



NEPC, LLC

YOU DEMAND MORE. So do we.SM

Fees, Returns and Cost-effective Management of Large Public Fund Investment Programs

October 19, 2017

Allan Martin, Partner
Sam Austin, Partner
Michael Miranda, Senior Analyst

255 State Street, Boston, MA 02109 | TEL: 617.374.1300 | FAX: 617.374.1313 | www.nepc.com

BOSTON | ATLANTA | CHARLOTTE | CHICAGO | DETROIT | LAS VEGAS | PORTLAND | SAN FRANCISCO

Management Fee Overview

- **Equities are common stocks holdings; these are ownership interests in publicly traded companies**
- **Fixed Income refers to bonds which are debt securities issued by various entities including the U.S. Treasury and large corporations**
- **Historically, most investment programs were structured as 60/40 or 70/30 Equity/Fixed Income portfolios**
 - These programs can be sourced at relatively low cost today
- **Since the early 2000s, many funds have diversified their investment programs through the use of alternative investments**
 - Alternative investments include Private Equity, Private Debt, Real Estate, Inflation-linked Assets (like Infrastructure, Timber, Farmlands) and Hedge-Funds. Alternative assets are generally higher fee asset classes however they provide benefits in return for the additional fees paid which include diversification, lower volatility and higher Sharpe ratios, and arguably more persistent out-performance

- **Fees should be paid for value-added, not simply lowest fee per dollar of assets**
- **Typical Fees*:**

	Active	Passive
Large Cap Equity	0.60%	0.04%
Small/Mid Cap Equity	0.90%	0.60%
International Equity	0.80%	0.07%
Emerging Markets Equity	0.95%	0.25%
Core Fixed Income Fee	0.30%	0.05%
Emerging Market Debt Fee	0.65%	0.43%
Private Equity	2.00%	N/A
Private Debt	1.50%	N/A
Real Estate	1.00%	N/A

- **Value-add should be measured as return above an appropriate benchmark per unit of risk taken (Sharpe Ratio, information ratio-no agreed-upon metric)**
- **Higher Sharpe Ratio asset classes in a rational world, will command higher fees**

**Median asset class fees; alternatives exclude any performance based fees*

Geometric Expected Return				
Asset Class	2016	2017	2017-2016	5-7 Year Forecasted Sharpe Ratio
Private Debt	7.50%	7.25%	-0.25%	0.75
Real Assets	7.65%	7.09%	-0.56%	0.32
Global Equities*	7.23%	7.08%	-0.15%	0.3
Risk Parity*	5.29%	4.68%	-0.61%	0.29
Emerging Int'l Equities	9.75%	9.50%	-0.25%	0.28
Private Equity	8.50%	8.25%	-0.25%	0.28
Real Estate	6.50%	6.00%	-0.50%	0.28
Int'l Equities (Unhedged)	7.25%	7.25%	-	0.26
Large Cap Equities	6.00%	5.75%	-0.25%	0.23
Small/Mid Cap Equities	6.25%	6.00%	-0.25%	0.2
Core Bonds*	2.46%	2.65%	0.19%	0.15
Cash	1.50%	1.75%	0.25%	0

- **Asset classes with higher fees exhibit either higher expected absolute returns or superior expected risk-adjusted performance**

* Assumption based on market weighted blend of relative sub-components.

- **Within Public Markets (Both Equity & Fixed Income) there are 3 general types of Fee structures:**

1. Flat Fee

- A flat basis point fee that is charged no matter the size of the mandate
- Typically used for passive or indexed mandates

2. Tier or Asset-Based Fee (Declining Marginal Rate Fee Structure)

- A fee schedule that includes breakpoints or “Tiers” based on the size of the mandate
- The breakpoints will provide lower fees as the amount of assets grows
- These fee structures are offered by passive and active managers and are the most prominently used (100 bps on the first \$50 mm, 75 bps on the next \$50 mm, with 50 bps on assets over \$100mm)

3. Performance-Based Fee

- A fee schedule that includes the ability for the manager to profit from the performance of a portfolio
- The fee is comprised of a base fee, which is substantially lower than the customary or normal fee, and a performance component that is earned or exceeded only when the manager earns a required excess returns

Notes:

- Performance fees do not lead to better performance
- Clients may be able to negotiate better fees using the performance fee approach, since manager most-favored-nation restrictions are less binding
- When managers seriously underperform, the optics are better, but in rising markets fees can be noticeably higher

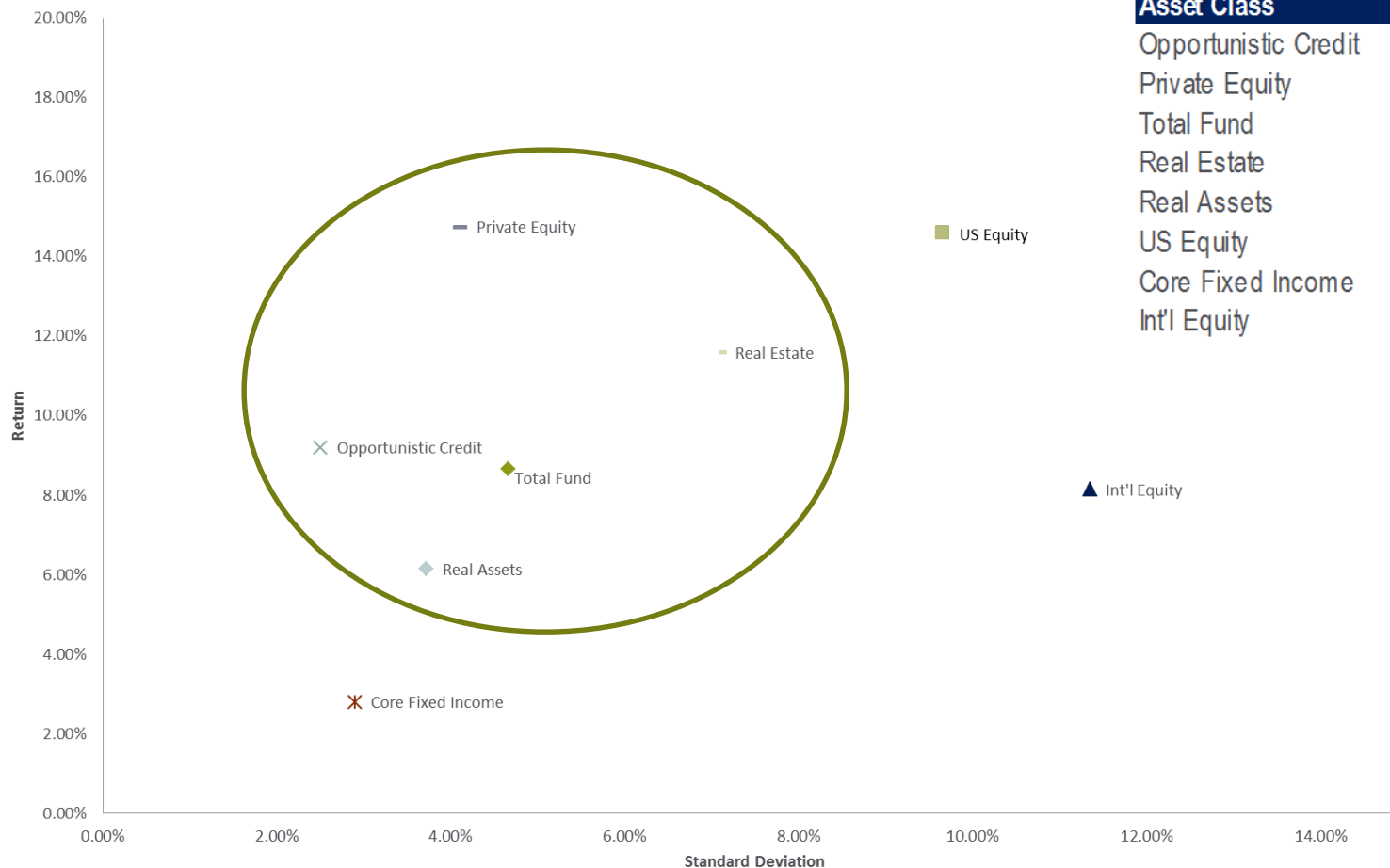
1. Private Market Fee Structures

- Fees are typically higher than for public market assets
- Fee structures often include the following components:
 - Management Fee – Typically 1-2%
 - Performance Fee or “carry” – Typically 20% of performance above a preferred return payable after all capital is returned
 - Preferred return or “hurdle rate” which needs to be attained in order to earn the performance fee– Typically 6-10%
- Fees often paid on committed, not invested capital, although this is changing

