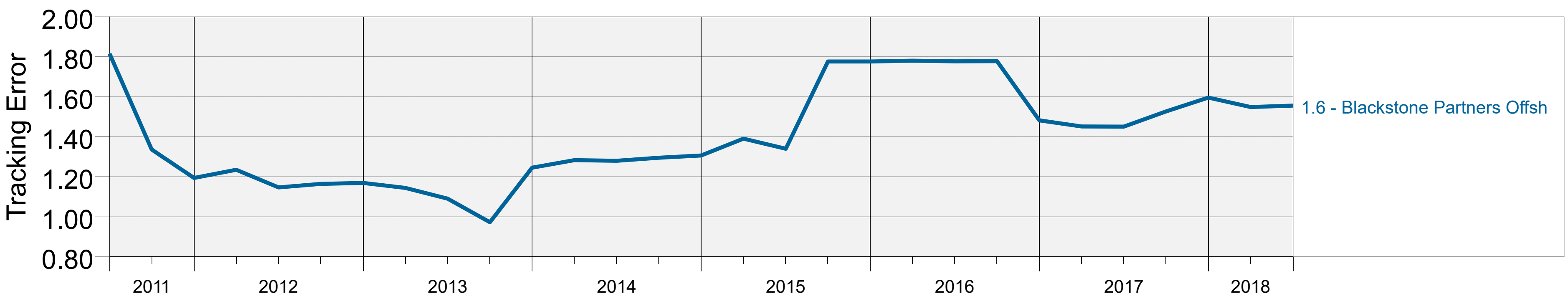
# Blackstone Partners Offshore – Hedge Fund of Funds

## Index Evaluation

**Rolling 12 Quarter Tracking Error Relative To**
**HFRI FOF:Conservative Idx**
**for 7 Years Ended June 30, 2018**



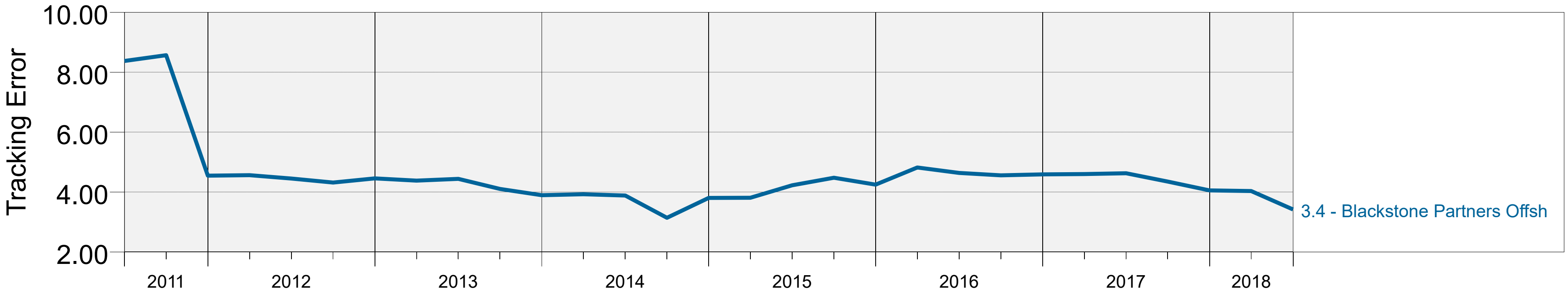

**Rolling 12 Quarter Tracking Error Relative To**
**HFRI FOF:Diversified Idx**
**for 7 Years Ended June 30, 2018**



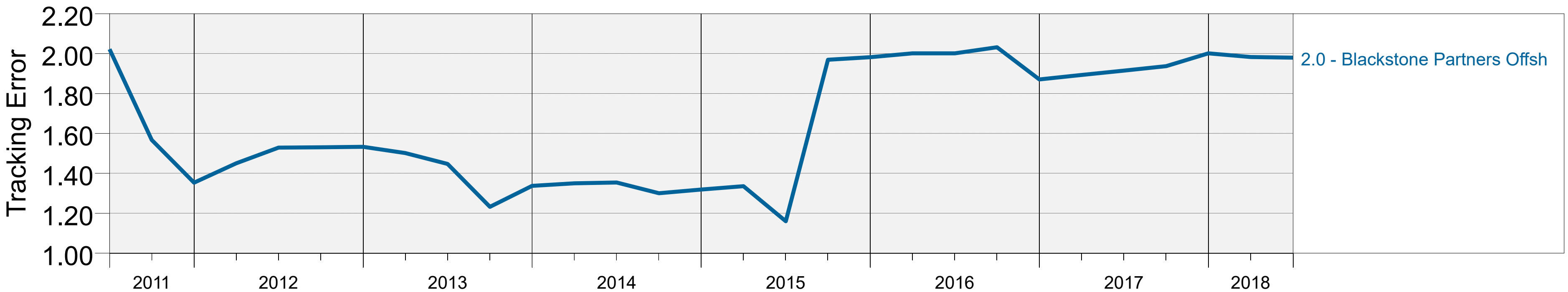
# Blackstone Partners Offshore – Hedge Fund of Funds

## Index Evaluation

**Rolling 12 Quarter Tracking Error Relative To**
**HFRI FOF:Mkt Defensive**
**for 7 Years Ended June 30, 2018**



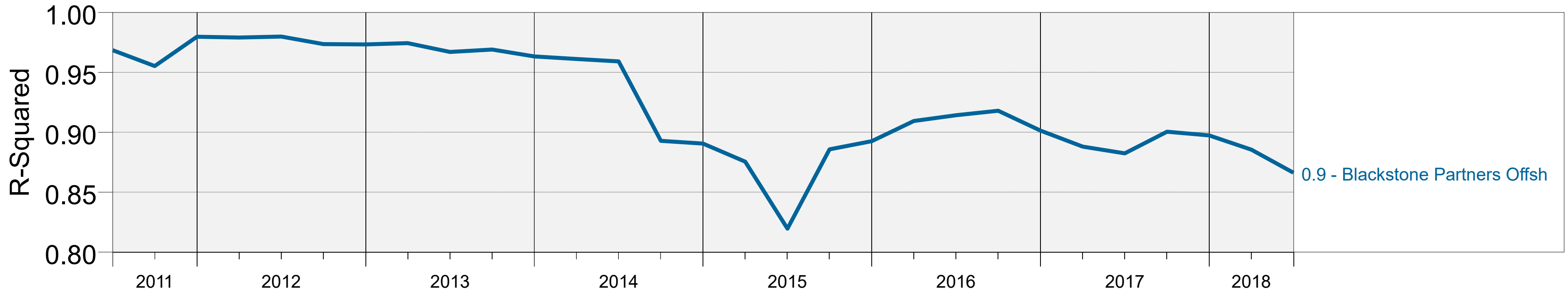

**Rolling 12 Quarter Tracking Error Relative To**
**HFRI Fund of Funds**
**for 7 Years Ended June 30, 2018**



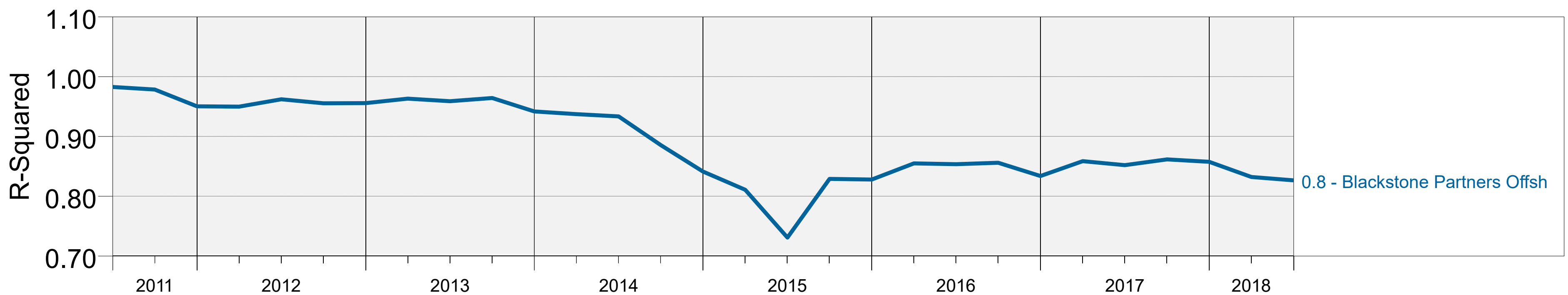
# Blackstone Partners Offshore – Hedge Fund of Funds

## Index Evaluation

### Rolling 12 Quarter R-Squared Relative To HFRI FOF:Conservative Idx for 7 Years Ended June 30, 2018



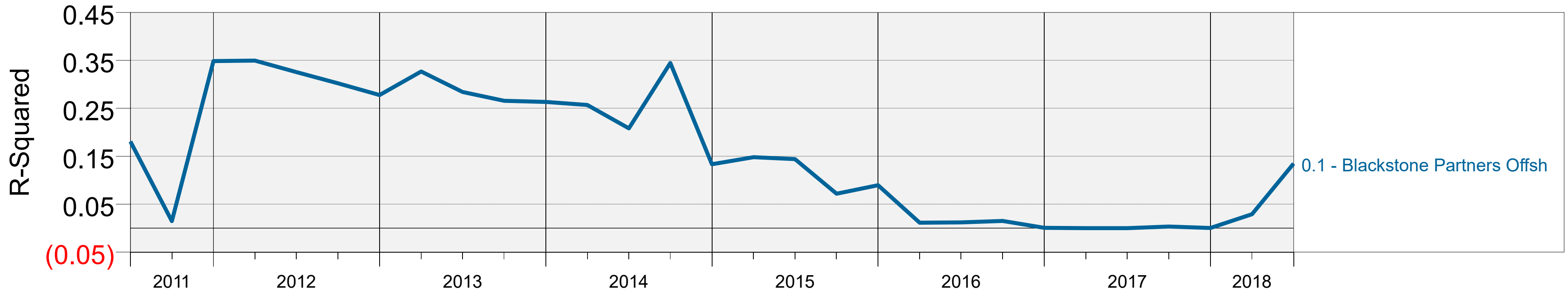

### Rolling 12 Quarter R-Squared Relative To HFRI FOF:Diversified Idx for 7 Years Ended June 30, 2018



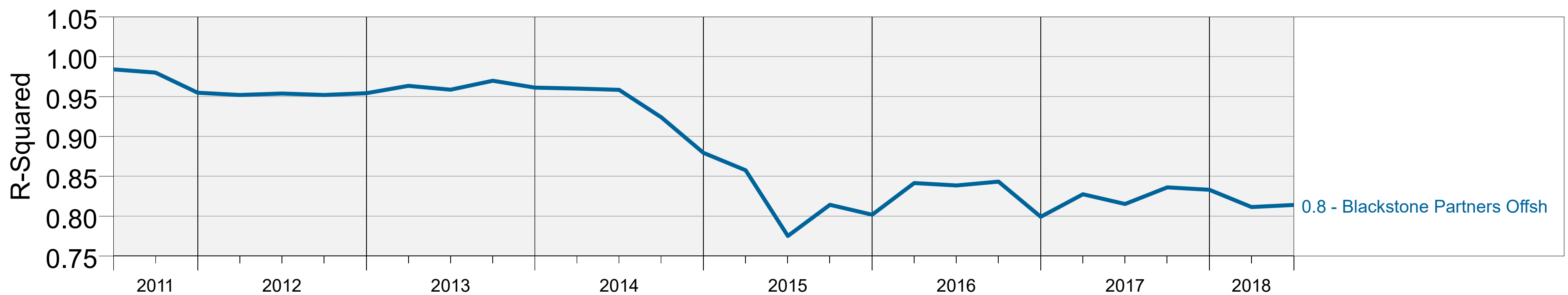
# Blackstone Partners Offshore – Hedge Fund of Funds

