



# **PERSPECTIVES THAT DRIVE ENTERPRISE SUCCESS**

JANUARY 2015

Active Management Environment



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# The active management environments

Our work on the active management environment this year has provided us new insights, and a new toolkit to help understand the range of impacts that active management can have on portfolio outcomes.

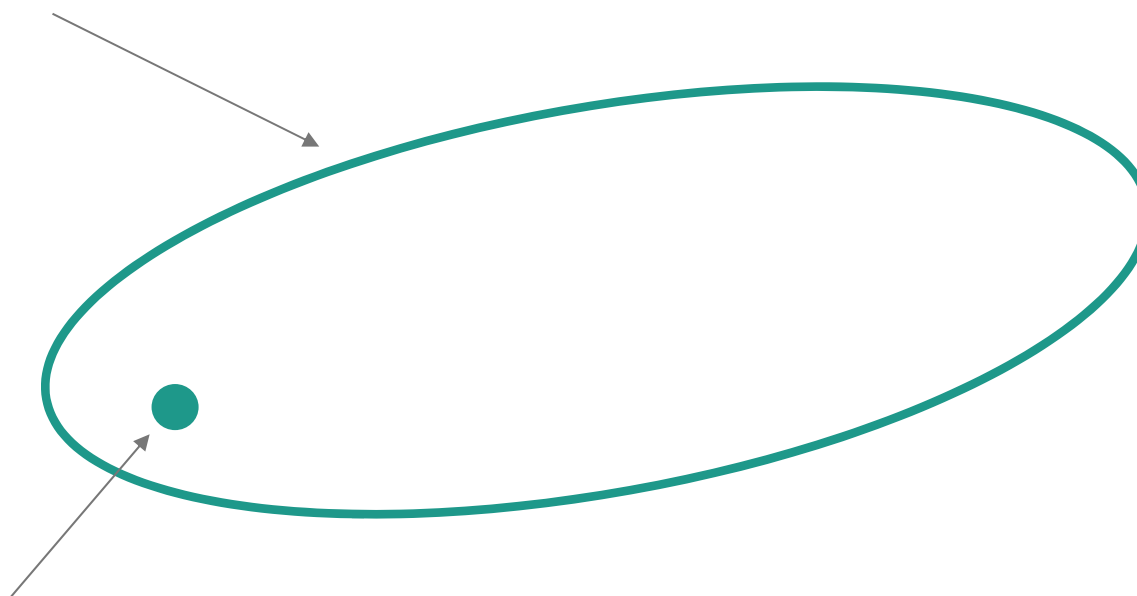
- Even without skilled manager selection there are many cases where active management can help investors achieve better portfolio outcomes in risk and return terms.
- Those better portfolio outcomes may come from additional return or lower risk. Not all investors have the same definition of better outcomes, and the trade-offs facing them vary by universe.
- Adding skilled manager selection to the process can add additional value in portfolio construction.
- Fees remain an important part of the active management conversation. Fees and survivor bias should be taken into account when analyzing active management universes.

Using the median manager to decide whether active management is appropriate can be entirely misleading and should be avoided where possible.

# How to read a universe chart

The line represents the area where we would expect to find 75% of all of the managers in the universe for the time period covered.

All universe data has been adjusted downwards to reflect the effect of fees and of survivorship bias.



The dot represents the behavior of the benchmark over the period concerned.

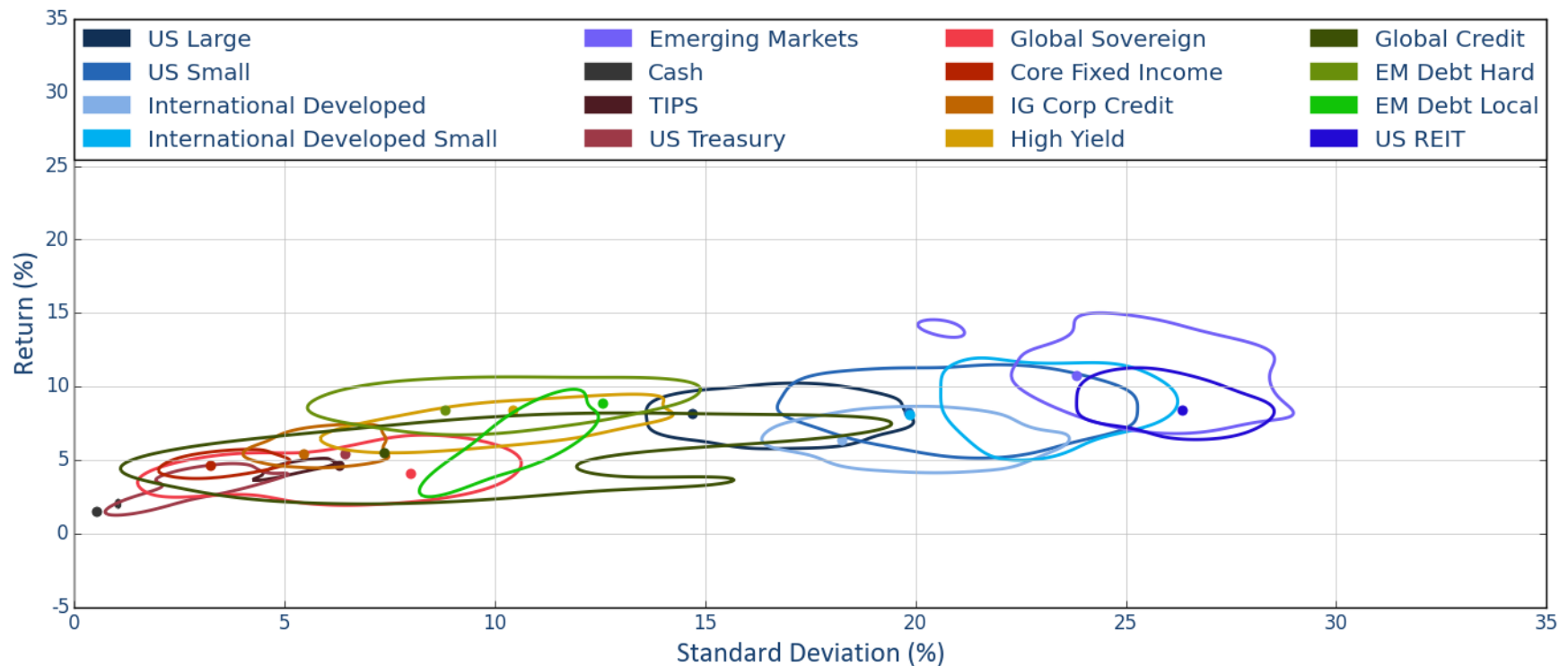
The relative positioning of the benchmark compared to the universe area tells us about the possible benefits of active management.

The shape of the probability density function will not be oval in most cases. The size and shape of the area calculated contains important information about the behavior of active managers and the outcomes achieved.

# The true investment opportunity set

The investment opportunity set is often represented in a risk-return chart, with asset classes represented by single-point benchmarks, and possibly single-point median managers to represent active management. In reality the active management universes in each asset class are extensive. Much of the risk-return surface between 3% and 12% return and between 2% and 28% volatility is covered, and many parts of that space are covered by multiple active management universes.

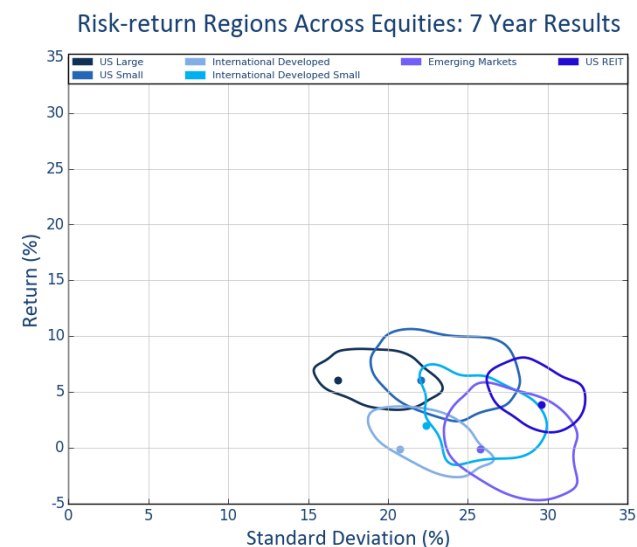
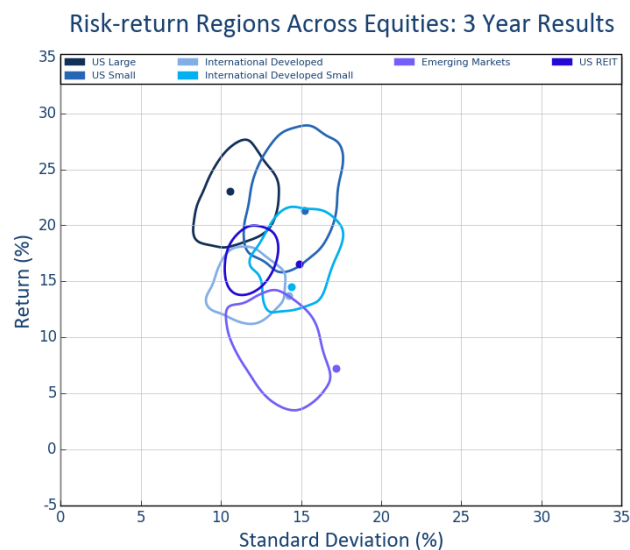
Risk-return Regions Across Asset Classes: 10 Year Results