2. Hedge Fund Fee Structures

- Fees are higher compared to traditional managers
- Fees are made up of two components:
 - Management Fee
 - A fixed fee usually determined as a percentage of assets
 - Typically between 1-3%
 - Performance Fee:
 - Based on net new performance
 - Generally subject to a “high-water mark” or max fee
 - Typically between 15-30% of performance, which can be either above a hurdle or simply a positive return

NMERB Asset Class Risk-Return Profiles – 5 Year Trailing



Asset Class	Sharpe Ratio
Opportunistic Credit	3.65
Private Equity	3.55
Total Fund	1.82
Real Estate	1.61
Real Assets	1.61
US Equity	1.50
Core Fixed Income	0.91
Int'l Equity	0.70

- **High fee asset classes have exhibited superior risk-adjusted performance as well as superior absolute performance relative to low fee asset classes over the most recent 5 year period**

*As of June 30, 2017

- Fees should be evaluated based on value-added not simply by dollar amount
- Despite lower cost of implementation, a traditional 70/30 portfolio is expected to underperform a higher cost, diversified portfolio on both an absolute and risk-adjusted basis
- The value add of higher cost alternatives is evident

	Current Target	70/30
Cash	1%	0%
Large Cap Equities	16%	0%
Small/Mid Cap Equities	3%	0%
Int'l Equities (Unhedged)	5%	0%
Emerging Int'l Equities	9%	0%
Global Equity	0%	70%
Total Equity	33%	70%
Core Bonds	6%	30%
EMD (External)	1%	0%
EMD (Local Currency)	1%	0%
Total Fixed Income	8%	30%
Private Equity	13%	0%
Private Debt	18%	0%
Private Real Assets	8%	0%
Real Estate	7%	0%
Opportunity - Absolute Return	5%	0%
Total Real Assets	51%	0%
Global Asset Allocation	4%	0%
Risk Parity	3%	0%
Total Multi Asset	7%	0%

<i>Expected Return 5-7 yrs (net)</i>	7.1%	6.1%
<i>Expected Return 5-7 yrs (gross)</i>	8.1%	6.3%
<i>Expected Cost (bps)</i>	98	16
<i>Standard Dev</i>	13.1%	13.2%
<i>Sharpe Ratio (5-7 years)</i>	0.41	0.33

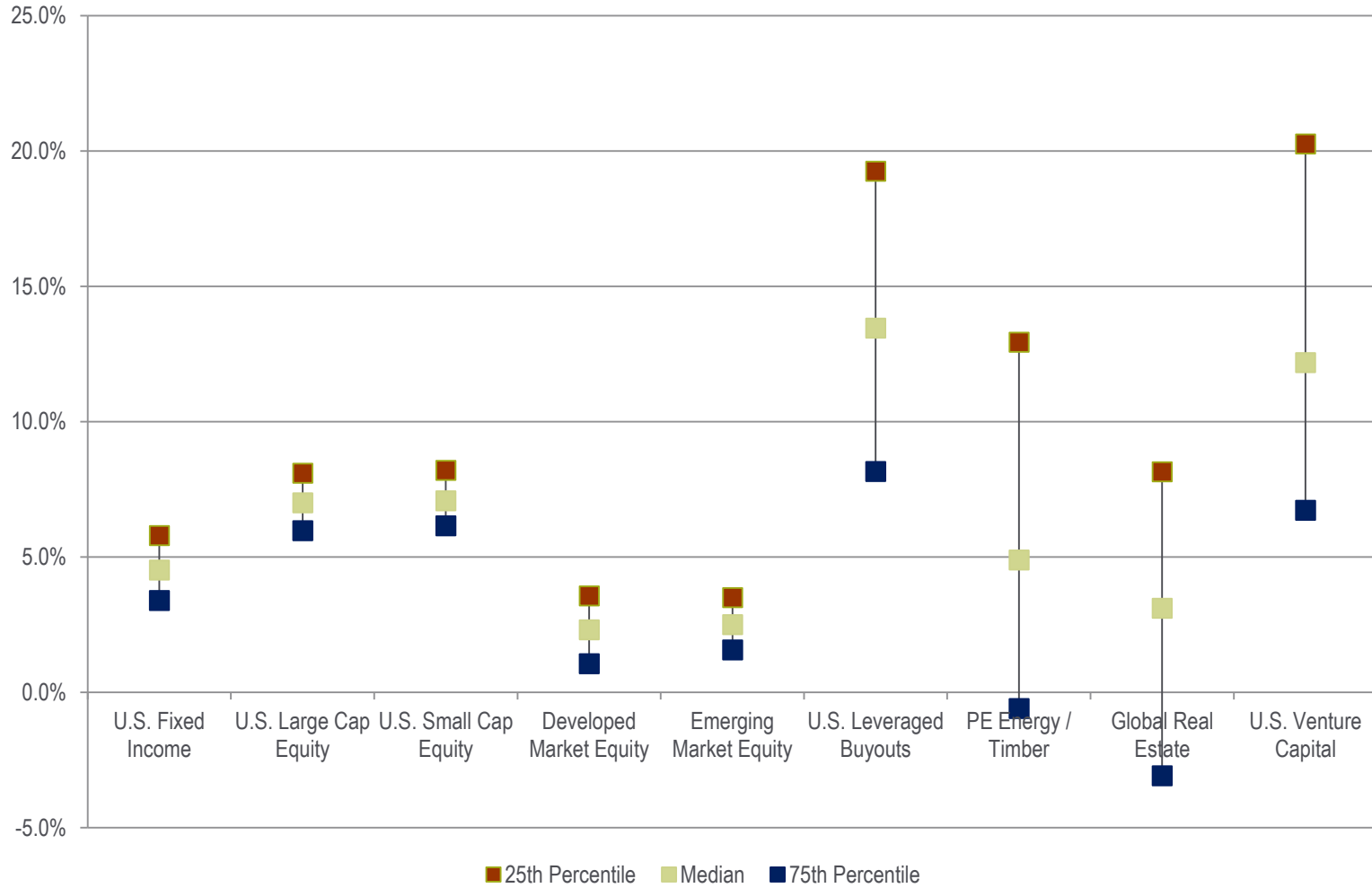
The Active vs. Passive Decision

- **There is no one “right” answer**
 - Depends on investment program characteristics
 - Available resources – time, active risk, management fees
 - Governance structure in place to:
 - Seek excess return in all components of plan structure
 - If active is selected, be patient with short-term underperformance
 - Depends on asset class
 - Focus active risk, management fee, and time budget on:
 - Most inefficient markets
 - Less constrained mandates

- **Difficult to draw hard and fast conclusions despite many analyses performed over the years**
- **Analytical challenges include:**
 - Universe selection
 - Survivorship bias
 - Time period sensitivity
- **Analyses can be created to prove the case of the interested party**
- **Recommend taking retrospective analyses with a “grain of salt”**
- **Test intuitively consistent hypotheses**
- **Be wary of secular extremes that can lead to wrong conclusion at worst time**

- **Active management more likely to add value in less efficient markets**
- **Characteristics of more efficient investment categories:**
 - Smaller, more homogeneous opportunity set
 - Well-researched
 - Highly liquid
 - Tightly constrained
 - Inexpensive index vehicles and derivatives readily available
- **Examples:**
 - U.S. Large Cap Stocks
 - U.S. Core Bonds (particularly Treasuries & Agencies)
- **Characteristics of less efficient investment categories:**
 - Larger, more heterogeneous opportunity set
 - Not well-researched
 - Poor/intermittent liquidity
 - Less constrained
 - Index vehicles and derivatives unavailable, expensive, and/or involve high tracking error
- **Examples:**
 - U.S. small company stocks
 - Non-US stocks, including Emerging Markets
 - High yield bonds/bank loans
 - Hedge funds
 - Private equity and real estate
 - Private Debt