## Index Evaluation

**Rolling 12 Quarter R-Squared Relative To**
**HFRI FOF:Mkt Defensive**
**for 7 Years Ended June 30, 2018**



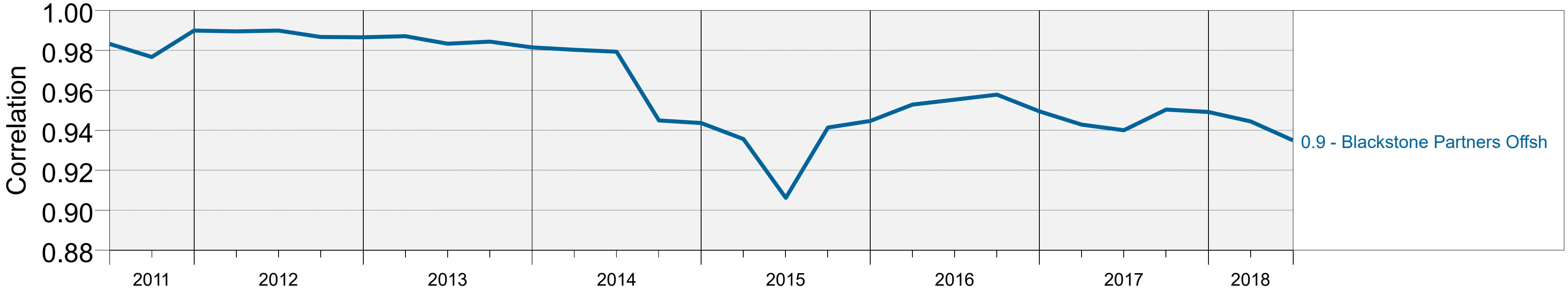

**Rolling 12 Quarter R-Squared Relative To**
**HFRI Fund of Funds**
**for 7 Years Ended June 30, 2018**



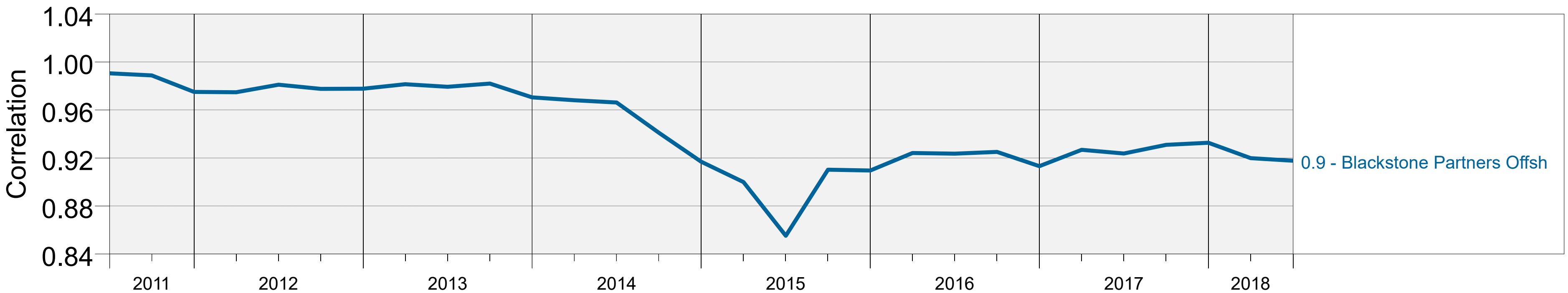
# Blackstone Partners Offshore – Hedge Fund of Funds

## Index Evaluation

**Rolling 12 Quarter Correlation Relative To**
**HFRI FOF:Conservative Idx**
**for 7 Years Ended June 30, 2018**



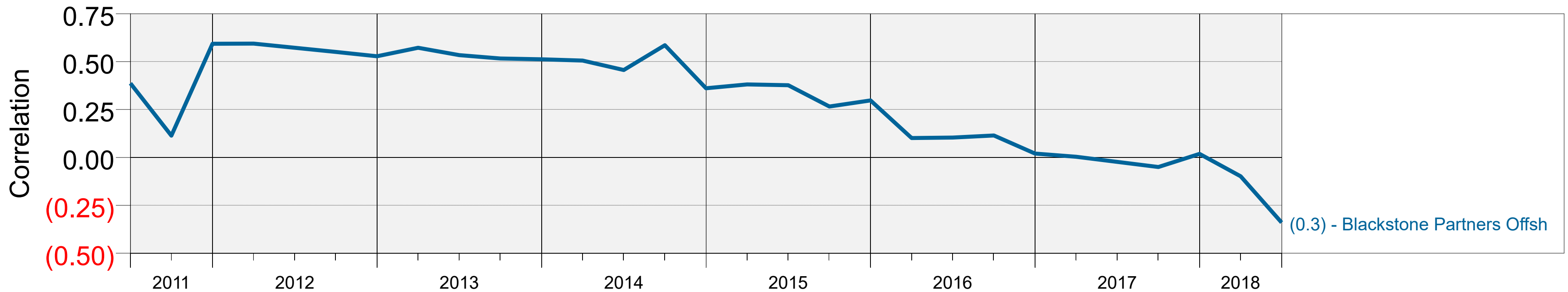

**Rolling 12 Quarter Correlation Relative To**
**HFRI FOF:Diversified Idx**
**for 7 Years Ended June 30, 2018**



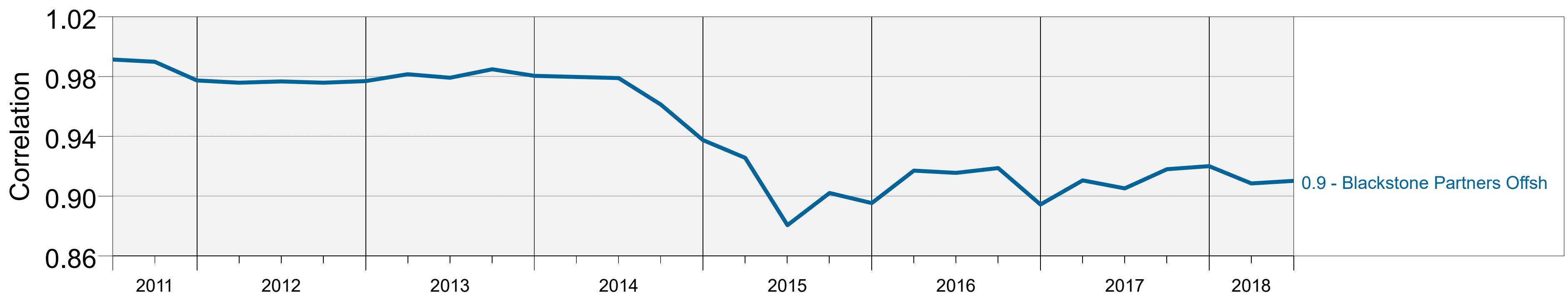
# Blackstone Partners Offshore – Hedge Fund of Funds

## Index Evaluation

**Rolling 12 Quarter Correlation Relative To**
**HFRI FOF:Mkt Defensive**
**for 7 Years Ended June 30, 2018**



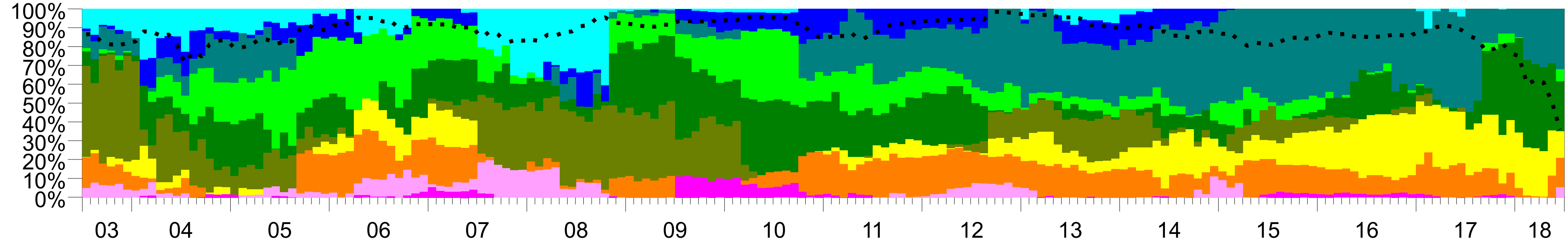

**Rolling 12 Quarter Correlation Relative To**
**HFRI Fund of Funds**
**for 7 Years Ended June 30, 2018**



# Blackstone Partners Offshore – Hedge Fund of Funds

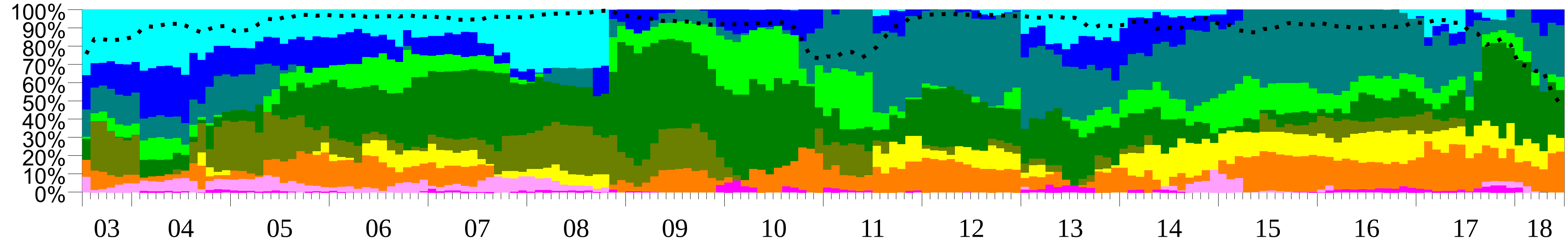
$R^2$=0.8751

Blackstone Partners Offsh - Returns-Based Strategy Exposures based on Rolling 24 Month Periods