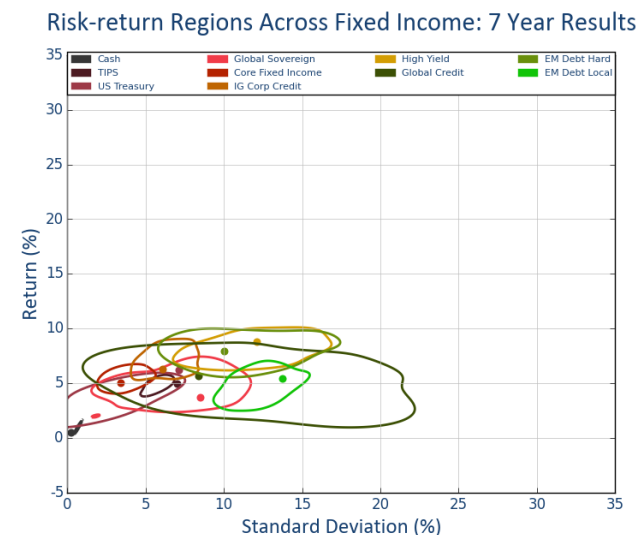
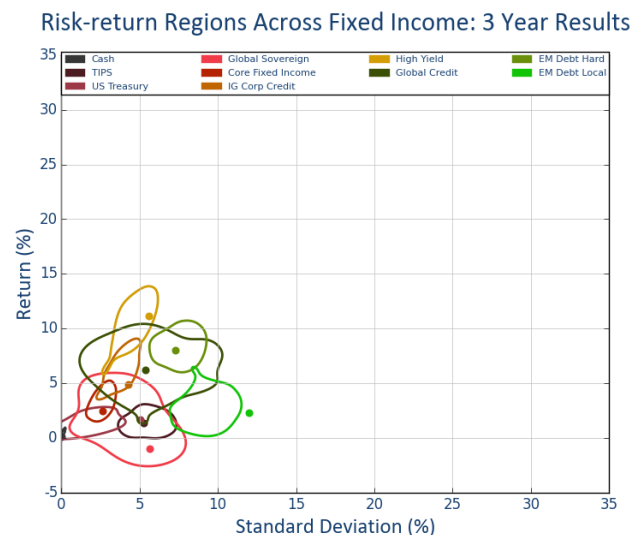
*This represents 10-year manager performance data and 75% contour areas  
Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.*

# Separating by asset class

Equity active managers clearly cluster around the equity risk premium, yet cover a significant area of the risk-return space.



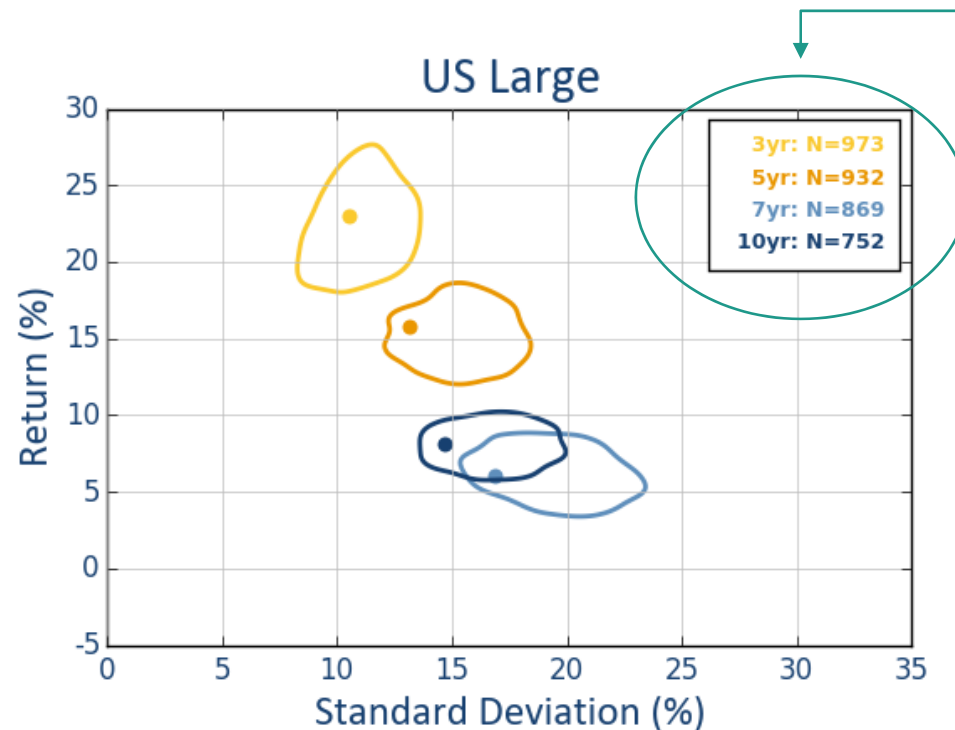
Fixed income active management clusters in a similar fashion. There has been significant contraction on the risk dimension, but much less change on the return dimension between the time periods concerned.



Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

# Tracking universes through time

Tracking the behavior of a single universe through time can provide insight into the way that active management has changed in that space over those time periods.



The movement of the universe, the change in shape and of size all provide information about active manager behavior.

The number of products included in the analysis provides insight into the robustness of the analysis.

The relative position of the benchmark relative to the universe may also change through time, representing dynamic structure changes through time.

Throughout this report each asset class universe chart is placed at the same position on the page, at the same size and with the scales of the axes identical. This allows for easy comparison between universes.