10 Years Ending June 30, 2017



Active vs. Passive – Summary by Asset Category

Asset Class	Market Efficiency	Diversity of Opportunity Set	Active Constraints	Excess Return Expectation	Ease of Indexing	Comments/Recommendation
US Large Cap Stocks	High	Low	High	Low	High	Most obvious choice for indexing (and /or portable alpha)
US Small Cap Stocks	Moderate	Moderate	Moderate	Moderate	Moderate	In general seek active; can index core exposure
Non-US Developed Market Stocks	Moderate	Moderate	High	Moderate	Moderate	In general seek active; can index core exposure
Emerging Market Stocks	Moderate	Moderate	Moderate	Moderate	Moderate	In general seek active; can index core exposure
Core Bonds (Gov't/Credit)	High/Moderate	Low/Moderate	High	Low / Moderate	Moderate	Evaluate index components; potentially seek active in less efficient sectors
Emerging Market Bonds	Moderate	Moderate	Moderate	Moderate	Low	Seek active
High Yield/Bank Loans	Low	High	Moderate	Moderate	Low	Seek active
Hedge Funds	Low	High	Low	High	Low	Hedge fund beta replication emerging, but unproven; seek active
Private Equity	Low	High	Low	High	N/A	Must use active
Real Estate	Low	High	Low	High	N/A	Must use active

- **Higher fee asset classes provide the greatest probabilities for earning outsized return and excess returns**
- **Greater return dispersion in less efficient asset classes provide greater opportunities for active management**

Internal vs. External Management

- **Fees**

- Passive mandates can be managed in-house cheaply in relation to the costs of external vendors as more mandates are moved internally
 - Consider management fees, incremental custody fees, licensing fees

- **Resources**

- Are internal resources sufficient to manage the portfolio?
 - What software is required?
- What are the time requirements for staff to manage the portfolio?

- **Staffing**

- Loss of key staff more of a concern than is the case where an external manager is engaged
- Salaries must be reasonably competitive to provide oversight and continuity

- **S&P 500 Index Portfolio**

- Bloomberg Terminal (2 Licenses): \$2,000 annually
- Portfolio Optimization Software: \$305,000 annually
- Index Provider License: \$25,000 annually (\$0 if already subscribing)
- Accounting Software to Reconcile with Custodian (QED): \$104,000 annually
- Trade Settlements: \$2,200 annually
- Incremental Custody Fee: \$10,000
- Proxy Voting/Corp. Actions/Quarterly Rebalancing: \$50,000 (\$0 if already subscribing)
- Staff (2 portfolio managers): \$300,000 (25% of staff time)
- Total Cost: \$575,200

- **At a 4bps annual fee rate, an externally managed fund would need to have a value of just over \$1.4 billion to break even (it is important to note that the breakeven point is lower if more than one passive mandate is managed in-house)**

- **Incremental costs are reduced as more funds are introduced however**
 - Typically no need for additional Bloomberg licenses, software, index licenses, accounting software and staff

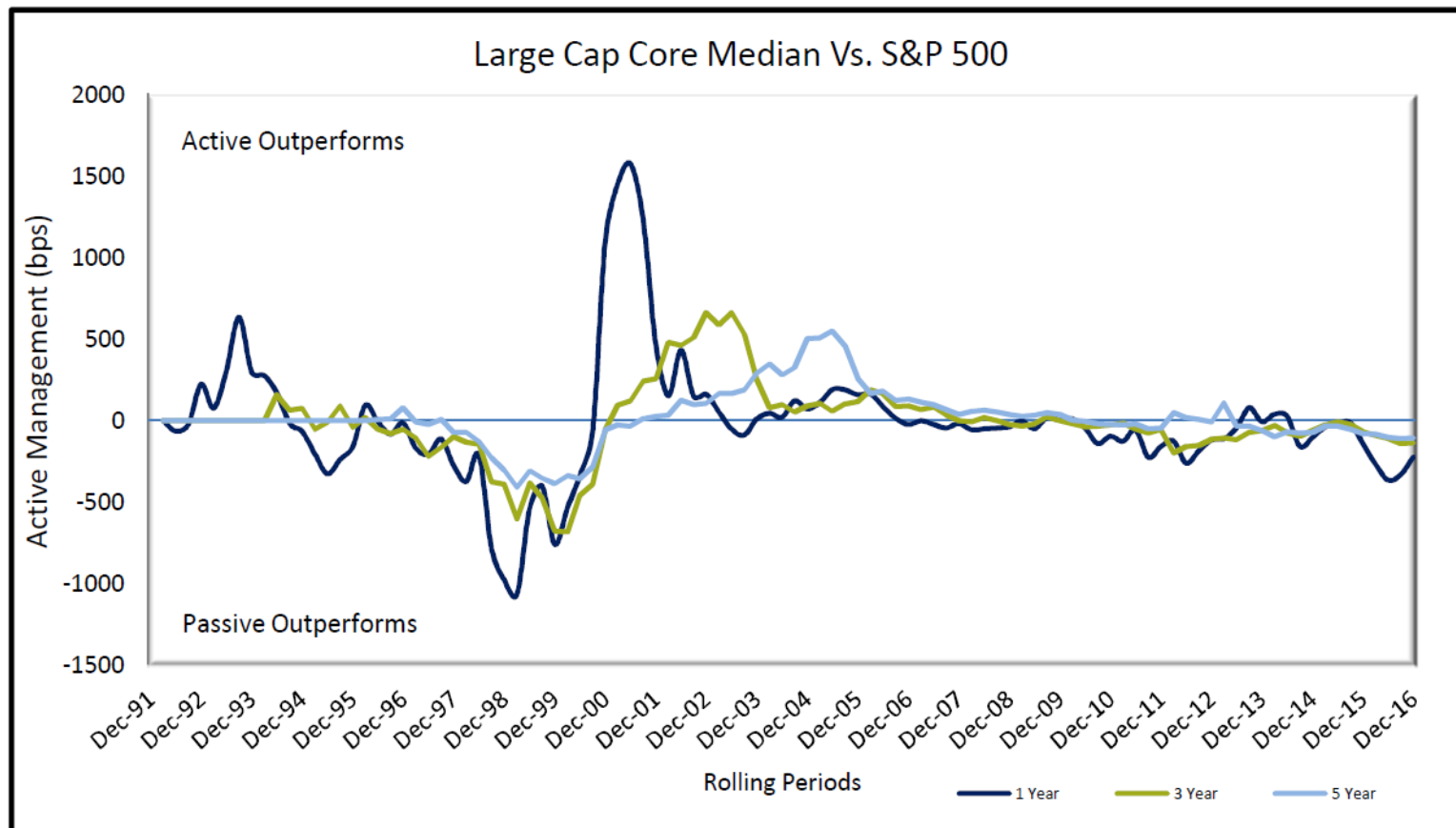
Externally Managed S&P 400 Portfolio		
Managers	Fee (bps)	Cost for \$300 MM Mandate
Blackrock	Lendable - 2bps	Lendable - \$60,000
	Non-Lendable - 3bps	Non-Lendable - \$90,000
Northern	Lendable - 2.32bps	Lendable - \$69,600
	Non-Lendable - 2.79bps	Non-Lendable - \$83,700
State Street	3.17bps	\$95,000
Vanguard	8bps	\$240,000

- **Fees above are based only on the asset based management fee charged and do not include additional custody fees**
- **Cost of internal management for this specific portfolio was only an incremental \$25,000 in staff time (portfolio manager and back office) as the current S&P 500 Index Portfolio is managed internally**

Active vs. Passive Appendix

- **Evaluated performance of active managers over rolling 1, 3, and 5-year periods ending 12/31/16**
 - Net of fees*
 - Attempts to minimize “survivorship bias”, particularly over one and three year periods
- **Evaluated ranking of indexes in universe over calendar year periods**
 - Net of fees*
 - Attempts to minimize “survivorship bias”
- **Used data from eVestment Alliance for 2012 and after.**
 - Encompasses over 10,000 investment products, 1,900 different investment firms
 - Industry’s largest provider of traditional and hedge fund data
 - Data prior to 2012 is from the Independent Consultants Cooperative universe

* Fees from 2008 eVestment Alliance manager fee study; used fee for \$25 million mandate