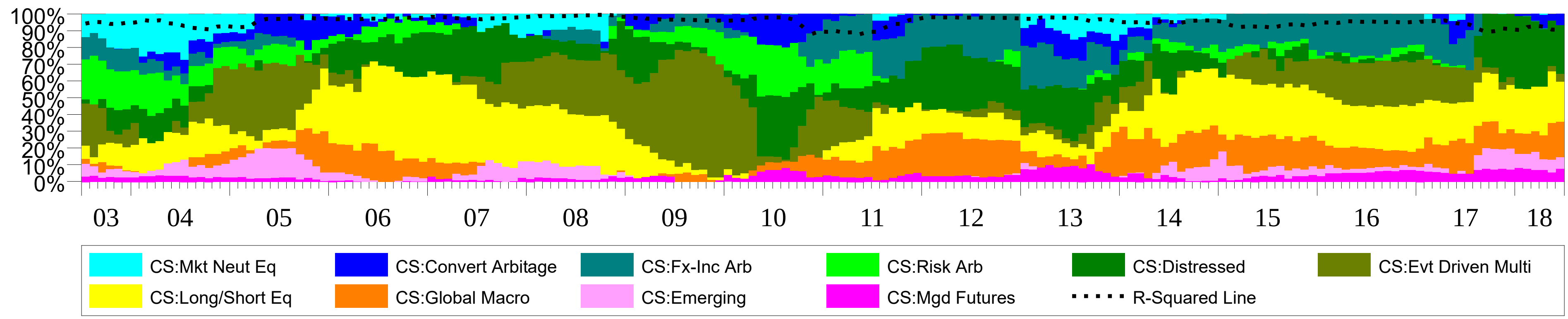

$R^2$=0.9097

HFRI FOF:Conservative Idx - Returns-Based Strategy Exposures based on Rolling 24 Month Periods




$R^2$=0.9546

HFRI FOF:Diversified Idx - Returns-Based Strategy Exposures based on Rolling 24 Month Periods



# Private Equity

# Total Private Equity Portfolio

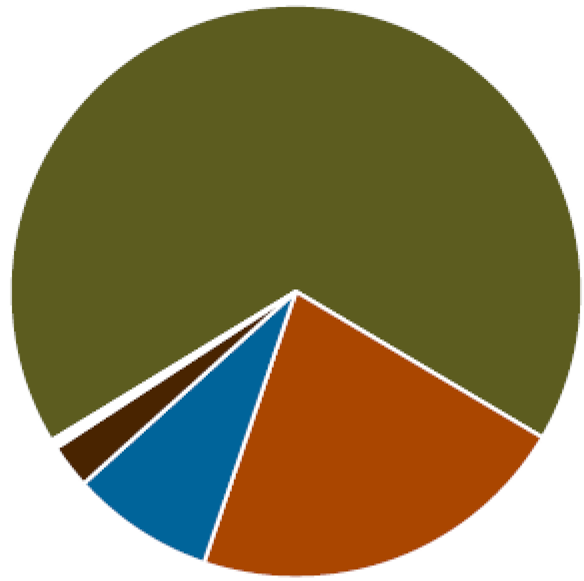
## Index Evaluation

- Current Index: MSCI ACWI IMI + 300bps, 1-quarter lag
- Callan Recommendation: No changes recommended.
- Rationale: In aggregate, the existing benchmark is a reasonable fundamental proxy and return target for the current collection of managers and strategies.

# Total Private Equity Portfolio

## Index Evaluation

| | |
|---|---|
| **Summary** | |
| Vintage Years | 11 in 2007-2018 |
| **Changes in Value** | |
| Capital Commitments | $332,500,000 |
| Paid-In Capital | $220,524,217 |
| Uncalled Capital | $111,975,783 |
| % Paid-In | 66.32% |
| Distributed Capital | $72,849,450 |
| Net Asset Value | $212,859,358 |
| **Total Realized and Unrealized Value** | **$285,708,808** |
| **Ratios and Performance** | |
| Distributions to Paid-In Capital (DPI) | 0.33x |
| Residual Value to Paid-In Capital (RVPI) | 0.97x |
| Total Value to Paid-In Capital (TVPI) | 1.30x |
| Quartile Ranking | *3rd* |
| Net IRR | 10.92% |
| **Public Market Equivalent (PME) Comparison** | |
| MSCI ACWI TVPI | 1.24 |
| MSCI ACWI IRR | 9.25% |



| | |
|---|---|
| Buyout | 67.23% |
| Venture/Growth Capital | 21.71% |
| Special Situations | 8.06% |
| Distressed/Restructuring | 2.51% |
| Secondary Interest | 0.49% |

As of June 30, 2018. The NAV represents the prior quarter NAV adjusted for current quarter cash flows.
Quartile rankings against the Global Private Equity and Real Assets Thomson/Cambridge database.

# Total Private Equity Portfolio

## Index Evaluation

| Geographic Regional Weights | Total PE | MSCI ACWI IMI | *Difference* | MSCI ACWI | *Difference* | MSCI EAFE | *Difference* |
|---|---|---|---|---|---|---|---|
| North America | **61.6%** | 54.7% | *6.9%* | 55.2% | *6.4%* | - | *61.6%* |
| Europe/Mid East | **22.4%** | 20.8% | *1.6%* | 20.8% | *1.6%* | 63.7% | *(41.3%)* |
| Asia/Pacific | **8.8%** | 12.3% | *(3.5%)* | 11.8% | *(3.0%)* | 36.3% | *(27.5%)* |
| Emerging Markets | **1.4%** | 12.1% | *(10.7%)* | 12.2% | *(10.8%)* | - | *1.4%* |
| Other | **5.9%** | - | *5.9%* | - | *5.9%* | - | *5.9%* |

| GICS Sector Weights | Total PE | MSCI ACWI IMI | *Difference* | MSCI ACWI | *Difference* | MSCI EAFE | *Difference* |
|---|---|---|---|---|---|---|---|
| Technology | **22.5%** | 18.0% | *4.5%* | 18.6% | *3.9%* | 6.5% | *16.0%* |
| Financial | **13.4%** | 18.0% | *(4.6%)* | 18.7% | *(5.3%)* | 20.9% | *(7.5%)* |
| Consumer Staples | **14.3%** | 7.9% | *6.4%* | 8.4% | *5.9%* | 11.1% | *3.2%* |
| Consumer Discretionary | **5.0%** | 12.3% | *(7.3%)* | 12.1% | *(7.1%)* | 12.5% | *(7.5%)* |
| Health Care | **11.7%** | 10.5% | *1.2%* | 10.6% | *1.1%* | 10.1% | *1.6%* |
| Telecommunications | **0.1%** | 2.8% | *(2.7%)* | 3.1% | *(3.0%)* | 4.1% | *(4.0%)* |
| Energy | **15.6%** | 5.8% | *9.8%* | 6.2% | *9.4%* | 5.3% | *10.3%* |
| Utilities | **-** | 2.9% | *(2.9%)* | 2.9% | *(2.9%)* | 3.2% | *(3.2%)* |
| Industrials | **8.0%** | 12.0% | *(4.0%)* | 11.1% | *(3.1%)* | 14.9% | *(6.9%)* |
| Materials | **7.5%** | 5.8% | *1.7%* | 5.4% | *2.1%* | 7.9% | *(0.4%)* |
| Real Estate | **0.1%** | 4.0% | *(3.9%)* | 3.0% | *(2.9%)* | 3.5% | *(3.4%)* |
| Other | **1.9%** | - | *1.9%* | - | *1.9%* | - | *1.9%* |

As of March 31, 2018

# Adams Street Partners

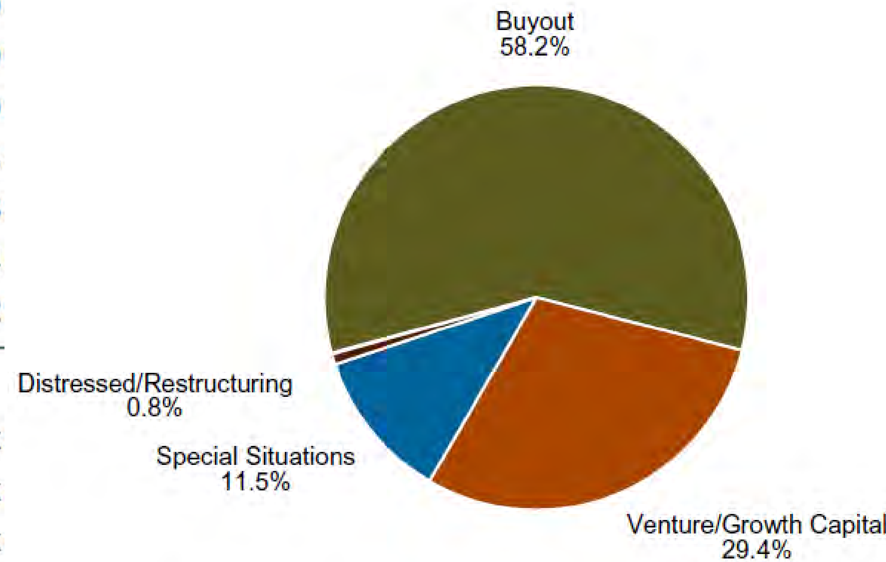
## Index Evaluation

- Strategy:
  - The Adams Street Annual Global Program consists of funds-of-funds that invest in primary and secondary partnerships as well as co-investments. The funds invest in a variety of strategy types including buyouts, growth equity, and other specialized funds.
  - The Adams Street Venture Innovation Funds are funds-of-funds that invest in venture capital partnerships. Global in nature, the funds focus predominantly on early-stage investments though they do have some exposure to late-stage venture capital and growth equity.
- Current Index: MSCI ACWI IMI + 300bps, 1-quarter lag.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

# Adams Street Partners

## Index Evaluation

| | |
|---|---|
| **Summary** | |
| Vintage Years | 8 in 2011-2018 |
| **Changes in Value** | |
| Capital Commitments | $178,600,000 |
| Paid-In Capital | $110,954,100 |
| Uncalled Capital | $67,645,900 |
| % Paid-In | 62.12% |
| Distributed Capital | $31,334,988 |
| Net Asset Value | $116,165,084 |
| **Total Realized and Unrealized Value** | **$147,500,072** |
| **Ratios and Performance** | |
| Distributions to Paid-In Capital (DPI) | 0.28x |
| Residual Value to Paid-In Capital (RVPI) | 1.05x |
| Total Value to Paid-In Capital (TVPI) | 1.33x |
| Quartile Ranking | *2nd* |
| Net IRR | 11.85% |
| **Public Market Equivalent (PME) Comparison** | |
| MSCI ACWI TVPI | 1.24 |
| MSCI ACWI IRR | 9.20% |




As of June 30, 2018. The NAV represents the prior quarter NAV adjusted for current quarter cash flows.
Quartile rankings against the Global Private Equity Thomson/Cambridge database.