# Drivers, fees and asset class detail



# Volatility and fees

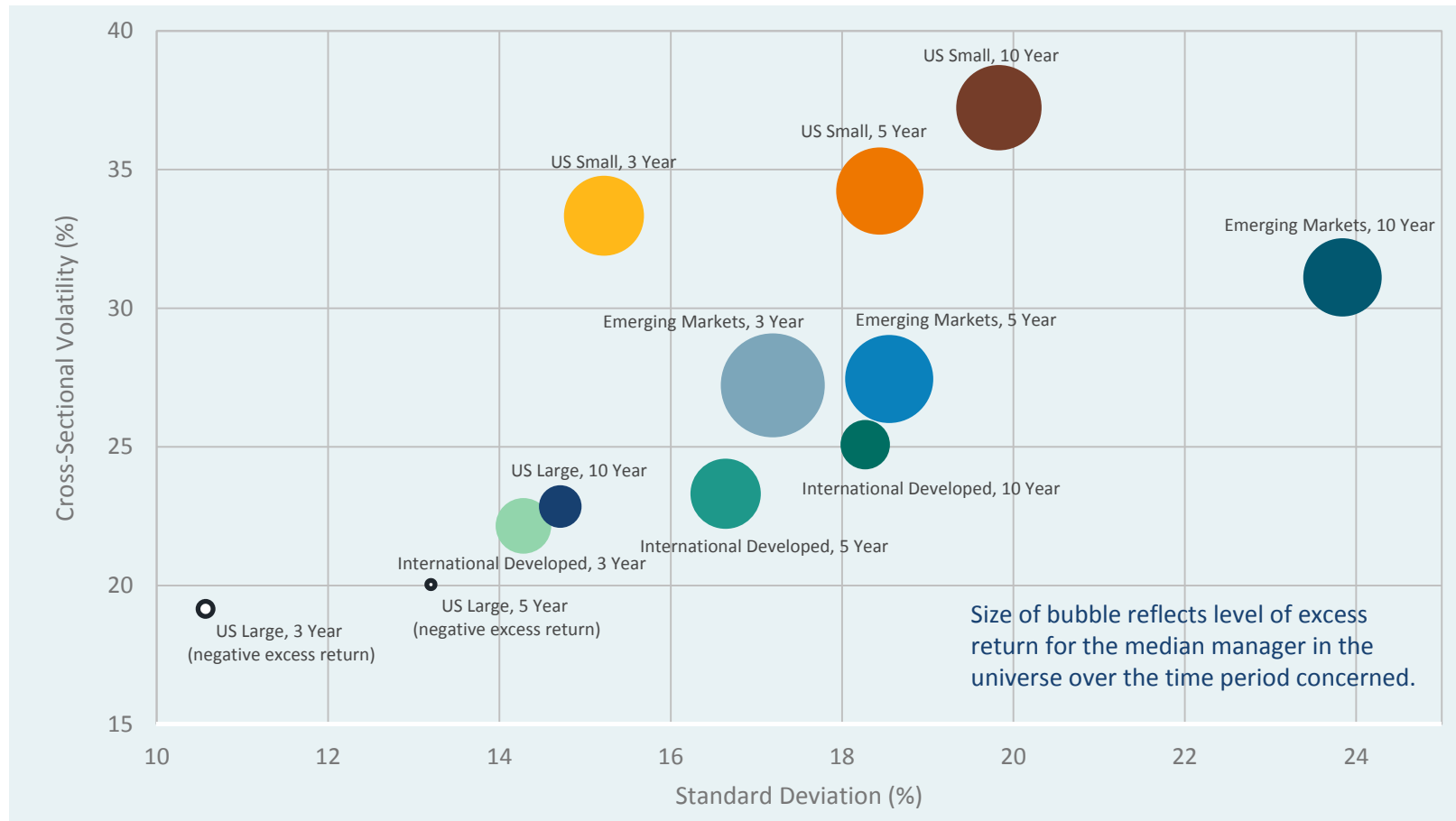
The ability of active investment managers to generate excess return that can be consumed by the owner of capital is thought to be significantly dependent on three key factors.

- The degree of absolute volatility in the asset class in which they are investing.
- The degree of cross-sectional volatility within that asset class. This represents the degree to which different assets within the asset class vary relative to each other, regardless of the absolute volatility within the market.
- The fees that are charged by the active manager, and in particular the fees expressed relative to the excess return generated.

While over time it is possible that these factors might be able to be represented using the analytics developed in the rest of this report we continue to assess these factors using the median manager in the universes concerned. This is not optimal, for the reasons outlined elsewhere in this report, but can still provide some insight.

# Volatility, dispersion and excess return

It appears that the expected relationship between volatility, cross-sectional volatility and excess return generated by the median manager does indeed hold true



More volatile asset classes, where there is higher cross-sectional volatility, do tend to produce higher excess return

Source: Russell Investments, MPI

# Fees paid vs. value received

Despite managers being able to generate excess return in many markets fees represent a significant cost.

- Certain fixed income marketplaces are particularly poor in this regard. While this represents the median manager, and therefore half of the managers will have provided higher excess returns, it seems clear that investors in active fixed income should be careful not to overpay for positive outcomes.
- The exact outcomes will be very manager dependent. However the importance of fees should be a major consideration for investors.

ASSET CLASS	COMMINGLED FUND FEE	MUTUAL FUND FEE	MEDIAN MANAGER EXCESS RETURN	EXCESS RETURNS NET OF COMMINGLED FUND FEES	EXCESS RETURNS NET OF MUTUAL FUND FEES
US Large	0.65	0.85	0.88	0.23	0.03
US Small	0.87	1.08	1.76	0.89	0.68
International Developed	0.76	0.96	1.02	0.26	0.06
International Developed Small	0.96	1.09	2.31	1.34	1.21
Emerging Markets	0.95	1.19	1.62	0.67	0.43
Cash	0.11	0.23	0.46	0.36	0.23
TIPS	0.21	0.47	0.11	(0.09)	(0.35)
US Treasury	0.50	0.46	-1.27	(1.77)	(1.73)
Global Sovereign	0.50	0.65	1.01	0.51	0.36
Core Fixed Income	0.33	0.54	0.51	0.18	(0.03)
IG Corp Credit	0.26	0.60	0.87	0.62	0.27
High Yield	0.62	0.73	-0.14	(0.76)	(0.87)
Global Credit	0.54	0.50	0.95	0.42	0.45
EM Debt Hard	0.65	0.79	1.12	0.47	0.33
EM Debt Local	0.73	0.86	-1.34	(2.07)	(2.20)
US REIT	0.67	0.92	1.45	0.79	0.54

Source: eVestment, 10 years ending 9/30/2014

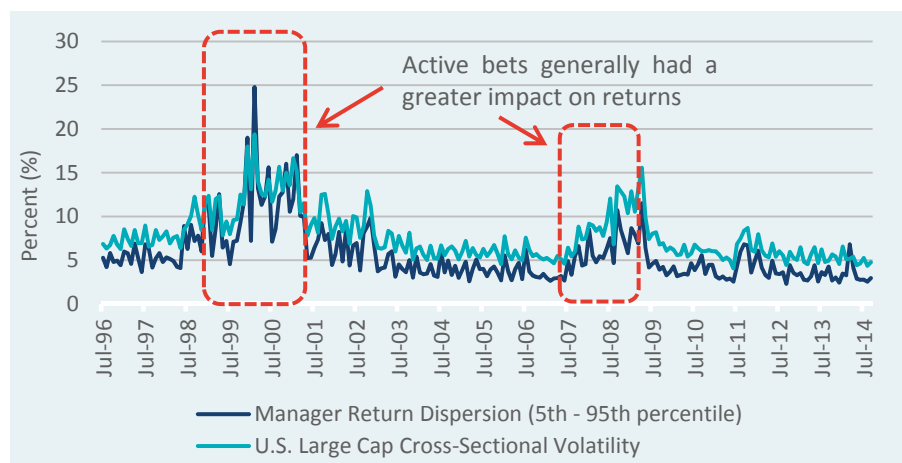
# Asset class environments



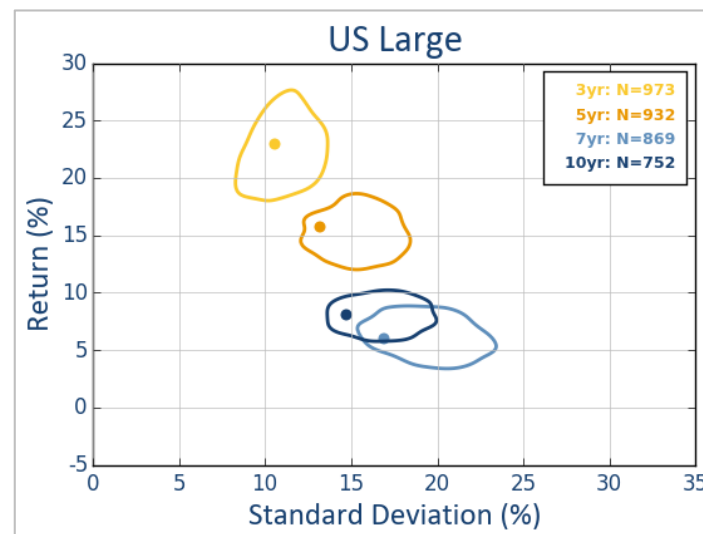
# Equities – U.S. large cap

- The evidence seems to suggest that US large cap equity has been a fairly efficient asset class over the trailing 3, 5, 7 and 10-year time periods. The benchmark tends to rest at the lower volatility end of the distribution. Some managers have been able to produce better return even at this lower level of volatility, but most active managers have simply increased their volatility exposure. There seems to be a weak relationship between this additional volatility and compensating return.
- As illustrated in the chart at bottom-right, cross-sectional volatility (CSV) in large cap equities is currently at muted levels. This is significant as CSV may provide a guide to the level of alpha potential in a market.
- CSV and manager universe dispersion are closely related. This suggests that when CSV is higher, manager return dispersion is wider, and there is potential to add value through superior active manager selection. Although manager dispersion spiked earlier in the year, like CSV it remains muted.
- Despite a healthy market for large cap equities in 2014, most active managers have underperformed their respective style benchmarks, with the median growth manager generating the largest negative excess return (see Appendix).