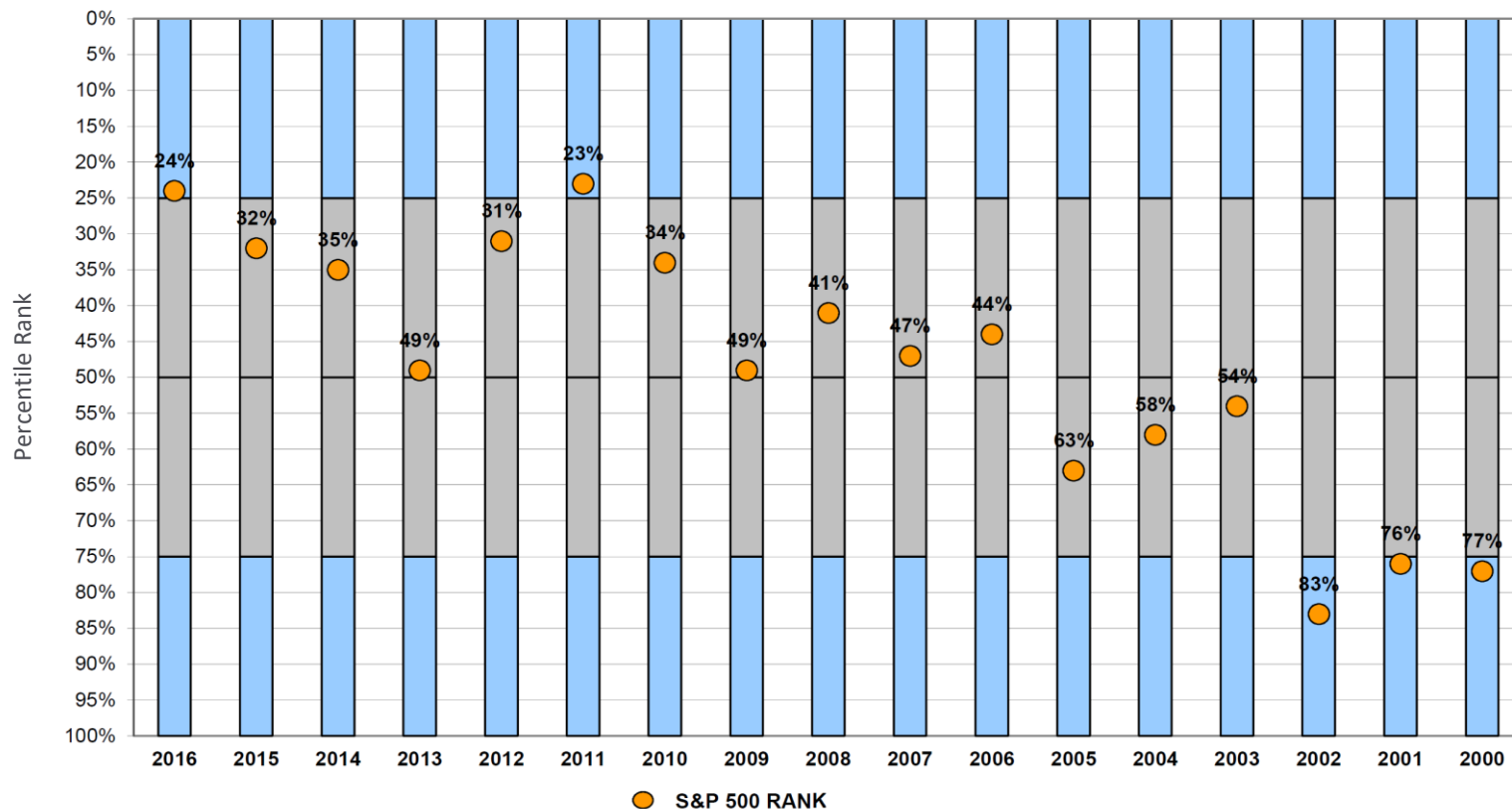
The median large cap core equity manager has outperformed the S&P 500, net of fees¹, in:

- 36 of 99 rolling one-year periods (or, 36% of the time)
- 35 of 91 rolling three-year periods (or, 38% of the time)
- 43 of 83 rolling five-year periods (or, 52% of the time)

¹ Annualized net-of-fee results are calculated by subtracting the average manager fee, respective of asset class and style, from the eVestment or ICC gross-of-fee performance. The average manager fees used prior to 2009 were obtained from the 2008 eVestment Alliance manager fee study. For periods after to 2009, the 2009 eVestment Alliance manager fee study was used.

² The universe data shown includes only actively managed portfolios. The minimum sample size used for each time period is 20 portfolios.

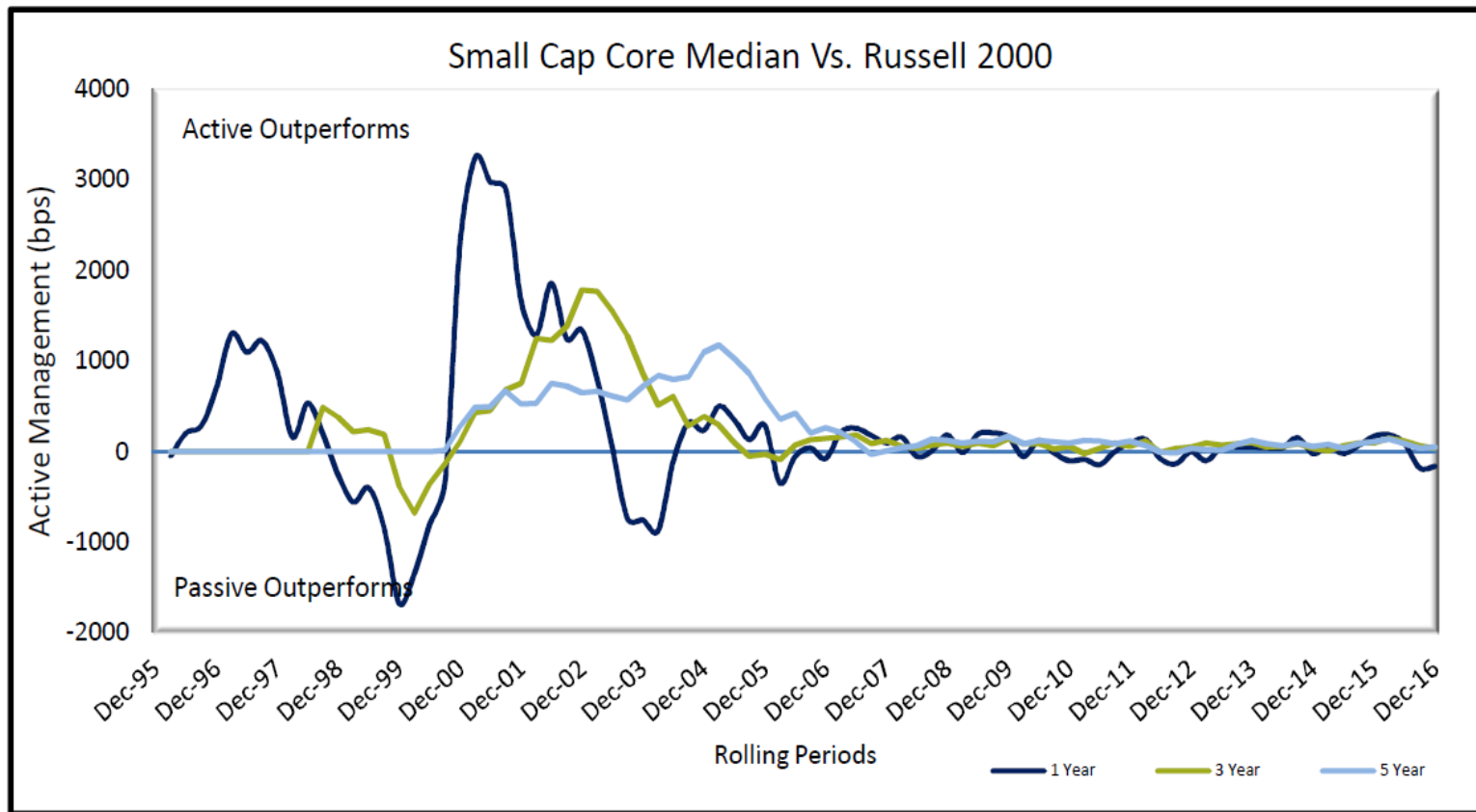
Annual Periods Ending December 31



NEPC

The S&P 500 ranked below median 6 out of the last 17 years

¹ eVestment and ICC universes shown. Benchmark rankings are relative to the respective actively managed gross-of-fee universe. Rankings reflect the gross-of-fee results of the benchmark. For periods prior to 2009 results were calculated by adding the respective asset class and style annual fee as obtained from the 2008 eVestment Alliance manager fee study to the annual benchmark return. For periods after to 2009, the 2009 eVestment Alliance manager fee study was used.