# Adams Street Partners

## Index Evaluation

| Geographic Regional Weights | Adams Street | MSCI ACWI IMI | *Difference* | MSCI ACWI | *Difference* | MSCI EAFE | *Difference* |
|---|---|---|---|---|---|---|---|
| North America | **49.4%** | 54.7% | *(5.3%)* | 55.2% | *(5.8%)* | - | *49.4%* |
| Europe/Mid East | **35.3%** | 20.8% | *14.5%* | 20.8% | *14.5%* | 63.7% | *(28.4%)* |
| Asia/Pacific | **14.4%** | 12.3% | *2.1%* | 11.8% | *2.6%* | 36.3% | *(21.9%)* |
| Emerging Markets | **-** | 12.1% | *(12.1%)* | 12.2% | *(12.2%)* | - | - |
| Other | **0.9%** | - | *0.9%* | - | *0.9%* | - | *0.9%* |

| GICS Sector Weights | Adams Street | MSCI ACWI IMI | *Difference* | MSCI ACWI | *Difference* | MSCI EAFE | *Difference* |
|---|---|---|---|---|---|---|---|
| Technology | **31.1%** | 18.0% | *13.1%* | 18.6% | *12.5%* | 6.5% | *24.6%* |
| Financial | **22.7%** | 18.0% | *4.7%* | 18.7% | *4.0%* | 20.9% | *1.8%* |
| Consumer Staples | **17.3%** | 7.9% | *9.4%* | 8.4% | *8.9%* | 11.1% | *6.2%* |
| Consumer Discretionary | **-** | 12.3% | *(12.3%)* | 12.1% | *(12.1%)* | 12.5% | *(12.5%)* |
| Health Care | **11.6%** | 10.5% | *1.1%* | 10.6% | *1.0%* | 10.1% | *1.5%* |
| Telecommunications | **-** | 2.8% | *(2.8%)* | 3.1% | *(3.1%)* | 4.1% | *(4.1%)* |
| Energy | **8.6%** | 5.8% | *2.8%* | 6.2% | *2.4%* | 5.3% | *3.3%* |
| Utilities | **-** | 2.9% | *(2.9%)* | 2.9% | *(2.9%)* | 3.2% | *(3.2%)* |
| Industrials | **7.0%** | 12.0% | *(5.0%)* | 11.1% | *(4.1%)* | 14.9% | *7.9%* |
| Materials | **-** | 5.8% | *(5.8%)* | 5.4% | *(5.4%)* | 7.9% | *(7.9%)* |
| Real Estate | **-** | 4.0% | *(4.0%)* | 3.0% | *(3.0%)* | 3.5% | *(3.5%)* |
| Other | **1.6%** | - | *1.6%* | - | *1.6%* | - | *1.6%* |

As of March 31, 2018

# Aether Investment Partners

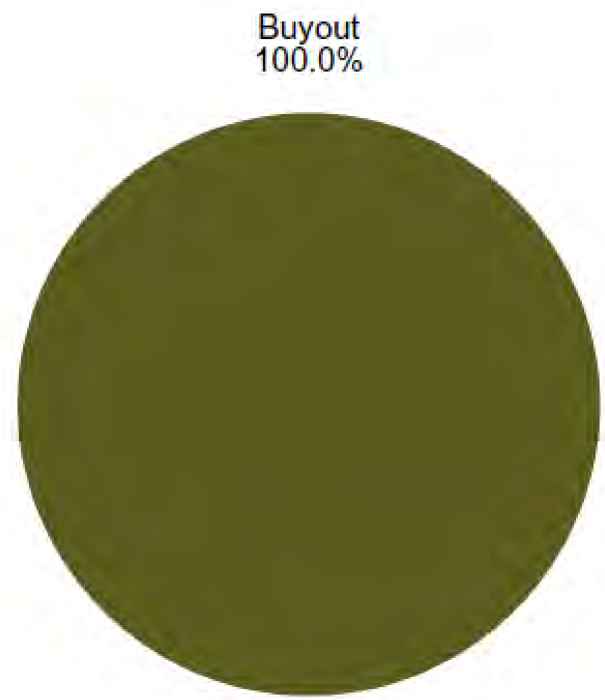
## Index Evaluation

- Strategy:
  - Aether Investment Partners III, IV, and V are funds-of-funds that invests in primary and secondary partnerships with Fund V making co-investments as well. Investing globally, the strategy targets funds investing in (70%) oil and natural gas, metals and minerals, and agriculture and timber as well as (30%) more opportunistic investments in energy assets, infrastructure, and water. The funds do not invest in real estate or funds that apply high levels of leverage.
- Current Index: MSCI ACWI IMI + 300bps, 1-quarter lag.
- Callan Recommendation: S&P Global Natural Resources + 300bps, 1-quarter lag.
- Rationale:
  - As the Aether Investment Partners funds are real assets-focused, they should be benchmarked against a real assets index, not a broad equity index like the MSCI ACWI IMI. The S&P Global Natural Resources index's sector and geographic weights line up reasonable well with Aether Investment Partners' sector and geographic exposures.

# Aether Investment Partners

## Index Evaluation

| | |
|---|---|
| **Summary** | |
| Vintage Years | 8 in 2011-2018 |
| **Changes in Value** | |
| Capital Commitments | $31,900,000 |
| Paid-In Capital | $20,814,576 |
| Uncalled Capital | $11,085,424 |
| % Paid-In | 65.25% |
| Distributed Capital | $1,879,934 |
| Net Asset Value | $23,571,227 |
| **Total Realized and Unrealized Value** | **$25,451,161** |
| **Ratios and Performance** | |
| Distributions to Paid-In Capital (DPI) | 0.09x |
| Residual Value to Paid-In Capital (RVPI) | 1.13x |
| Total Value to Paid-In Capital (TVPI) | 1.22x |
| Quartile Ranking | *2nd* |
| Net IRR | 11.49% |
| **Public Market Equivalent (PME) Comparison** | |
| S&P Global Nat Res (Net) TVPI | 1.29 |
| S&P Global Nat Res (Net) IRR | 14.59% |




As of June 30, 2018. The NAV represents the prior quarter NAV adjusted for current quarter cash flows.
Quartile rankings against the Global Real Assets Thomson/Cambridge database.

# Aether Investment Partners

## Index Evaluation

| **Geographic Regional Weights** | **Aether** | MSCI ACWI IMI | *Difference* | S&P Global Natural Resources | *Difference* | S&P North American Natural Resources | *Difference* |
|---|---|---|---|---|---|---|---|
| North America | **44.5%** | 54.7% | *(10.2%)* | 41.2% | *3.3%* | *100.0%* | *(55.55)* |
| Europe/Mid East | **-** | 20.8% | *(20.8%)* | 33.8% | *(33.8%)* | - | - |
| Asia/Pacific | **-** | 12.3% | *(12.3%)* | 15.2% | *(15.2%)* | - | - |
| Emerging Markets | **12.1%** | 12.1% | - | 9.8% | *2.3%* | - | *12.1%* |
| Other | **43.4%*** | - | *43.4%* | - | *43.4%* | - | *43.4%* |

| **GICS Sector Weights** | **Aether** | MSCI ACWI IMI | *Difference* | S&P Global Natural Resources | *Difference* | S&P North American Natural Resources | *Difference* |
|---|---|---|---|---|---|---|---|
| Technology | **-** | 18.0% | *(18.0%)* | - | - | - | - |
| Financial | **-** | 18.0% | *(18.0%)* | - | - | - | - |
| Consumer Staples | **20.3%** | 7.9% | *12.4%* | 4.3% | *16.0%* | - | *20.3%* |
| Consumer Discretionary | **-** | 12.3% | *(12.3%)* | - | - | - | - |
| Health Care | **-** | 10.5% | *(10.5%)* | - | - | - | - |
| Telecommunications | **-** | 2.8% | *(2.8%)* | - | - | - | - |
| Energy | **34.5%** | 5.8% | *28.7%* | 34.6% | *(0.1%)* | *81.5%* | *(47.0%)* |
| Utilities | **-** | 2.9% | *(2.9%)* | - | - | - | - |
| Industrials | **-** | 12.0% | *(12.0%)* | - | - | - | - |
| Materials | **40.2%** | 5.8% | *34.4%* | 59.2% | *(19.0%)* | *18.5%* | *21.7%* |
| Real Estate | **-** | 4.0% | *(4.0%)* | 1.9% | *(1.9%)* | - | - |
| Other | **5.0%** | - | *5.0%* | - | *5.0%* | - | *5.0%* |

* Other indicates commitments made to funds investing in multiple geographies.
As of March 31, 2018

# Commonfund

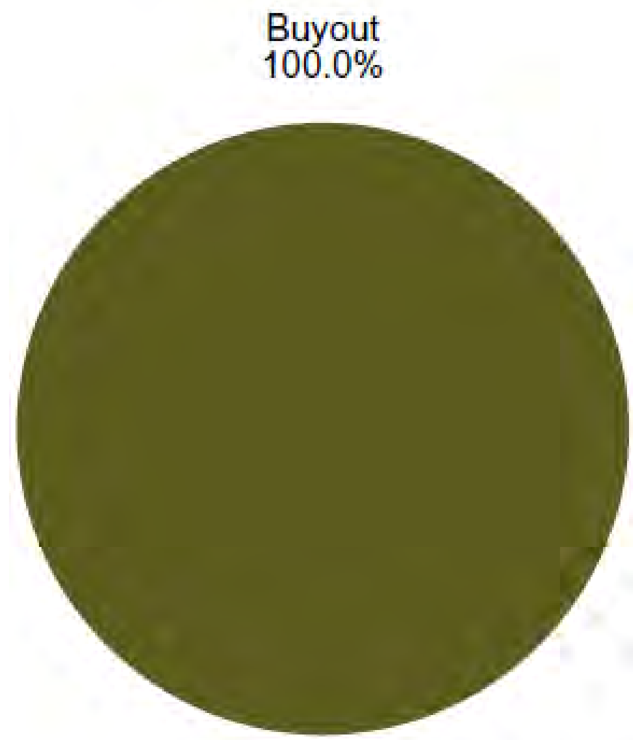
## Index Evaluation

- Strategy:
  - Commonfund Natural Resources Partners IX, LP is a fund-of-funds that invests in primary and secondary partnerships as well as direct investments. It targets U.S. and Canadian funds that make investments in oil and natural gas production, oilfield services, and power generation as well as other natural resources-related industries like energy infrastructure, mining and minerals extraction, clean energy, and timber.
- Current Index: MSCI ACWI IMI + 300bps.
- Callan Recommendation: S&P North American Natural Resources + 300bps, 1-quarter lag.
- Rationale:
  - As the Commonfund funds are real assets-focused, they should be benchmarked against a real assets index, not a broad equity index like the MSCI ACWI IMI. The North American Natural Resources index's sector and geographic weights line up reasonably well with Commonfund's sector and geographic exposures.