## U.S. LARGE CAP EQUITY CROSS-SECTIONAL VOLATILITY RELATIVE TO MANAGER RETURN DISPERSION



Source: Russell Investments, eVestment

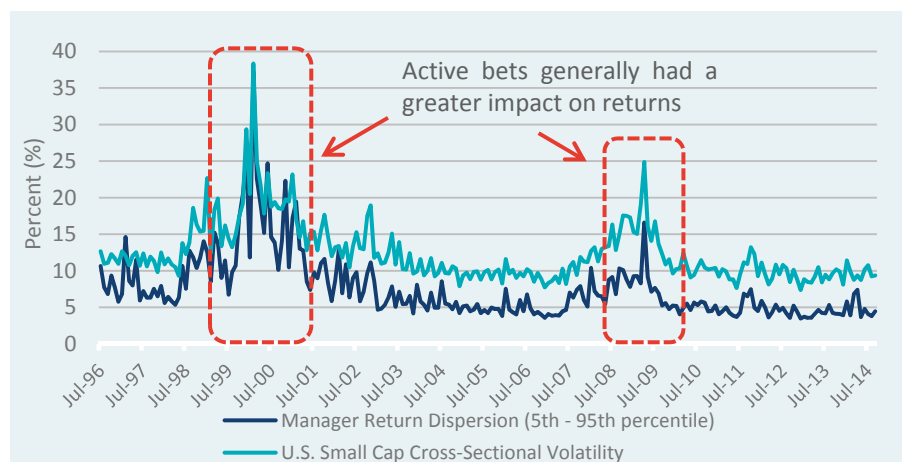


Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

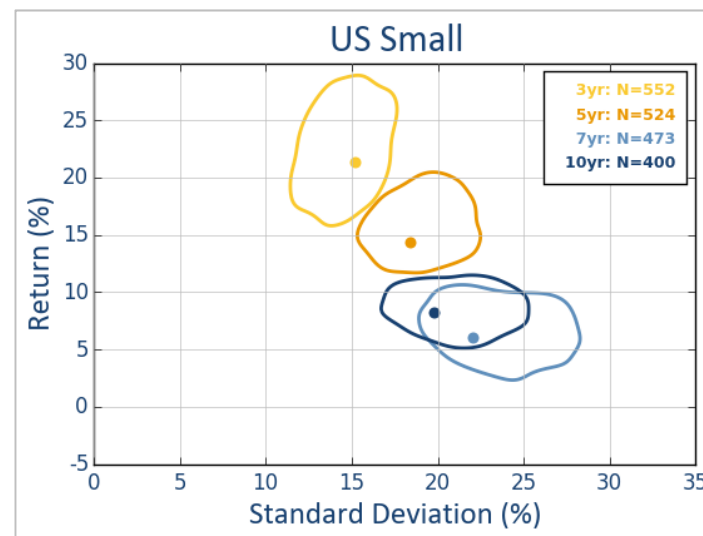
# Equities – U.S. small cap

- The evidence seems to suggest that US small cap equity has been a less efficient asset class than US large cap equity, and active managers have tended to generate more value in this space.
- Over most time periods large parts of the manager universe have produced better returns than the benchmark. On a risk-adjusted basis, small cap managers have fared reasonably well over most time periods.
- Although small cap equities have significantly lagged their larger counterparts in 2014, most active small cap managers have outperformed their respective style benchmarks, with the median value manager generating the largest positive excess return (see Appendix). Similar to what we observed in the large cap space, the median small cap growth manager generated the least favorable excess return year-to-date.
- As illustrated in the chart at bottom-left, cross-sectional volatility (CSV) in small cap equities remains at muted levels. This is significant as CSV may provide a guide to the level of alpha potential in a market.
- CSV and manager universe dispersion are closely related. This suggests that when CSV is high, manager return dispersion is wide, and there is potential to add value through superior active manager selection. Like CSV, manager dispersion remains muted, at or near historical lows.

## U.S. SMALL CAP EQUITY CROSS-SECTIONAL VOLATILITY RELATIVE TO MANAGER RETURN DISPERSION



Source: Russell Investments, eVestment

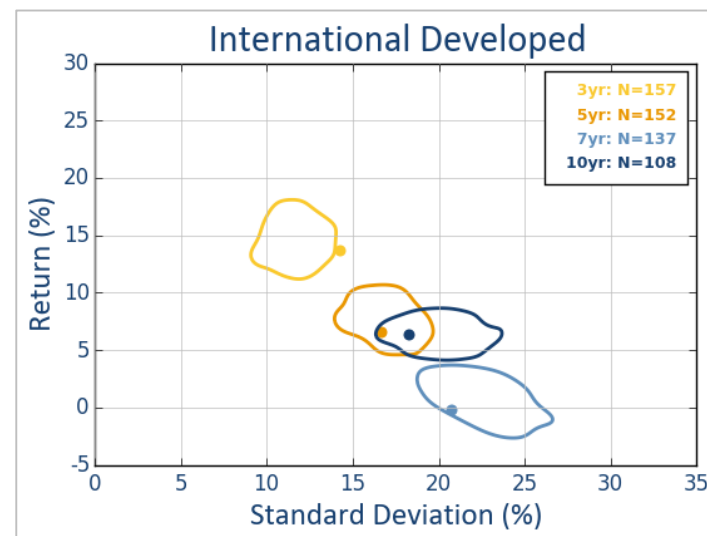
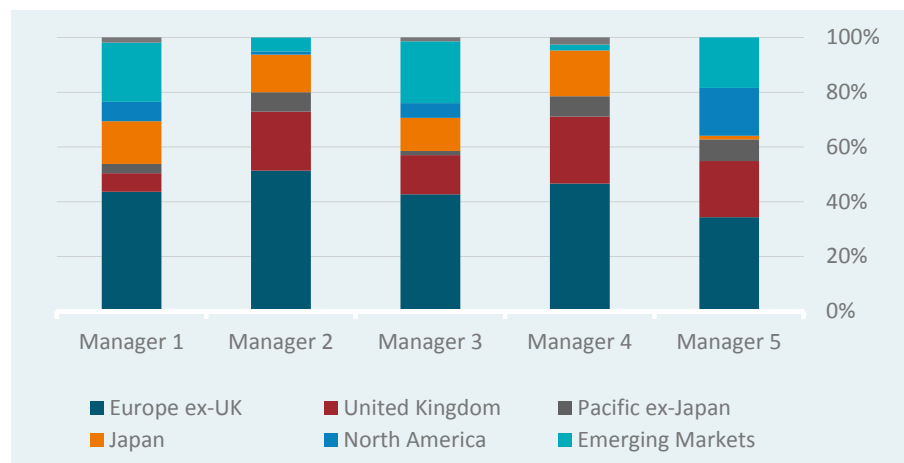


Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

# Equities – international developed

- Over longer time frames manager returns were more volatile than the benchmark, while over the last 3 and 5 years this trend has reversed. In particular, the most recent 3 years was a period where much of the universe displayed less volatility than the benchmark. Over most time periods, a majority of managers generated better returns than the market, although the risk-return relationship varied through time.
- An increasing quantity of managers in the eVestment EAFE universe hold a 10-20% maximum allocation to emerging markets. This emerging market exposure comes both through direct exposure to emerging market listed companies, and through emerging market domiciled but developed market listed companies. In addition, many developed market companies derive significant revenue and earnings from emerging markets. This means the index country weights are often not representative of the true economic exposures and geographic diversification within the portfolio.
- Over the last several months, all currencies in the MSCI EAFE index depreciated against the US dollar. If this trend persists, the gap between local currency returns and dollar returns will continue to widen.

**SAMPLE OF INTERNATIONAL DEVELOPED MANAGERS - GEOGRAPHIC EXPOSURES**



Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

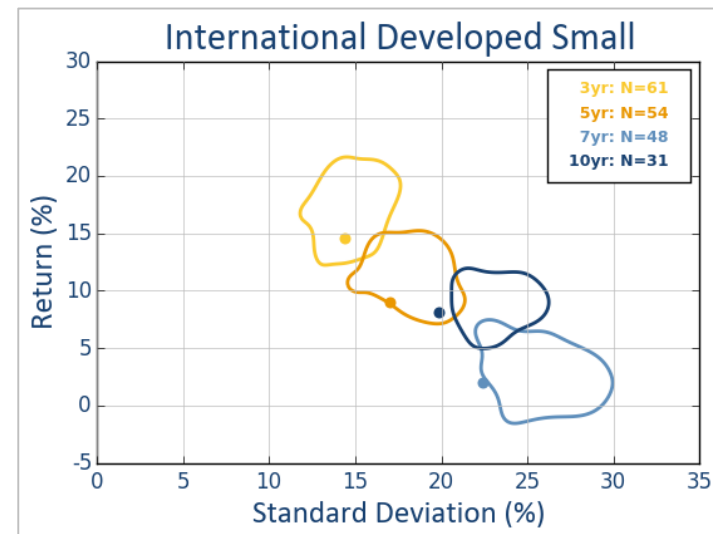
# Equities – international developed small cap

- Similar to the international large cap universe, most international small cap strategies have displayed higher volatility than the index across each time horizon shown.
- International small cap managers have produced higher returns over most time periods, relative to the benchmark and to other asset classes.
- International small cap companies are much less covered by investment analysts than their large cap counterparts. At the same time, there are approximately seven times more international developed small cap companies than large cap companies, resulting in a significantly larger opportunity set.
- Most of the large cap international companies operate globally and compete against large US companies. A greater number of smaller companies are tied to their local economy and therefore provide stronger diversification benefits. This may continue to provide active managers with the opportunity to add significant value in the portfolio management process.