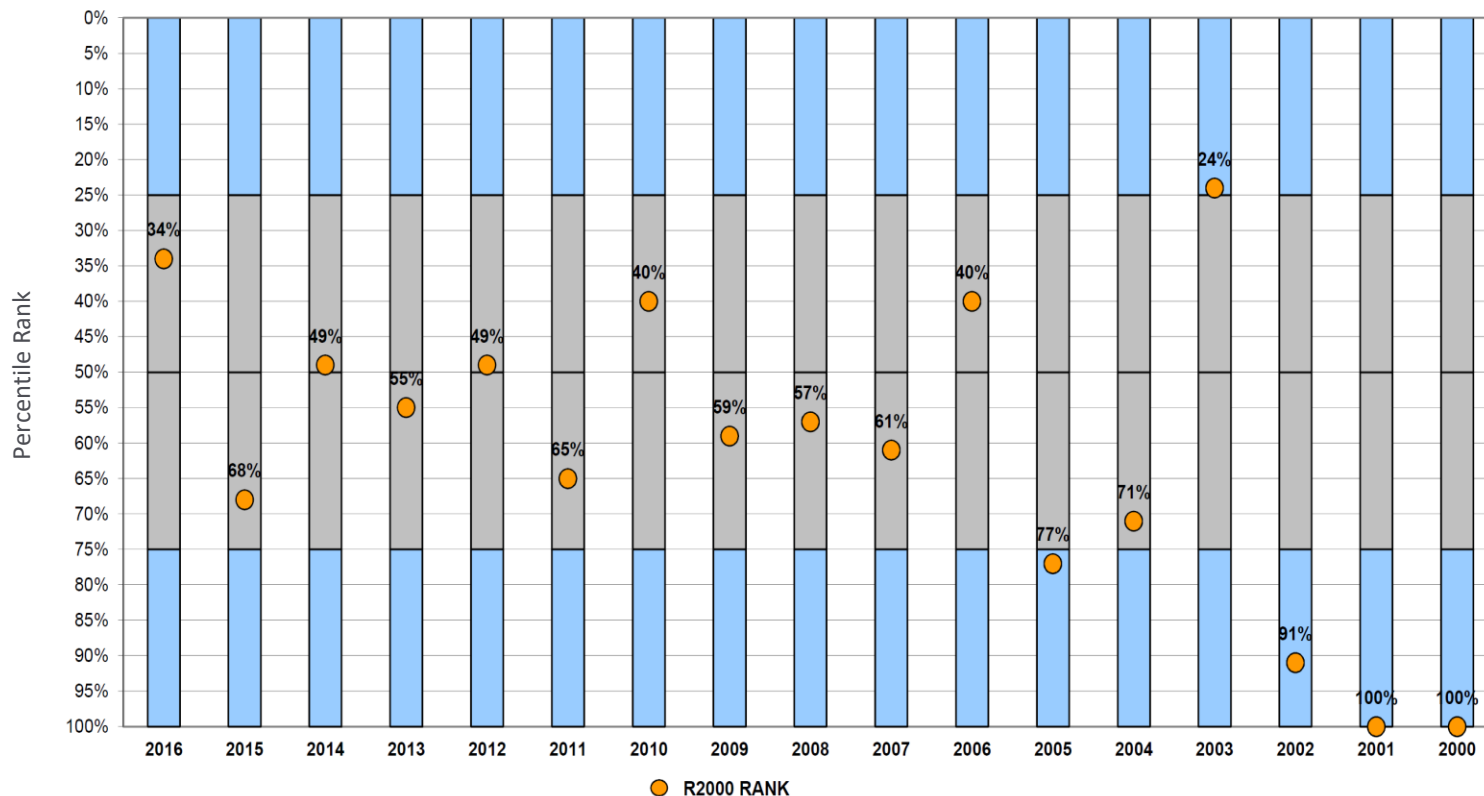
The median small cap core equity manager has outperformed the Russell 2000, net of fees¹, in:

- 54 of 84 rolling one-year periods (or, 64% of the time)
- 65 of 74 rolling three-year periods (or, 88% of the time)
- 63 of 66 rolling five-year periods (or, 95% of the time)

¹ Annualized net-of-fee results are calculated by subtracting the average manager fee, respective of asset class and style, from the eVestment or ICC gross-of-fee performance. The average manager fees used prior to 2009 were obtained from the 2008 eVestment Alliance manager fee study. For periods after to 2009, the 2009 eVestment Alliance manager fee study was used.

² The universe data shown includes only actively managed portfolios. The minimum sample size used for each time period is 20 portfolios.

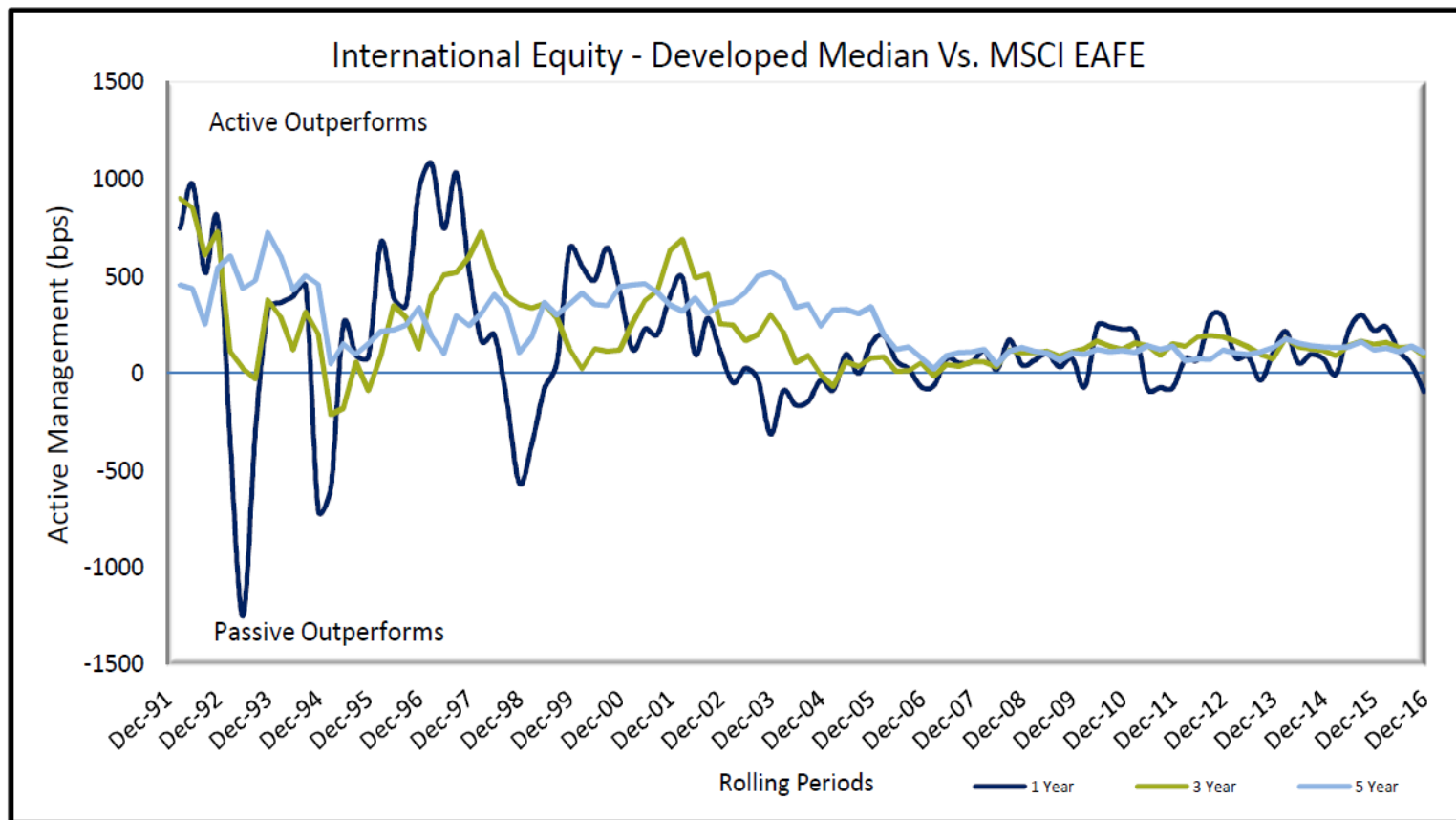
Annual Periods Ending December 31



NEPC

The Russell 2000 ranked below median 11 out of the last 17 years

¹ eVestment and ICC universes shown. Benchmark rankings are relative to the respective actively managed gross-of-fee universe. Rankings reflect the gross-of-fee results of the benchmark. For periods prior to 2009 results were calculated by adding the respective asset class and style annual fee as obtained from the 2008 eVestment Alliance manager fee study to the annual benchmark return. For periods after to 2009, the 2009 eVestment Alliance manager fee study was used.