# Commonfund

## Index Evaluation

| | |
|---|---|
| **Summary** | |
| Vintage Years | 5 in 2012-2016 |
| **Changes in Value** | |
| Capital Commitments | $20,000,000 |
| Paid-In Capital | $16,210,000 |
| Uncalled Capital | $3,790,000 |
| % Paid-In | 81.05% |
| Distributed Capital | $1,710,511 |
| Net Asset Value | $18,213,408 |
| **Total Realized and Unrealized Value** | **$19,923,919** |
| **Ratios and Performance** | |
| Distributions to Paid-In Capital (DPI) | 0.11x |
| Residual Value to Paid-In Capital (RVPI) | 1.12x |
| Total Value to Paid-In Capital (TVPI) | 1.23x |
| Quartile Ranking | *2nd* |
| Net IRR | 7.97% |
| **Public Market Equivalent (PME) Comparison** | |
| S&P Global Natural Resour TVPI | 1.26 |
| S&P Global Natural Resour IRR | 8.80% |




As of June 30, 2018. The NAV represents the prior quarter NAV adjusted for current quarter cash flows.
Quartile rankings against the Global Private Energy Thomson/Cambridge database.

# Commonfund

## Index Evaluation

| Geographic Regional Weights | Commonfund | MSCI ACWI IMI | *Difference* | S&P Global Natural Resources | *Difference* | S&P North American Natural Resources | *Difference* |
|---|---|---|---|---|---|---|---|
| North America | **78.0%** | 54.7% | *23.3%* | 41.2% | *36.8%* | *100.0%* | *(22.0%)* |
| Europe/Mid East | **12.0%** | 20.8% | *(8.8%)* | 33.8% | *(21.8%)* | - | *12.0%* |
| Asia/Pacific | **7.0%** | 12.3% | *(5.3%)* | 15.2% | *(8.2%)* | - | *7.0%* |
| Emerging Markets | **-** | 12.1% | *(12.1%)* | 9.8% | *(9.8%)* | - | - |
| Other* | **3.0%** | - | *3.0%* | - | *3.0%* | - | *3.0%* |

| GICS Sector Weights | Commonfund | MSCI ACWI IMI | *Difference* | S&P Global Natural Resources | *Difference* | S&P North American Natural Resources | *Difference* |
|---|---|---|---|---|---|---|---|
| Technology | **-** | 18.0% | *(18.0%)* | - | - | - | - |
| Financial | **-** | 18.0% | *(18.0%)* | - | - | - | - |
| Consumer Staples | **-** | 7.9% | *(7.9%)* | 4.3% | *(4.3%)* | - | - |
| Consumer Discretionary | **-** | 12.3% | *(12.3%)* | - | - | - | - |
| Health Care | **-** | 10.5% | *(10.5%)* | - | - | - | - |
| Telecommunications | **-** | 2.8% | *(2.8%)* | - | - | - | - |
| Energy | **78.0%** | 5.8% | *72.2%* | 34.6% | *43.4%* | *81.5%* | *(3.5%)* |
| Utilities | **-** | 2.9% | *(2.9%)* | - | - | - | - |
| Industrials | **-** | 12.0% | *(12.0%)* | - | - | - | - |
| Materials | **21.0%** | 5.8% | *15.2%* | 59.2% | *(38.2%)* | *18.5%* | *2.5%* |
| Real Estate | **-** | 4.0% | *(4.0%)* | 1.9% | *(1.9%)* | - | - |
| Other | **1.0%** | - | *1.0%* | - | *1.0%* | - | *1.0%* |

*Other predominantly refers to geographic exposure to Brazil and some nominal exposure to Europe.
As of March 31, 2018

# LGT

## Index Evaluation

- Strategy:
  - LGT Crown Secondaries IV is a secondary fund-of-funds that invests in early and mature secondaries. The fund invests on a global basis across multiple currencies, though historically roughly half the fund has invested in European transactions. The fund sources transactions from a variety of sellers, including financial institutions, pensions, endowments/foundations, fund-of-funds, and family offices.
- Current Index: MSCI ACWI IMI + 300bps, 1-quarter lag.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

# LGT

## Index Evaluation

| | |
|---|---|
| **Summary** | |
| Vintage Year | 2017 |
| **Changes in Value** | |
| Capital Commitments | $10,000,000 |
| Paid-In Capital | $1,660,000 |
| Uncalled Capital | $8,340,000 |
| % Paid-In | 16.60% |
| Distributed Capital | $0 |
| Net Asset Value | $2,031,660 |
| **Total Realized and Unrealized Value** | **$2,031,660** |
| **Ratios and Performance** | |
| Distributions to Paid-In Capital (DPI) | 0.00x |
| Residual Value to Paid-In Capital (RVPI) | 1.22x |
| Total Value to Paid-In Capital (TVPI) | 1.22x |
| Quartile Ranking | *1st* |
| Net IRR | 33.34% |
| **Public Market Equivalent (PME) Comparison** | |
| MSCI ACWI TVPI | 1.05 |
| MSCI ACWI IRR | 8.06% |


As of June 30, 2018. The NAV represents the prior quarter NAV adjusted for current quarter cash flows.
Quartile rankings against the Global Private Energy Thomson/Cambridge database.

# LGT

## Index Evaluation

| Geographic Regional Weights | LGT | MSCI ACWI IMI | *Difference* | MSCI ACWI | *Difference* | MSCI EAFE | *Difference* |
|---|---|---|---|---|---|---|---|
| North America | **23.4%** | 54.7% | *(31.1%)* | 55.2% | *(31.8%)* | - | *23.4%* |
| Europe/Mid East | **47.0%** | 20.8% | *26.2%* | 20.8% | *26.2%* | 63.7% | *(16.7%)* |
| Asia/Pacific | **16.5%** | 12.3% | *4.2%* | 11.8% | *4.7%* | 36.3% | *(19.8%)* |
| Emerging Markets | **-** | 12.1% | *(12.1%)* | 12.2% | *(12.2%)* | - | - |
| Other | **13.0%*** | - | *13.0%* | - | *13.0%* | - | *13.0%* |

| GICS Sector Weights | LGT | MSCI ACWI IMI | *Difference* | MSCI ACWI | *Difference* | MSCI EAFE | *Difference* |
|---|---|---|---|---|---|---|---|
| Technology | **20.6%** | 18.0% | *2.6%* | 18.6% | *2.0%* | 6.5% | *14.1%* |
| Financial | **10.1%** | 18.0% | *(7.9%)* | 18.7% | *(8.6%)* | 20.9% | *(10.8%)* |
| Consumer Staples | **8.6%** | 7.9% | *0.7%* | 8.4% | *0.2%* | 11.1% | *(2.5%)* |
| Consumer Discretionary | **17.4%** | 12.3% | *5.1%* | 12.1% | *5.3%* | 12.5% | *4.9%* |
| Health Care | **16.4%** | 10.5% | *5.9%* | 10.6% | *5.8%* | 10.1% | *6.3%* |
| Telecommunications | **4.5%** | 2.8% | *1.7%* | 3.1% | *1.4%* | 4.1% | *0.4%* |
| Energy | **1.4%** | 5.8% | *(4.4%)* | 6.2% | *(4.8%)* | 5.3% | *(3.9%)* |
| Utilities | **0.8%** | 2.9% | *(2.1%)* | 2.9% | *(2.1%)* | 3.2% | *(2.4%)* |
| Industrials | **14.1%** | 12.0% | *2.1%* | 11.1% | *3.0%* | 14.9% | *(0.8%)* |
| Materials | **4.8%** | 5.8% | *(1.0%)* | 5.4% | *(0.6%)* | 7.9% | *(3.1%)* |
| Real Estate | **0.5%** | 4.0% | *(3.5%)* | 3.0% | *(2.5%)* | 3.5% | *(3.0%)* |
| Other | **0.9%** | - | *0.9%* | - | *0.9%* | - | *0.9%* |

*Other refers to funds that invest globally.
As of March 31, 2018

# Neuberger Berman

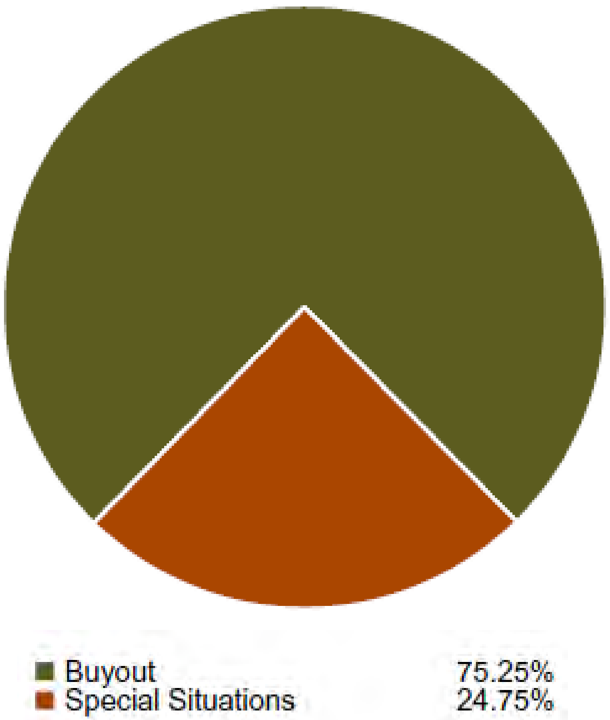
## Index Evaluation

- Strategy
  - Neuberger Berman Crossroads Fund XXI is a fund-of-funds that invests in primary and secondary partnerships as well as co-investments. Investing globally, the fund focuses on small, mid, and large cap buyouts, special situations (primarily distress-oriented), growth equity, and venture capital strategies. The majority of the portfolio is invested in buyout funds.
- Current Index: MSCI ACWI IMI + 300bps, 1-quarter lag.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

# Neuberger Berman

## Index Evaluation

| | |
|---|---|
| **Summary** | |
| Vintage Years | 5 in 2014-2018 |
| **Changes in Value** | |
| Capital Commitments | $30,000,000 |
| Paid-In Capital | $15,000,000 |
| Uncalled Capital | $15,000,000 |
| % Paid-In | 50.00% |
| Distributed Capital | $1,154,135 |
| Net Asset Value | $15,194,773 |
| **Total Realized and Unrealized Value** | **$16,348,908** |
| **Ratios and Performance** | |
| Distributions to Paid-In Capital (DPI) | 0.08x |
| Residual Value to Paid-In Capital (RVPI) | 1.01x |
| Total Value to Paid-In Capital (TVPI) | 1.09x |
| Quartile Ranking | *3rd* |
| Net IRR | 8.38% |
| **Public Market Equivalent (PME) Comparison** | |
| MSCI World TVPI | 1.13 |
| MSCI World IRR | 12.41% |




As of June 30, 2018. The NAV represents the prior quarter NAV adjusted for current quarter cash flows.
Quartile rankings against the Global Buyouts Thomson/Cambridge database.