**Correlation with US Equities (S&P 500)**

US Small-Cap Stocks	0.93
Global Stocks	0.94
International Stocks	0.83
Emerging Markets Stocks	0.75
International Small-Cap Stocks	0.73

Source: Morningstar



Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

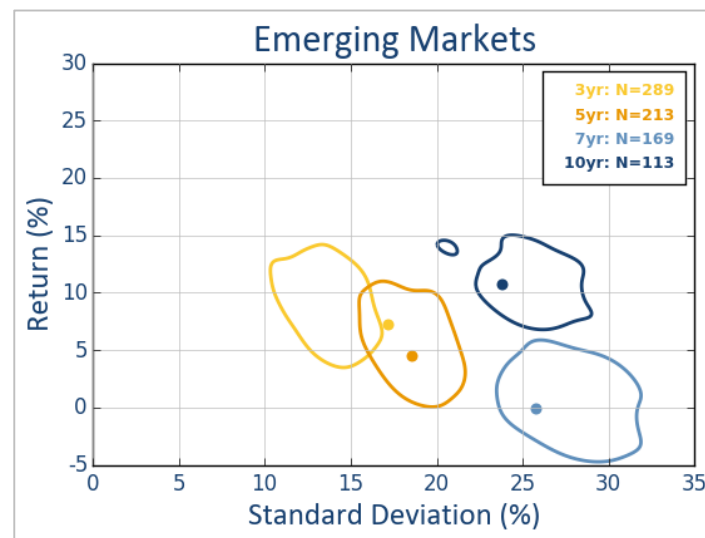


# Equities – emerging markets

- The chart on the right confirms that emerging market equities typically have the highest volatility of the equity asset classes. However, volatility has significantly decreased over the last several years. In more recent periods, managers have taken on less volatility relative to the benchmark; noticeably so in the 3-year horizon.
- Active manager behavior has typically been positive over the periods covered. Even when producing higher than benchmark volatility, large parts of the universe have produced higher returns. This trend to higher returns has continued even as manager volatility levels have come down.
- Over the last several years, emerging market equities significantly underperformed developed equities. However, the underlying case for emerging market exposure remains intact, and active management continues to appear attractive.

Returns (10/31/2014)	1-Year Return	3-Year Return	5-Year Return	7-Year Return	10-Year Return
Russell 1000	16.8	19.9	17.0	6.4	8.5
Russell 2000	8.1	18.2	17.4	6.6	8.7
MSCI EAFE	-0.6	9.7	6.5	-1.0	5.8
MSCI EAFE Small	-2.0	11.1	8.9	0.8	7.4
MSCI EM	0.6	3.2	4.6	-1.5	10.5
MSCI EM Small	3.2	5.7	6.1	-0.1	11.9

Source: MPI



Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

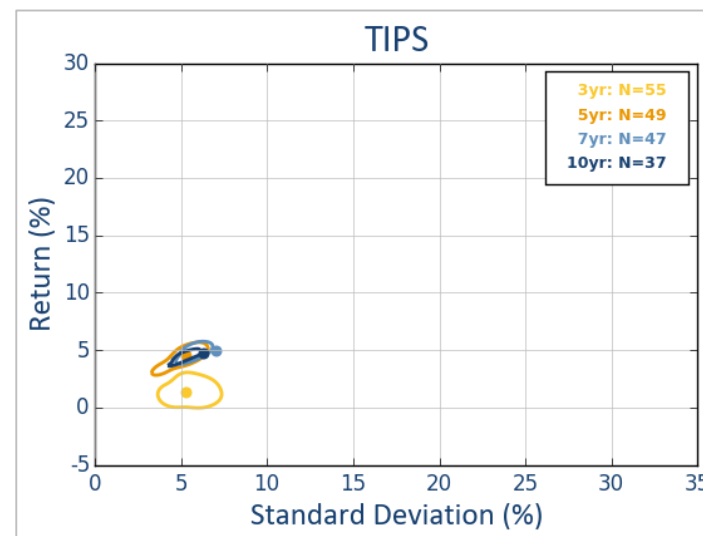
# Fixed income – TIPS

- Active managers in the TIPS asset class have produced extremely tightly bunched outcomes on both risk and return dimensions. This is less the case over the 3-year time frame, but even over this shorter period the dispersion was minimal.
- TIPS remain a viable alternative for investors concerned about the loss of purchasing power due to rising inflation. US TIPS 10Yr breakeven spreads have declined as concerns about future global economic growth have abated.
- In efforts to stimulate economic growth, Central Bank monetary policy has contributed to decreased volatility in US Treasury markets.
- As the US Federal budget deficit situation has improved, issuance of new Treasury bonds has declined, leading to fewer TIPS outstanding.
- The expectation of rising future inflation contributes to investors' demand for TIPS.
- Active management in the TIPS space appears to provide limited upside in return terms, although it may allow for some risk management benefits.

**10 YEAR TIPS BREAKEVEN SPREADS**



Source: Federal Reserve Bank, Bank of Merrill Lynch November 2014



Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

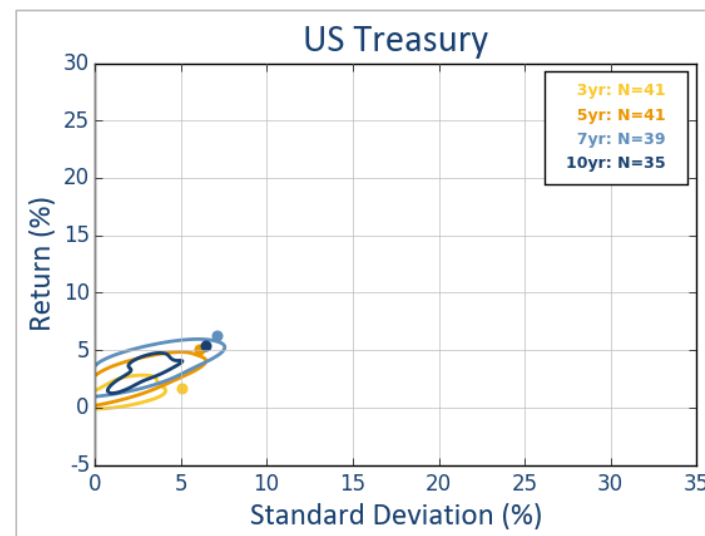
# Fixed income – U.S. treasury

- The active management universe for US Treasuries demonstrates a greater degree of dispersion than for TIPS, but remains tightly contained. Active manager returns are linearly related to volatility, with managers generally producing less return than the benchmark, but suffering less volatility than the benchmark.
- While US interest rates have been declining since the 1980's, the collapse in long-term US rates has accelerated since the financial crisis and remains at near-historic lows.
- US Inflation rates remain low, further reducing upward pressure on yields.
- Recently, managers with biases towards shorter duration bonds relative to their benchmarks, in anticipation of higher interest rates, have underperformed.
- Active management in this marketplace is fundamentally risk-related. The very clear relationship between risk and return over multiple time periods, unlike most other asset classes, leaves the investor with a relatively clear risk management payoff decision to make.