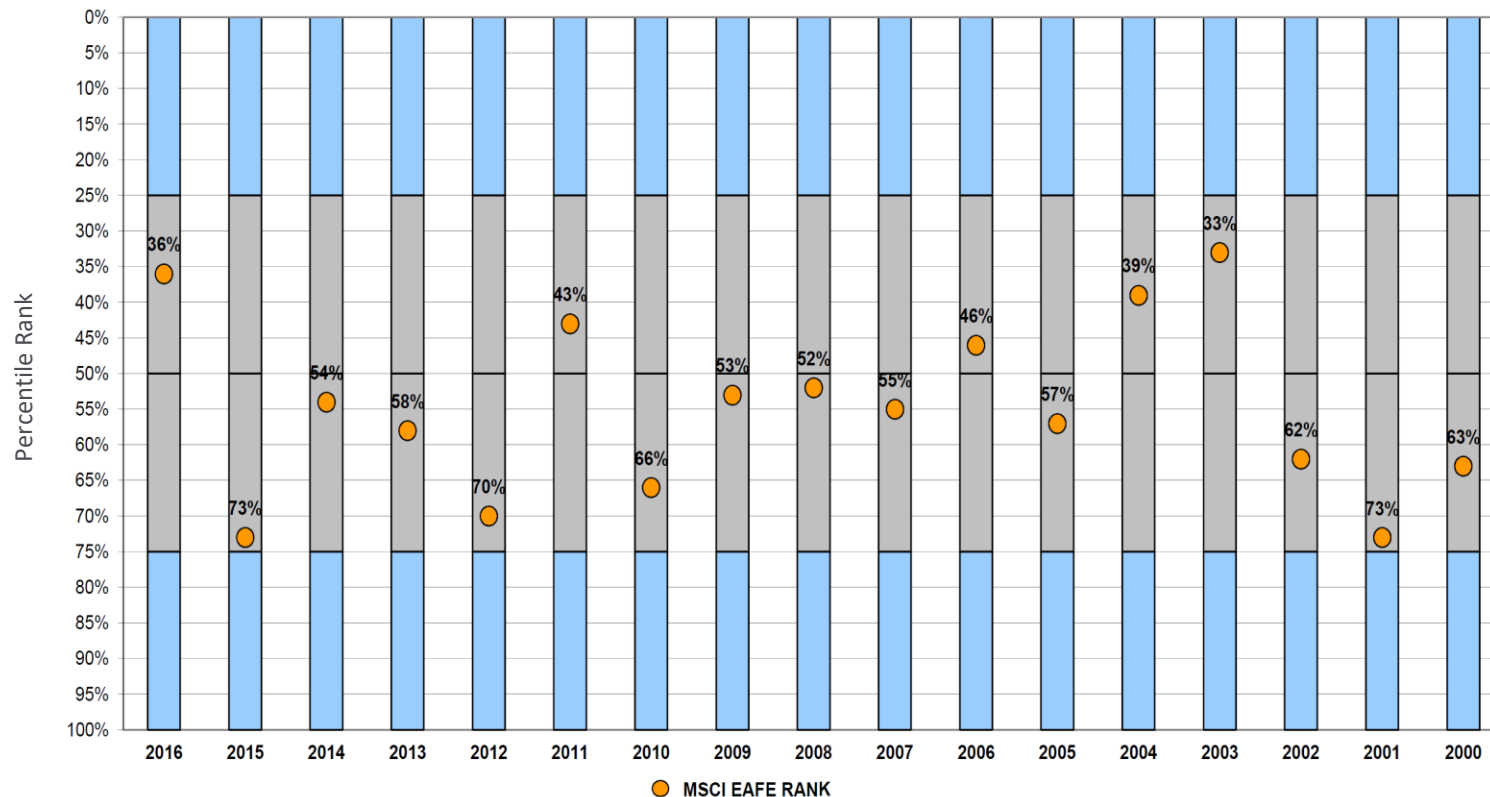
The median international equity developed manager has outperformed the MSCI EAFE, net of fees¹, in:

- 73 of 100 rolling one-year periods (or, 73% of the time)
- 93 of 100 rolling three-year periods (or, 93% of the time)
- 100 of 100 rolling five-year periods (or, 100% of the time)

¹ Annualized net-of-fee results are calculated by subtracting the average manager fee, respective of asset class and style, from the eVestment or ICC gross-of-fee performance. The average manager fees used prior to 2009 were obtained from the 2008 eVestment Alliance manager fee study. For periods after to 2009, the 2009 eVestment Alliance manager fee study was used.

² The universe data shown includes only actively managed portfolios. The minimum sample size used for each time period is 20 portfolios.