# Neuberger Berman

## Index Evaluation

| Geographic Regional Weights | Neuberger Berman | MSCI ACWI IMI | *Difference* | MSCI World | *Difference* | MSCI EAFE | *Difference* |
|---|---|---|---|---|---|---|---|
| North America | **82.6%** | 54.7% | *27.9%* | 62.8% | *19.8%* | - | *82.6%* |
| Europe/Mid East | **14.5%** | 20.8% | *(6.3%)* | 23.7% | *(9.2%)* | 63.7% | *(49.2%)* |
| Asia/Pacific | **2.7%** | 12.3% | *(9.6%)* | 13.5% | *(10.8%)* | 36.3% | *(33.6%)* |
| Emerging Markets | **0.2%** | 12.1% | *(11.9%)* | - | *0.2%* | - | *0.2%* |
| Other | **-** | - | - | - | - | - | - |

| GICS Sector Weights | Neuberger Berman | MSCI ACWI IMI | *Difference* | MSCI World | *Difference* | MSCI EAFE | *Difference* |
|---|---|---|---|---|---|---|---|
| Technology | **29.8%** | 18.0% | *11.8%* | 17.5% | *12.3%* | 6.5% | *23.3%* |
| Financial | **4.1%** | 18.0% | *(13.9%)* | 17.8% | *(13.7%)* | 20.9% | *(16.8%)* |
| Consumer Staples | **7.8%** | 7.9% | *(0.1%)* | 8.6% | *(0.8%)* | 11.1% | *(3.3%)* |
| Consumer Discretionary | **27.3%** | 12.3% | *15.0%* | 12.6% | *14.7%* | 12.5% | *14.8%* |
| Health Care | **11.4%** | 10.5% | *0.9%* | 11.6% | *(0.2%)* | 10.1% | *1.3%* |
| Telecommunications | **1.4%** | 2.8% | *(1.4%)* | 2.9% | *(1.5%)* | 4.1% | *(2.7%)* |
| Energy | **0.5%** | 5.8% | *(5.3%)* | 6.0% | *(5.5%)* | 5.3% | *(4.8%)* |
| Utilities | **0.2%** | 2.9% | *(2.7%)* | 3.0% | *(2.8%)* | 3.2% | *(3.0%)* |
| Industrials | **11.5%** | 12.0% | *(0.5%)* | 11.9% | *(0.4%)* | 14.9% | *(3.4%)* |
| Materials | **-** | 5.8% | *(5.8%)* | 5.0% | *(5.0%)* | 7.9% | *(7.9%)* |
| Real Estate | **0.9%** | 4.0% | *(3.1%)* | 3.0% | *(2.1%)* | 3.5% | *(2.6%)* |
| Other | **5.1%** | - | *5.1%* | - | *5.1%* | - | *5.1%* |

As of March 31, 2018

# Private Advisors

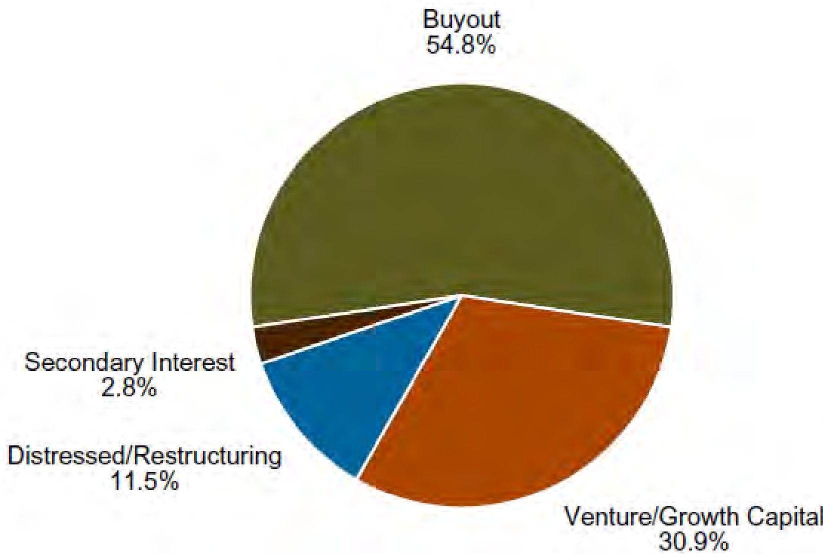
## Index Evaluation

- Strategy
  - Private Advisors Small Company Buyout Funds IV, VI, and VII are funds-of-funds that invest in North American lower middle market buyout, distressed/turnaround, and opportunistic funds. They define lower middle market as funds with less than $750 million in fund size, with an emphasis on less than $500 million, who target companies with enterprise values typically less than $150 million.
- Current Index: MSCI ACWI IMI + 300bps
- Callan Recommendation: Russell 2000 + 300bps, 1-quarter lag.
- Rationale:
  - Private Advisors invests in small companies so the Russell 2000 is a more appropriate benchmark.
  - As Private Advisors only invests in North America, it should be benchmarked against a U.S. only index.

# Private Advisors

## Index Evaluation

| | |
|---|---|
| **Summary** | |
| Vintage Years | 10 in 2007-2018 |
| **Changes in Value** | |
| Capital Commitments | $62,000,000 |
| Paid-In Capital | $55,885,541 |
| Uncalled Capital | $6,114,459 |
| % Paid-In | 90.14% |
| Distributed Capital | $36,769,882 |
| Net Asset Value | $37,683,206 |
| **Total Realized and Unrealized Value** | **$74,453,088** |
| **Ratios and Performance** | |
| Distributions to Paid-In Capital (DPI) | 0.66x |
| Residual Value to Paid-In Capital (RVPI) | 0.67x |
| Total Value to Paid-In Capital (TVPI) | 1.33x |
| Quartile Ranking | *3rd* |
| Net IRR | 10.13% |
| **Public Market Equivalent (PME) Comparison** | |
| Russell 2000 Index TVPI | 1.46 |
| Russell 2000 Index IRR | 12.95% |




As of June 30, 2018. The NAV represents the prior quarter NAV adjusted for current quarter cash flows.
Quartile rankings against the US Private Equity Thomson/Cambridge database.

# Private Advisors

## Index Evaluation

| Geographic Regional Weights | Private Advisors | Russell 2000 | *Difference* |
|---|---|---|---|
| North America | **95.4%** | 100% | *(4.6%)* |
| Europe/Mid East | **3.7%** | - | *3.7%* |
| Asia/Pacific | **-** | - | - |
| Emerging Markets | **-** | - | - |
| Other | **0.9%** | - | *0.9%* |

| GICS Sector Weights | Private Advisors | Russell 2000 | *Difference* |
|---|---|---|---|
| Technology | **18.0%** | 17.8% | *0.2%* |
| Financial | **3.6%** | 18.0% | *(14.4%)* |
| Consumer Staples | **10.9%** | 2.4% | *8.5%* |
| Consumer Discretionary | **16.4%** | 12.0% | *4.4%* |
| Health Care | **24.7%** | 16.6% | *8.1%* |
| Telecommunications | **-** | 0.6% | *(0.6%)* |
| Energy | **1.9%** | 3.7% | *(1.8%)* |
| Utilities | **-** | 3.3% | *(3.3%)* |
| Industrials | **17.8%** | 15.1% | *2.7%* |
| Materials | **6.6%** | 4.3% | *2.3%* |
| Real Estate | **-** | 6.1% | *(6.1%)* |
| Other | **-** | - | - |

As of March 31, 2018

# Golub Capital

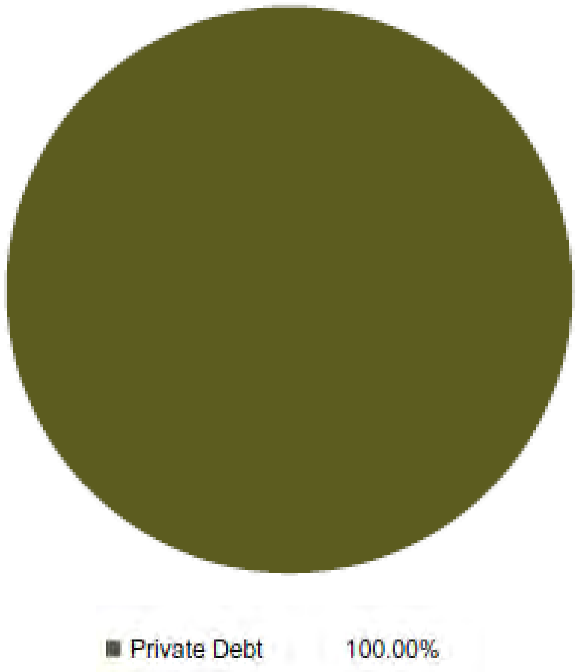
## Index Evaluation

- Strategy:
  – Golub Capital Partners 11 is a U.S. middle market lending fund that invests in senior secured, floating rate loans originated by GC Finance as well as broadly syndicated loans acquired from third-parties. Target leverage for the fund is a debt-to-equity ratio of 2.0x-2.5x.
- Current Index: S&P Leveraged Loan Index (aka S&P LSTA Leveraged Loan Index), 1-quarter lag.
- Callan Recommendation: No changes recommended.
- Rationale: The current index represents a reasonable benchmark on a fundamental and quantitative fit basis.

# Golub Capital

## Index Evaluation

| | |
|---|---|
| **Summary** | |
| Vintage Year | 2018 |
| **Changes in Value** | |
| Capital Commitments | $35,000,000 |
| Paid-In Capital | $10,500,000 |
| Uncalled Capital | $24,500,000 |
| % Paid-In | 30.00% |
| Distributed Capital | $157,115 |
| Net Asset Value | $10,112,255 |
| **Total Realized and Unrealized Value** | **$10,269,370** |
| **Ratios and Performance** | |
| Distributions to Paid-In Capital (DPI) | 0.01x |
| Residual Value to Paid-In Capital (RVPI) | 0.96x |
| Total Value to Paid-In Capital (TVPI) | 0.98x |
| Net IRR | (2.98%) |
| **Public Market Equivalent (PME) Comparison** | |
| S&P/LSTA Leveraged Loan TVPI | 1.01 |
| S&P/LSTA Leveraged Loan IRR | 1.90% |




As of June 30, 2018. The NAV represents the prior quarter NAV adjusted for current quarter cash flows.