US TREASURY YIELDS AND VOLATILITY



Source: Bloomberg

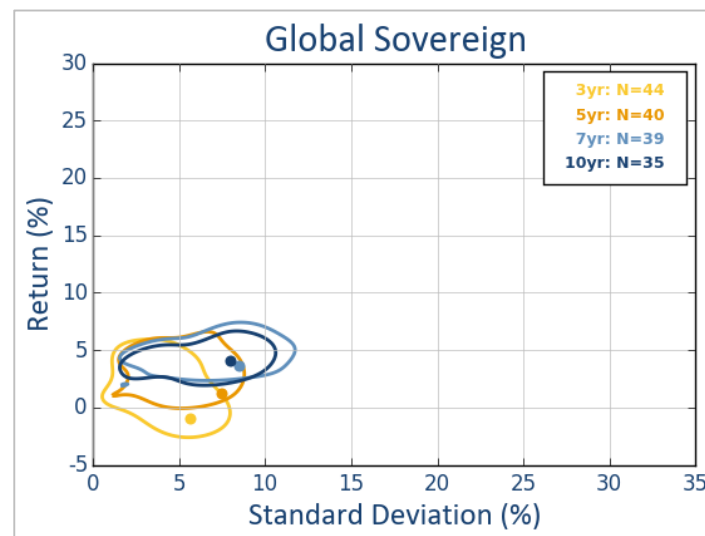
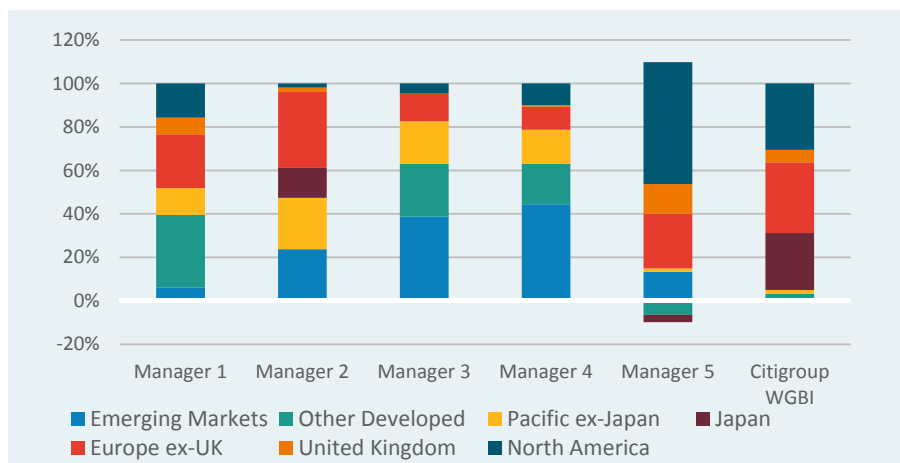


Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

# Fixed income – global sovereign

- Global sovereign managers have demonstrated greater dispersion. Managers have tended to produce lower levels of volatility than the benchmark, and yet have typically generated greater return.
- Global bonds act to diversify US interest rate risks in diversified fixed income portfolios.
- Concerns regarding slowing global economic growth, especially in developed markets (Europe & Japan) have resulted in lower sovereign bond yields.
- Central Banks continue to provide liquidity, primarily through bond purchases, which has resulted in lower yields for investors.
- Commonly used benchmarks are tilted towards the largest borrowers (ex: Germany, Japan, UK and the US).
- Managers are increasingly willing to deviate from benchmark weights to add value, and may include exposures to currency and credit. It remains unclear whether the results of these off-benchmark bets should truly be attributed to benchmark-relative performance, or should be thought of differently.

**SAMPLE OF GLOBAL BOND MANAGERS - COUNTRY EXPOSURES**



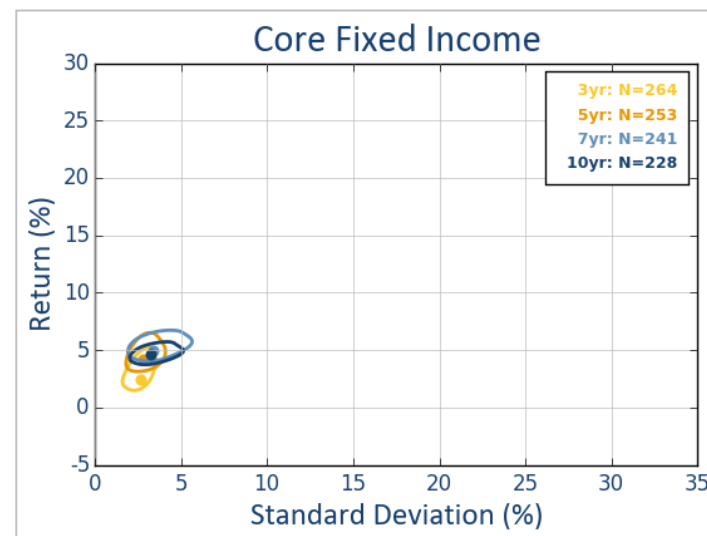
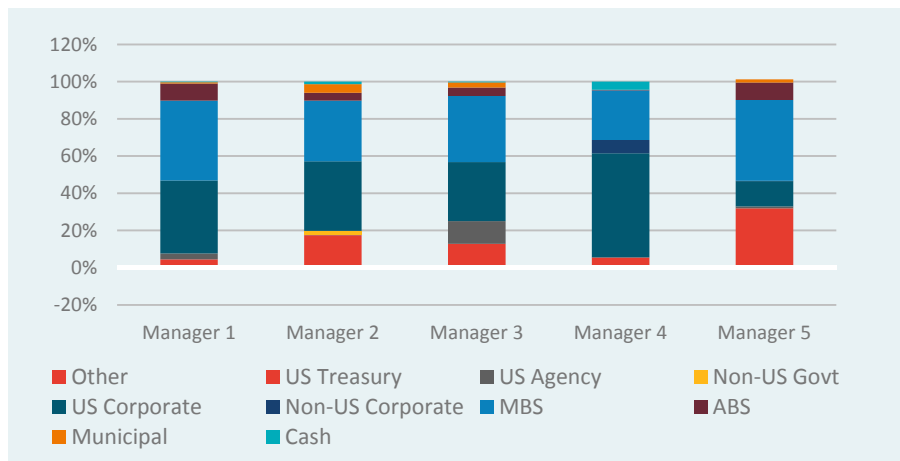
Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.



# Fixed income – U.S. core

- The Core fixed income universe has demonstrated extremely low levels of manager dispersion. Managers have behaved very similarly to the benchmark across all periods.
- Core and Core Plus bond portfolios are designed to provide income and return with low correlation to equities.
- With US Treasury yields remaining at near-historic lows, managers in the space have increasingly turned to off-benchmark allocations such as high yield bonds, emerging market bonds and non-agency mortgages to provide relative value above the benchmark.
- However, during periods of market dislocations, managers with exposure to higher equity beta assets may underperform the benchmark.
- The role of active management in the core fixed income space appears relatively limited, with a tight universe dispersion and little return or risk management advantage obviously accessible, at least relative to other asset classes.