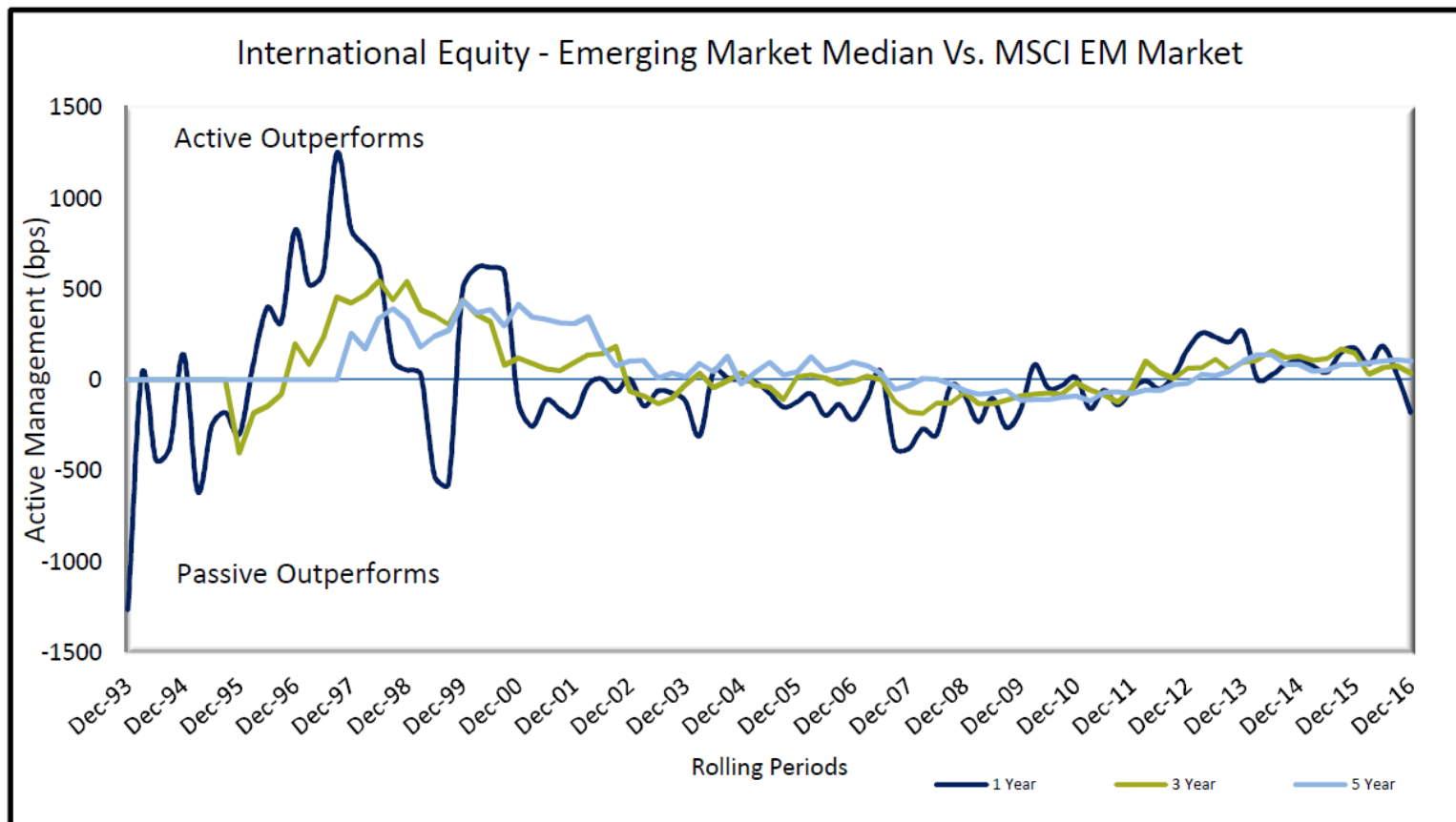
Annual Periods Ending December 31



NEPC

MSCI EAFE ranked below median 12 out of the last 17 years

¹ eVestment and ICC universes shown. Benchmark rankings are relative to the respective actively managed gross-of-fee universe. Rankings reflect the gross-of-fee results of the benchmark. For periods prior to 2009 results were calculated by adding the respective asset class and style annual fee as obtained from the 2008 eVestment Alliance manager fee study to the annual benchmark return. For periods after to 2009, the 2009 eVestment Alliance manager fee study was used.



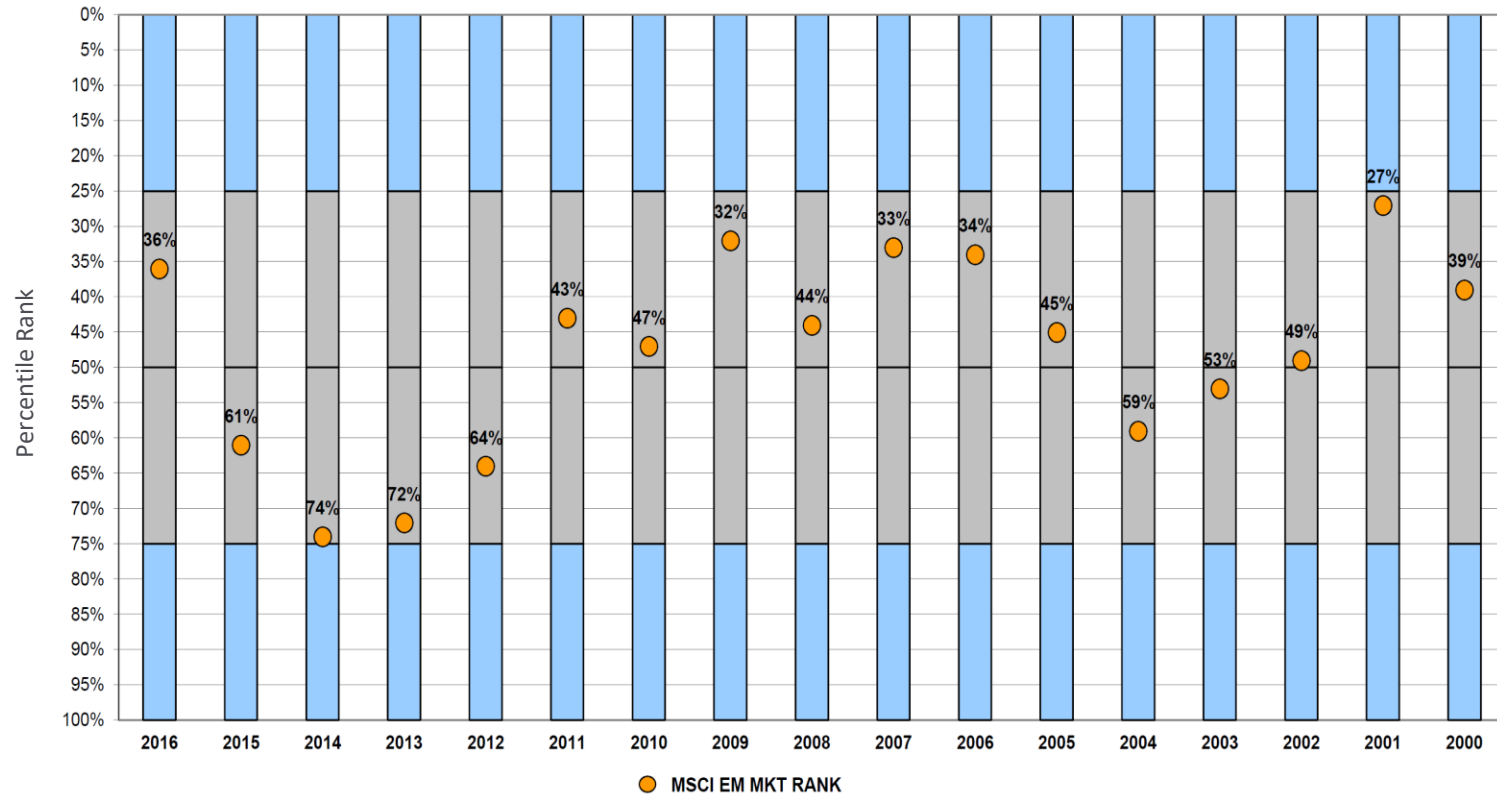
The median international equity emerging market manager has outperformed the MSCI EM Market, net of fees¹, in:

- 43 of 93 rolling one-year periods (or, 46% of the time)
- 50 of 85 rolling three-year periods (or, 59% of the time)
- 56 of 77 rolling five-year periods (or, 73% of the time)

¹ Annualized net-of-fee results are calculated by subtracting the average manager fee, respective of asset class and style, from the eVestment or ICC gross-of-fee performance. The average manager fees used prior to 2009 were obtained from the 2008 eVestment Alliance manager fee study. For periods after to 2009, the 2009 eVestment Alliance manager fee study was used.

² The universe data shown includes only actively managed portfolios. The minimum sample size used for each time period is 20 portfolios.