# Golub Capital

## Index Evaluation

| Geographic Regional Weights | Golub Capital |
|---|---|
| North America | **99.8%** |
| Europe/Mid East | **0.2%** |
| Asia/Pacific | **-** |
| Emerging Markets | **-** |
| Other | **-** |

| GICS Sector Weights | Golub Capital | S&P/LSTA Leveraged Loan | *Difference* | S&P/LSTA 100 | *Difference* |
|---|---|---|---|---|---|
| Technology | **7.4%** | 12.8% | *(5.4%)* | 15.6% | *(8.2%)* |
| Financial | **30.8%** | 5.4% | *25.4%* | 6.1% | *24.7%* |
| Consumer Staples | **12.6%** | 3.5% | *9.1%* | 3.1% | *9.5%* |
| Consumer Discretionary | **15.4%** | 28.5% | *(13.1%)* | 30.6% | *(15.2%)* |
| Health Care | **19.9%** | 10.7% | *9.2%* | 11.4% | *8.5%* |
| Telecommunications | **1.5%** | 4.9% | *(3.4%)* | 8.2% | *(6.7%)* |
| Energy | **2.4%** | 3.2% | *(0.8%)* | 0.8% | *1.6%* |
| Utilities | **0.2%** | 3.3% | *(3.1%)* | 2.4% | *(2.2%)* |
| Industrials | **6.5%** | 17.3% | *(10.8%)* | 16.0% | *(9.5%)* |
| Materials | **1.2%** | 7.1% | *(5.9%)* | 3.3% | *(2.1%)* |
| Real Estate | **1.9%** | 2.7% | *(0.8%)* | 2.4% | *(0.5%)* |
| Other* | **1.2%** | 0.6% | *0.6%* | - | *1.2%* |

* Other consists of Ecological.
As of March 31, 2018

# Real Estate

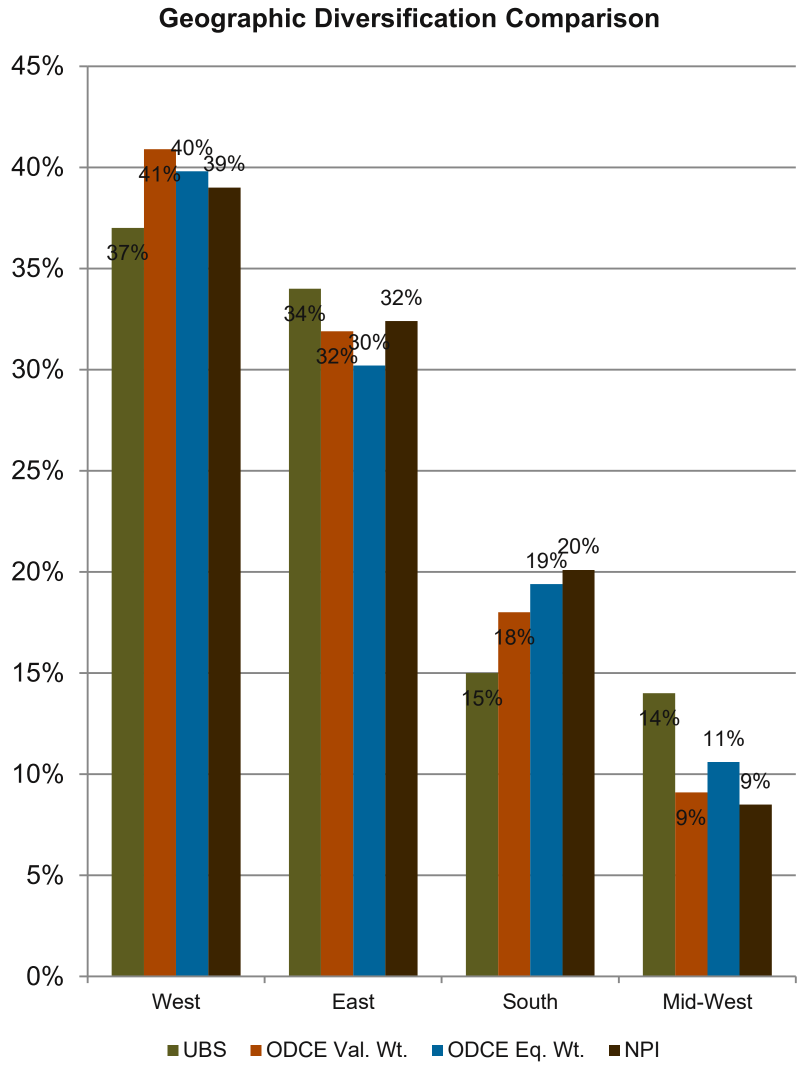
# UBS Trumbull Property Fund – Core Private Equity Real Estate

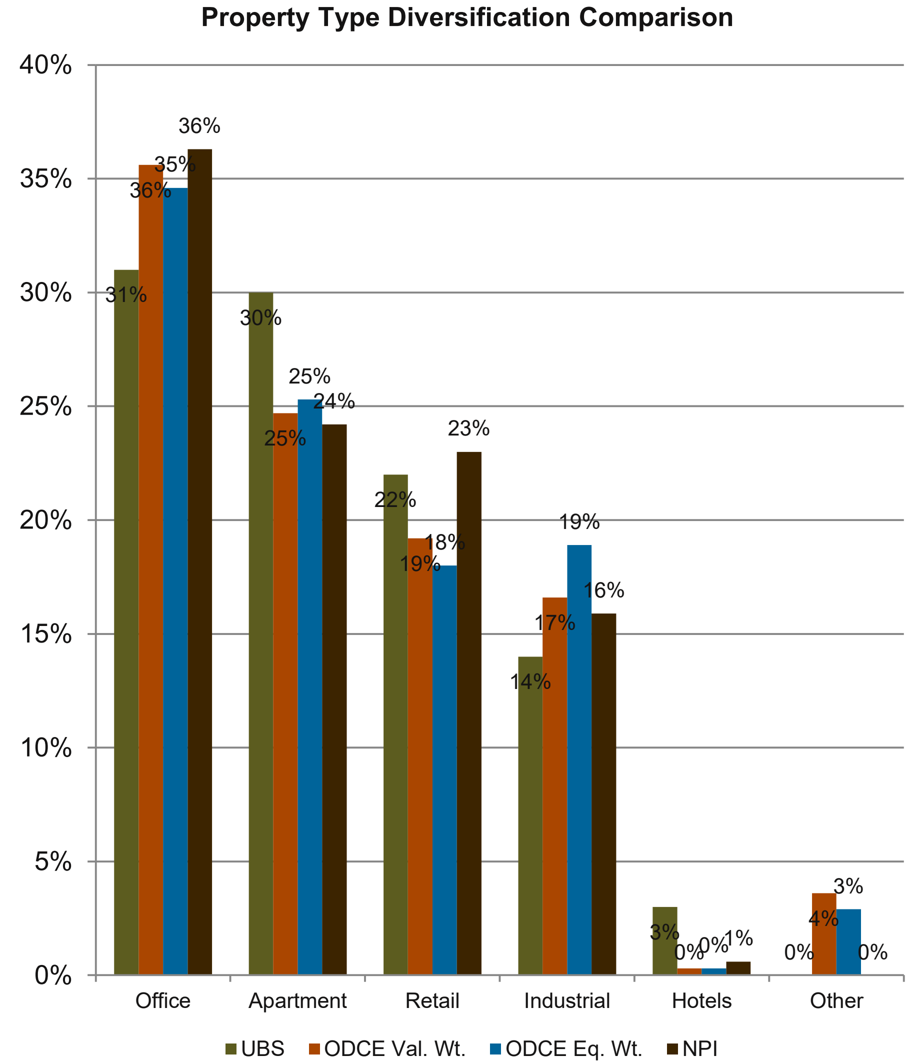
## Index Evaluation

- Current Index: NCREIF ODCE Value Weighted, 1-quarter lag.
- Callan Recommendation: No changes recommended
- Rationale:
  - The ODCE Value Weighted Index currently consist of 25 member funds, all with similar return objectives and diversification constraints of the UBS Trumbull Property Fund per the guidelines to be a contributor.
  - The Value Weighted Index is well diversified by contributors, with the single largest fund accounting for 17% of the market weight. However, approximately 47% of the index value consist from funds that are ~$20.0 billion or larger. This includes the UBS Fund. Comparatively, approximately 80% of the ODCE Equal Weight value consist of funds half the size of the UBS Fund or smaller.
  - Both the geographic and property type sector variances between the three index options are immaterial.
  - The ODCE Value Weighted Index is the stated recommended benchmark by UBS.
- Possible Considerations:
  - Eliminate the quarter lag if possible given the index is available two to three weeks after the UBS Fund information is available.

# UBS Trumbull Property Fund – Core Private Equity Real Estate

## Index Evaluation



# UBS Trumbull Property Fund vs Index Return Comparison

## Index Evaluation

### Total Returns
### for Periods Ended June 30, 2018

| | Last Quarter | Last Year | Last 3 Years | Last 5 Years | Last 7 Years | Last 10 Years |
|---|---|---|---|---|---|---|
| UBS | 1.58 | 6.85 | 7.00 | 8.36 | 8.65 | 4.52 |
| | | | | | | |
| NFI-ODCE VW (Net) | 1.81 | 7.47 | 8.38 | 10.03 | 10.36 | 4.33 |
| NFI-ODCE EQ (Net) | 1.89 | 7.68 | 8.70 | 10.21 | 10.47 | 4.17 |
| NCREIF NPI | 1.81 | 7.19 | 8.25 | 9.77 | 10.23 | 6.22 |

### Risk Statistics for 10 years
### for Periods Ended June 30, 2018

| | Standard Deviation | R-Squared | Correlation |
|---|---|---|---|
| UBS | 6.66 | 0.98 | 0.99 |
| | | | |
| NFI-ODCE VW (Net) | 8.50 | 1.00 | 1.00 |
| NFI-ODCE EQ (Net) | 8.66 | 0.99 | 1.00 |
| NCREIF NPI | 5.74 | 0.97 | 0.99 |

- R Squared and Correlation are based off of the NFI ODCE Value Weight Index

# UBS Trumbull Property Fund vs Index Return Comparison

## Index Evaluation

### Income Returns
### for Periods Ended June 30, 2018

| | Last Quarter | Last Year | Last 3 Years | Last 5 Years | Last 7 Years | Last 10 Years |
|---|---|---|---|---|---|---|
| UBS | 0.99 | 3.83 | 3.75 | 3.87 | 3.95 | 4.41 |
| NFI-ODCE VW (Net) | 0.82 | 3.36 | 3.49 | 3.72 | 3.90 | 4.24 |
| NFI-ODCE EQ (Net) | 0.86 | 3.56 | 3.70 | 3.89 | 4.04 | 4.37 |
| NCREIF NPI | 1.14 | 4.64 | 4.74 | 4.98 | 5.22 | 5.51 |

### Appreciation Returns
### for Periods Ended June 30, 2018

| | Last Quarter | Last Year | Last 3 Years | Last 5 Years | Last 7 Years | Last 10 Years |
|---|---|---|---|---|---|---|
| UBS | 0.59 | 2.93 | 3.17 | 4.36 | 4.57 | 0.10 |
| NFI-ODCE VW (Net) | 1.00 | 4.01 | 4.76 | 6.13 | 6.28 | 0.11 |
| NFI-ODCE EQ (Net) | 1.04 | 4.03 | 4.87 | 6.14 | 6.25 | (0.13) |
| NCREIF NPI | 0.67 | 2.46 | 3.40 | 4.63 | 4.82 | 0.68 |

# Aventura Office Building – Core Private Equity Real Estate

## Index Evaluation

- Current Index: NCREIF Property Index, 1-quarter lag.
- Callan Recommendation: No changes recommended
- Rationale:
  - Benchmarking a single building is very difficult due to the heterogeneous nature of real estate
    - *None of the widely available real estate indices is a great fit.*
  - The NCREIF Property Index is the most appropriate widely available index because it is a property-level index that does not include the effect of leverage.
    - *Both versions of the ODCE index incorporate leverage and other fund-level effects.*
- Possible Considerations:
  - A regional, property-type specific index may be more appropriate. NCREIF provides property level returns for various metropolitan statistical areas and sub-property types. The most appropriate stream was included in this analysis for comparison purposes. It currently comprises of 64 office buildings in major metropolitan areas within the Washington DC, Maryland and Virginia regions.