**SAMPLE OF CORE AND CORE PLUS MANAGERS – SECTOR EXPOSURES**

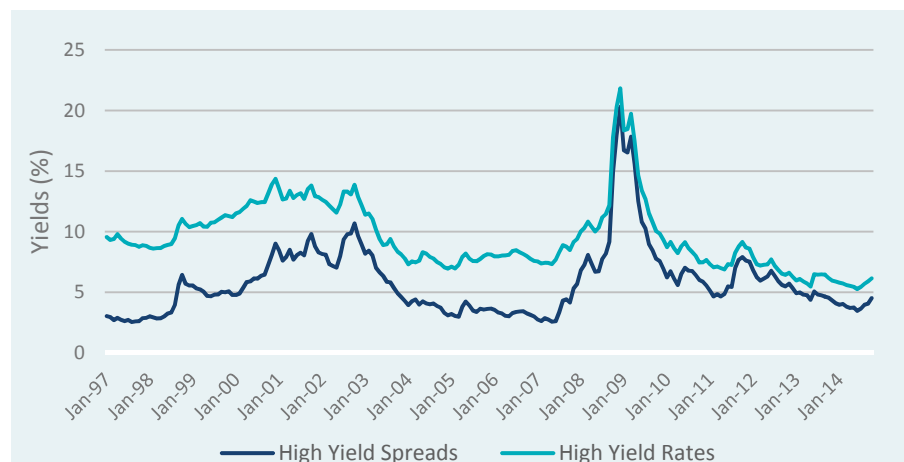


Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

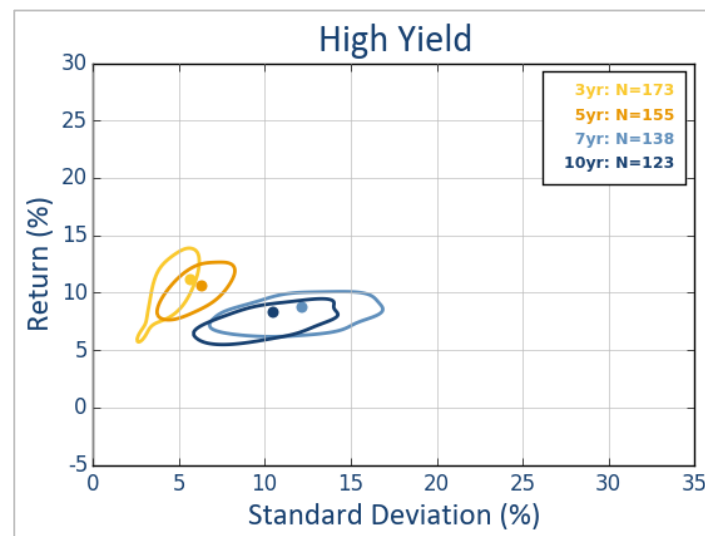
# Fixed income – high yield

- The high yield universe has tended to demonstrate much greater dispersion than other fixed income asset classes. This dispersion tends to be along the volatility dimension, and many managers fail to outperform the benchmark in terms of return. However, though many managers produce similar or lower returns, they can create value by reducing risk to the portfolio.
- With Treasury yields trading near historic lows and economic activity continuing to generate below long-term trend growth, US high yield bond spreads remain tight as investors search for higher yielding assets.
- US corporate balance sheets remain healthy with large cash balances and leverage remains at relatively low levels.
- High yield bond market volatility is highly correlated to economic business cycles. Avoiding idiosyncratic risks resulting from defaults is therefore an important part of active management.

US HIGH YIELD SPREADS



Source: Federal Reserve Bank, Bank of Merrill Lynch

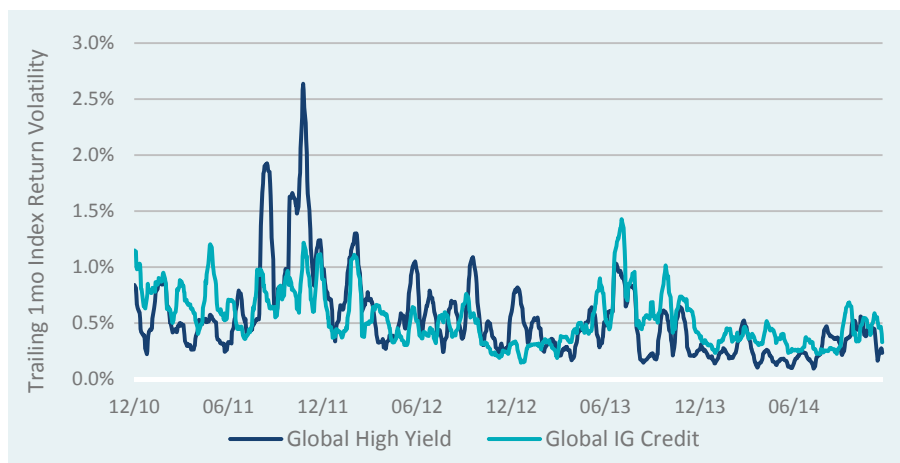


Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

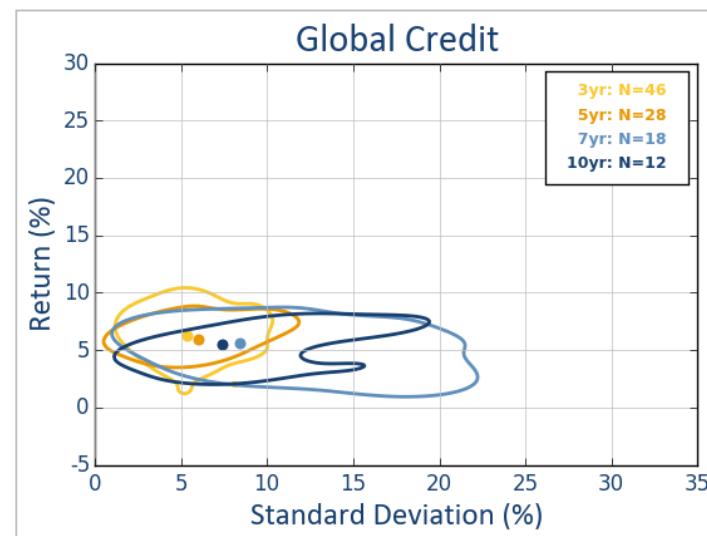
# Fixed income – global credit

- The global credit manager universe has demonstrated a high degree of dispersion; particularly along the risk dimension. A good portion of managers have successfully achieved returns over the benchmark during each time period examined. The universe behavior seems to show that managers have been able to reduce volatility, in many cases significantly, without giving up any significant return.
- Deteriorating expectations of future global economic growth in combination with an increasingly stringent banking regulatory environment has provided opportunities for managers to purchase distressed credit assets at discounts.
- As global interest rates have declined due to Central Bank monetary policy, managers have increasingly added off-benchmark allocations to lower quality bonds with the goal of increasing returns.
- During periods of increasing market volatility, managers with the flexibility to add exposures to lower quality bonds have benefited as markets and yield spreads normalize.

## GLOBAL CREDIT RETURN VOLATILITY



Source: Bloomberg

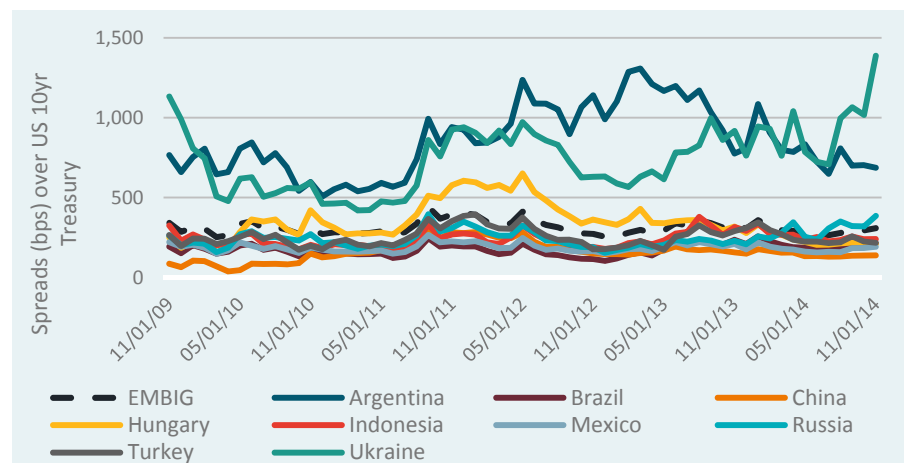


Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

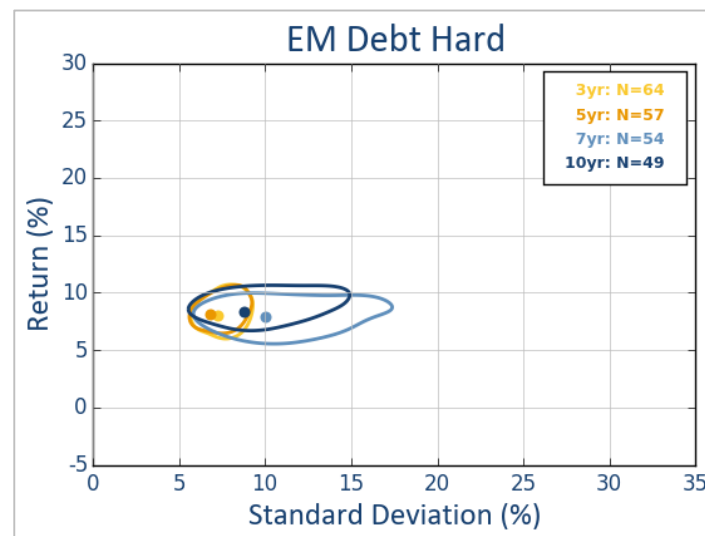
# Fixed income – emerging market debt (hard)

- Managers in the emerging market debt (EMD) hard currency universe have been able to produce returns that are in many cases significantly better than the benchmark. This ability to generate higher returns seems to be unrelated to the level of risk taken by managers in this universe.
- EMD hard currency spread volatility has increased recently primarily due to concerns about slowing global economic growth, growing geopolitical risk from Russian and Ukraine, and the potential impacts to fixed income markets resulting from the Federal Reserve's decision to raise US interest rates.
- EMD country fundamentals remain strong with low debt/GDP. Additionally, emerging market countries benefit from younger demographics as compared to aging developed market countries. The majority of EMD issuers are now investment grade.
- Managers have been value-additive in the space mainly due to their ability to avoid countries with deteriorating fundamentals, thereby protecting against increasing idiosyncratic risks.