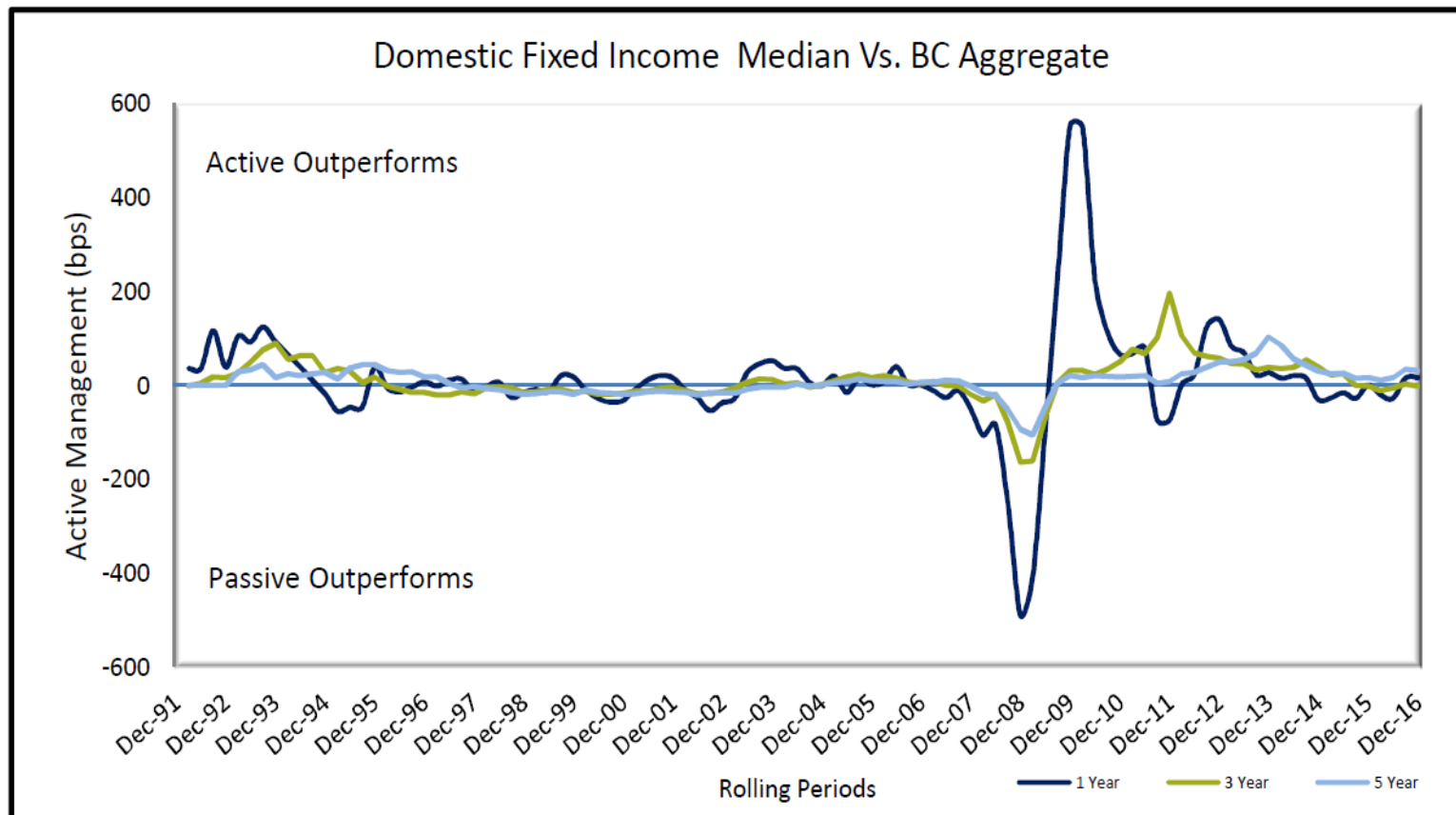
Annual Periods Ending December 31



NEPC

MSCI EM Index ranked below median 6 out of the last 17 years

¹ eVestment and ICC universes shown. Benchmark rankings are relative to the respective actively managed gross-of-fee universe. Rankings reflect the gross-of-fee results of the benchmark. For periods prior to 2009 results were calculated by adding the respective asset class and style annual fee as obtained from the 2008 eVestment Alliance manager fee study to the annual benchmark return. For periods after to 2009, the 2009 eVestment Alliance manager fee study was used.



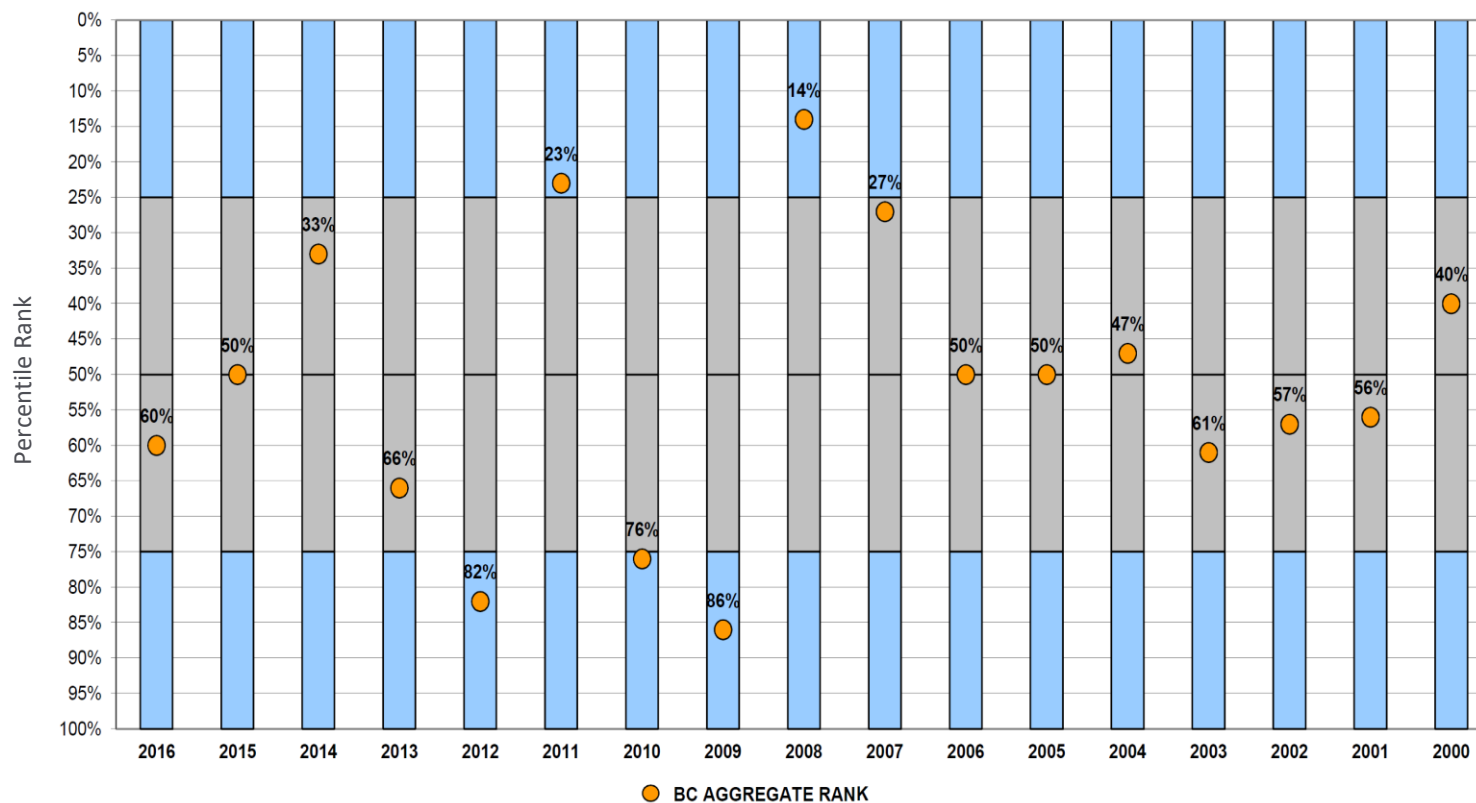
The median domestic fixed income manager has outperformed the BC Aggregate, net of fees¹, in:

- 55 of 100 rolling one-year periods (or, 55% of the time)
- 57 of 100 rolling three-year periods (or, 57% of the time)
- 61 of 96 rolling five-year periods (or, 64% of the time)

¹ Annualized net-of-fee results are calculated by subtracting the average manager fee, respective of asset class and style, from the eVestment or ICC gross-of-fee performance. The average manager fees used prior to 2009 were obtained from the 2008 eVestment Alliance manager fee study. For periods after to 2009, the 2009 eVestment Alliance manager fee study was used.

² The universe data shown includes only actively managed portfolios. The minimum sample size used for each time period is 20 portfolios.

Annual Periods Ending December 31



NEPC

BC Aggregate ranked at or below median 11 out of the last 17 years

¹ eVestment and ICC universes shown. Benchmark rankings are relative to the respective actively managed gross-of-fee universe. Rankings reflect the gross-of-fee results of the benchmark. For periods prior to 2009 results were calculated by adding the respective asset class and style annual fee as obtained from the 2008 eVestment Alliance manager fee study to the annual benchmark return. For periods after to 2009, the 2009 eVestment Alliance manager fee study was used.

- **Data appear broadly consistent with intuitive hypotheses:**
 - US Large cap stock managers exhibit lowest probability of active management outperformance; margins are relatively tight
 - Small cap, Non-US stocks exhibit higher probability of active management outperformance; margins are wider
 - Emerging markets stocks are an outlier – requires further consideration
 - Core fixed income demonstrated modest outperformance until big fall-off in 2008 followed by rebound in 2009 and 2010
- **Success of active management can appear cyclical**
 - Can be based on relative trends of performance related to biases of active strategies versus indexes
 - Lower probability of active management success in short-term periods does not preclude longer-term success
 - Trending nature of active management success indicates some alpha may be disguised beta
 - Example of fixed income – *2008 vs. 2009*

- **Past performance is no guarantee of future results.**
- **The goal of this report is to provide a basis for substantiating asset allocation recommendations. The opinions presented herein represent the good faith views of NEPC as of the date of this report and are subject to change at any time.**
- **Information on market indices was provided by sources external to NEPC. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.**
- **All investments carry some level of risk. Diversification and other asset allocation techniques do not ensure profit or protect against losses.**
- **This report is provided as a management aid for the client's internal use only. This report may contain confidential or proprietary information and may not be copied or redistributed to any party not legally entitled to receive it.**