# Aventura Office Building vs Index Return Comparison

## Index Evaluation

### Total Returns
### for Periods Ended June 30, 2018

| | Last Quarter | Last Year | Last 3 Years | Last 5 Years | Last 7 Years | Last 10 Years |
|---|---|---|---|---|---|---|
| Aventura Office | 3.48 | 7.85 | 7.24 | 8.64 | 8.50 | 4.73 |
| | | | | | | |
| NFI-ODCE VW (Net) | 1.81 | 7.47 | 8.38 | 10.03 | 10.36 | 4.33 |
| NFI-ODCE EQ (Net) | 1.89 | 7.68 | 8.70 | 10.21 | 10.47 | 4.17 |
| NCREIF NPI | 1.81 | 7.19 | 8.25 | 9.77 | 10.23 | 6.22 |
| Virginia Office Index | 1.11 | 3.71 | 4.85 | 5.88 | 6.26 | 5.17 |

### Risk Statistics for 10 years
### for Periods Ended June 30, 2018

| | Standard Deviation | R-Squared | Correlation |
|---|---|---|---|
| Aventura Office | 7.72 | 0.00 | (0.01) |
| | | | |
| NFI-ODCE VW (Net) | 8.50 | 0.97 | 0.99 |
| NFI-ODCE EQ (Net) | 8.66 | 0.97 | 0.99 |
| NCREIF NPI | 5.74 | 1.00 | 1.00 |
| Virginia Office Index | 5.42 | 0.82 | 0.91 |

- R Squared and Correlation are based off of the NCREIF Property Index

# Aventura Office Building vs Index Return Comparison

## Index Evaluation

### Income Returns
### for Periods Ended June 30, 2018

| | Last Quarter | Last Year | Last 3 Years | Last 5 Years | Last 7 Years | Last 10 Years |
|---|---|---|---|---|---|---|
| Aventura Office | 1.37 | 5.65 | 5.60 | 5.72 | 5.66 | 5.37 |
| | | | | | | |
| NFI-ODCE VW (Net) | 0.82 | 3.36 | 3.49 | 3.72 | 3.90 | 4.24 |
| NFI-ODCE EQ (Net) | 0.86 | 3.56 | 3.70 | 3.89 | 4.04 | 4.37 |
| NCREIF NPI | 1.14 | 4.64 | 4.74 | 4.98 | 5.22 | 5.51 |
| Virginia Office Index | 1.02 | 3.98 | 3.96 | 4.30 | 4.57 | 4.93 |

### Appreciation Returns
### for Periods Ended June 30, 2018

| | Last Quarter | Last Year | Last 3 Years | Last 5 Years | Last 7 Years | Last 10 Years |
|---|---|---|---|---|---|---|
| Aventura Office | 2.09 | 2.09 | 1.56 | 2.78 | 2.70 | (0.61) |
| | | | | | | |
| NFI-ODCE VW (Net) | 1.00 | 4.01 | 4.76 | 6.13 | 6.28 | 0.11 |
| NFI-ODCE EQ (Net) | 1.04 | 4.03 | 4.87 | 6.14 | 6.25 | (0.13) |
| NCREIF NPI | 0.67 | 2.46 | 3.40 | 4.63 | 4.82 | 0.68 |
| Virginia Office Index | 0.10 | (0.26) | 0.86 | 1.53 | 1.64 | 0.22 |

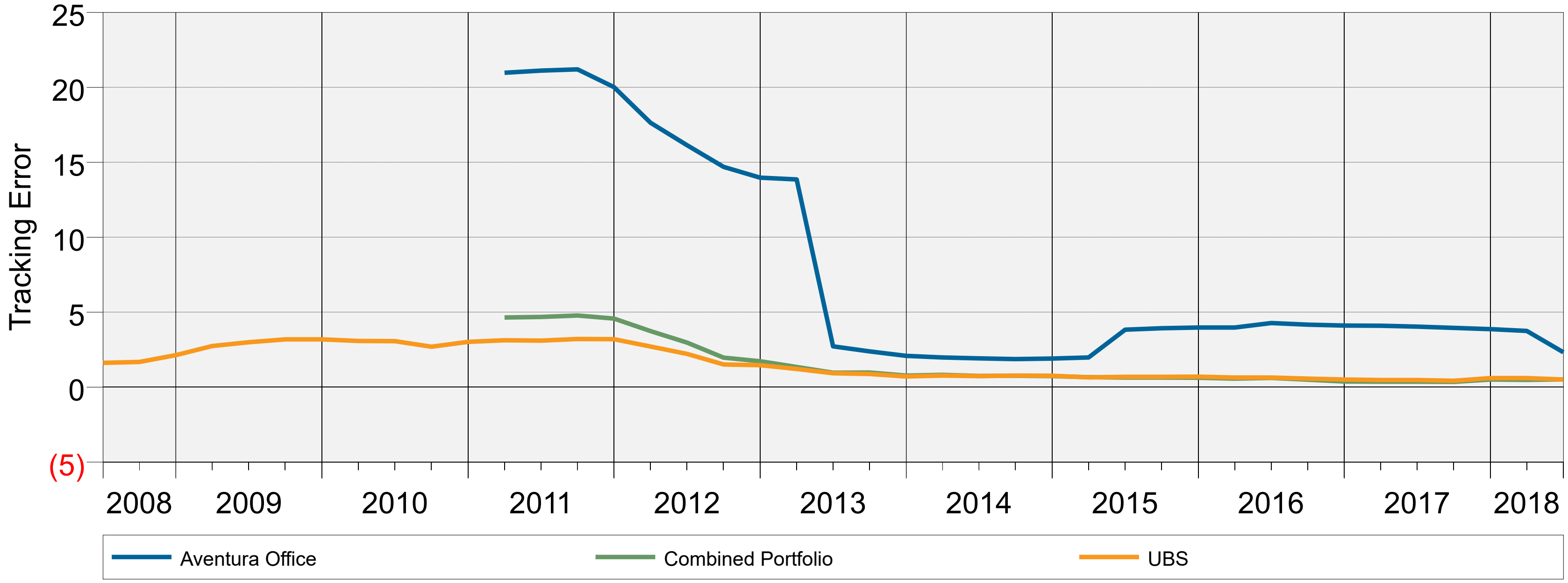
# Total Private Real Estate Portfolio

## Index Evaluation

- Callan Recommendation: NCREIF ODCE Value Weighted, 1-quarter lag.
- Rationale:
  - At $64.0 million, Virginia Prepaid plan's exposure to the UBS Fund is approximately eight times that of the value of the Aventura Building. Based on this, we believe the ODCE Value Weight Index is the most appropriate benchmark for the overall plan. In addition, despite the options for a specific benchmark for the Aventura Building, none of them are ideal, thusly we do not think it appropriate to incorporate a less than ideal benchmark even on a blended basis.

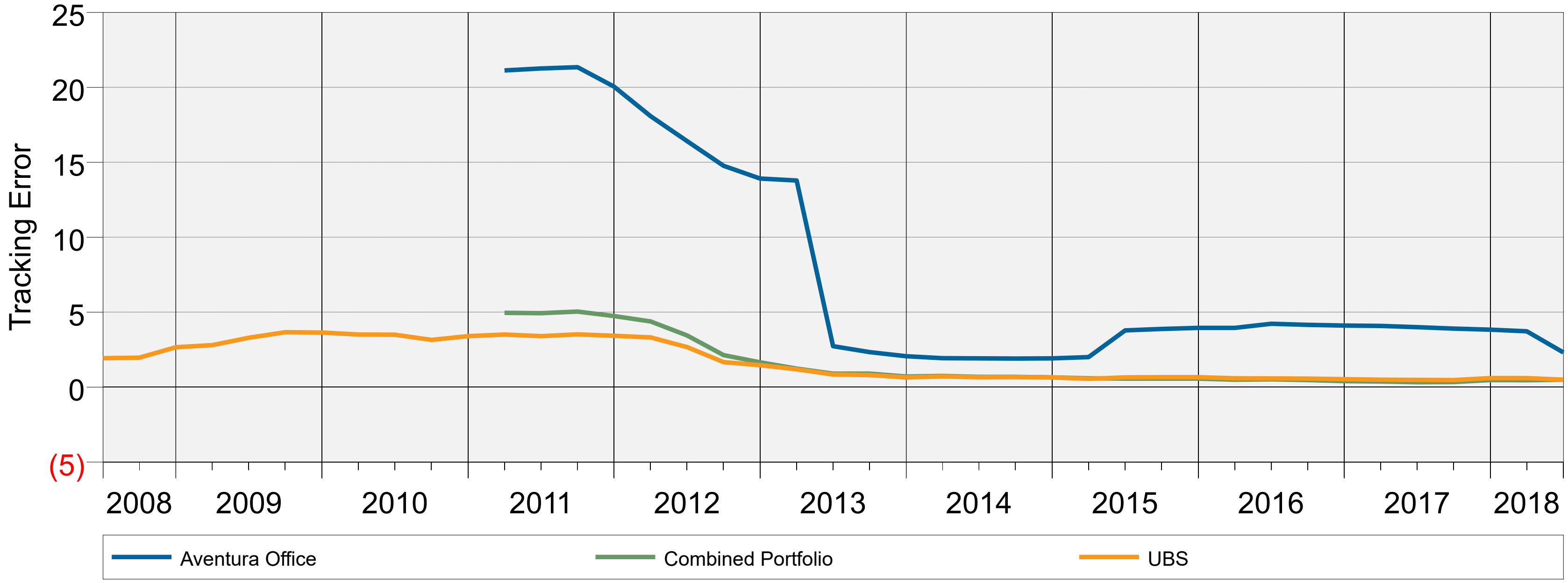
# Tracking Error Comparison

**Rolling 12 Quarter Net of Fee Tracking Error Relative To NFI-ODCE VW (Net)**
**for 10 Years Ended June 30, 2018**



# Tracking Error Comparison

**Rolling 12 Quarter Net of Fee Tracking Error Relative To NFI-ODCE EQ (Net)**
**for 10 Years Ended June 30, 2018**



# Tracking Error Comparison

**Rolling 12 Quarter Net of Fee Tracking Error Relative To NCREIF NPI**
**for 10 Years Ended June 30, 2018**