**EMERGING MARKET DEBT – COUNTRY SPREADS**



Source: JPMorgan, eVestment Analytics



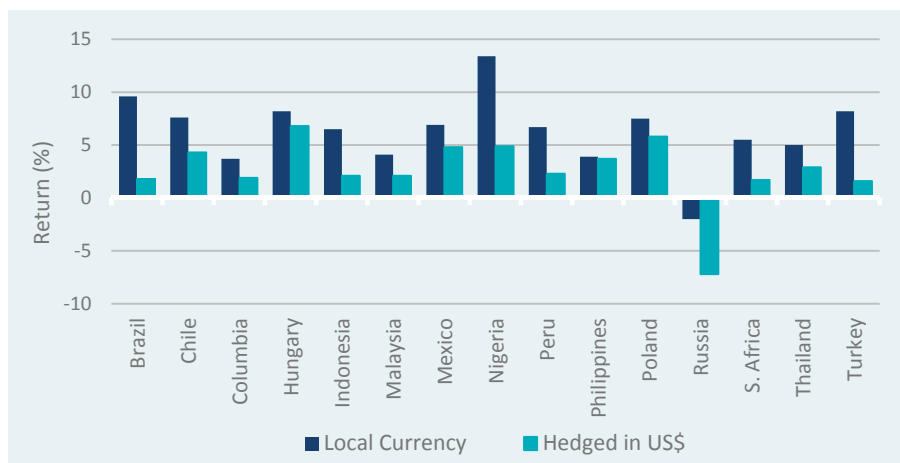
Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.



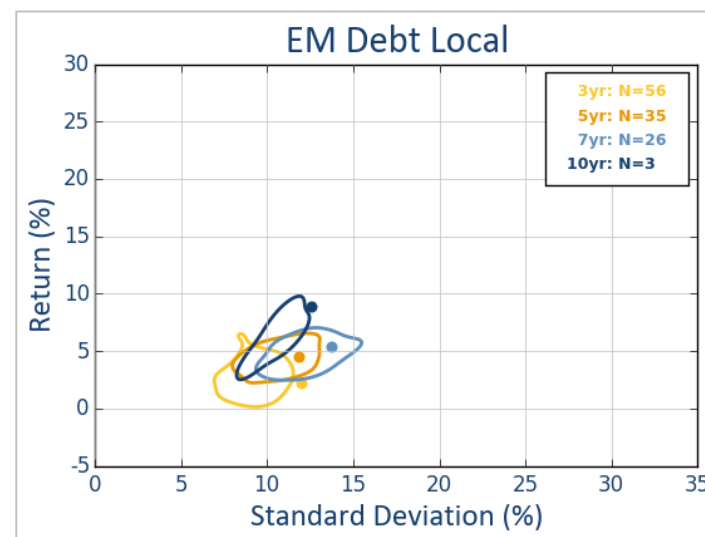
# Fixed income – emerging market debt (local)

- Manager behavior in the local currency emerging market debt (EMD) universe has been relatively clustered around the benchmark, but there appears to have been, at least over the longer time periods, a more direct relationship between risk and return than in other fixed income asset classes. Interestingly again most managers have reduced volatility relative to the benchmark.
- EMD local currency bonds have seen increasing volatility primarily due to concerns about increasing default risk, the timing of the Federal Reserve's decision to raise US interest rates, and an appreciating US dollar.
- Recent performance of the sector has largely been impacted by the weakness in emerging market currencies on concerns of slowing global economic growth.
- Managers who in the past benefited from taking large off-benchmark allocations to lower credit quality issuers and FX have been negatively impacted as EMD spreads have widened.

EMERGING MARKET DEBT – COUNTRY RETURNS YTD



Source: JPMorgan 09/30/2014, GBI-EM Global Diversified Index

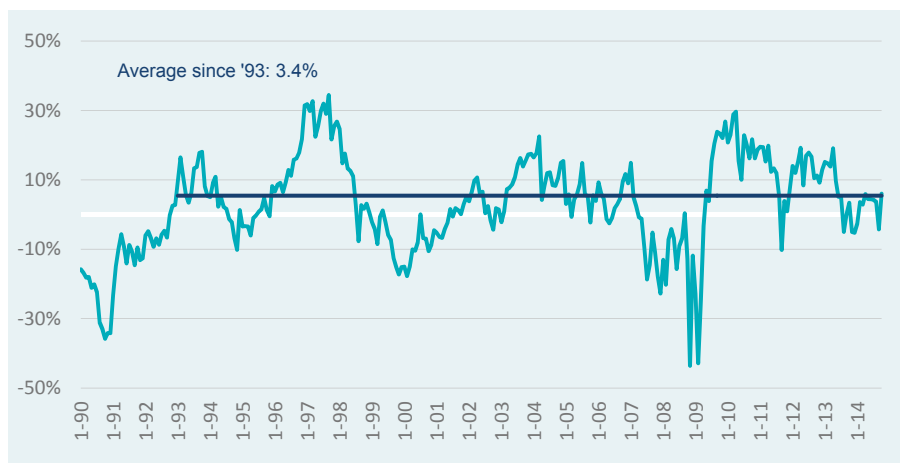


Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

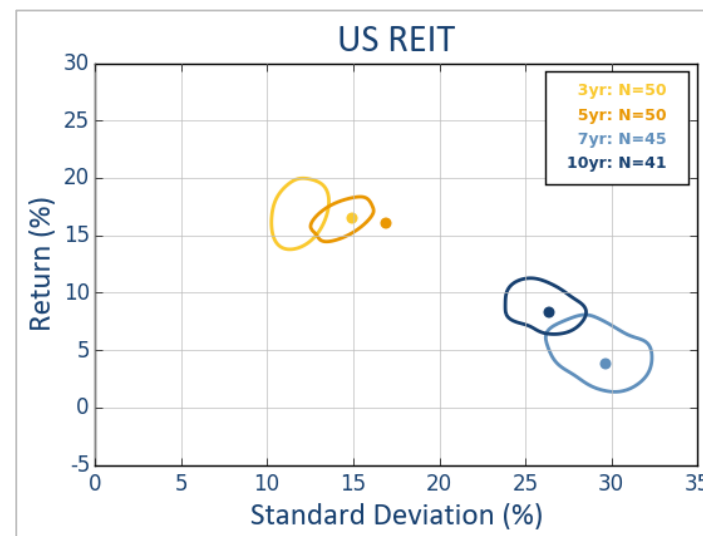
# U.S. REITs

- Over long periods of time, active management has been additive to returns and has also reduced volatility.
- More recently, the environment for active management has been more challenging due to higher correlations to the broader equity markets and lower dispersion amongst REITs. However, the universe of managers has increasingly seen significantly lower than benchmark volatility without an equivalent lowering of return.
- Since the 2008 financial crisis, macro forces have been a large driver of performance rather than idiosyncratic stock performance.
- However, over long time periods managers have been able to take advantage of high volatility in REIT valuations, which tend to fluctuate rapidly.
- REITs are typically used to gain liquid exposure to real estate for inflation protection and yield enhancement.

## SHARE PRICE PREMIUM TO NAV



Source: Greenstreet, Deutsche Asset & Wealth Management



Source: eVestment. Universe returns have been adjusted for fees and survivorship bias.

# Appendix

# The active management environments

Applying standard tools from non-finance disciplines to active manager universe data gives us a clearer view of how active management universes behave.

- Even without skilled manager selection there are many cases where active management can help investors achieve better portfolio outcomes in risk and return terms.
- Those better portfolio outcomes may come from additional return or lower risk. Not all investors have the same definition of better outcomes, and the trade-offs facing them vary by universe.
- Adding skilled manager selection to the process can add additional value in portfolio construction.
- The process of skilled manager selection itself can be improved by better understanding of the active management universes.

Some standard assumptions about active management remain true and are reiterated in our work

- Managers are able to add more excess return in markets where there is higher total and cross-sectional volatility.
- Fees remain an important part of the active management conversation. Fees and survivor bias should be taken into account when analyzing active management universes.

The use of active management remains an asset-class level decision and should be based on analysis of the opportunity rather than simple assumptions about efficiency. In most asset classes the environment for active management is good and active management should be seriously considered by investors.

# Alternative approaches to managers

The traditional approach to thinking about managers involves the following:

- Rank the managers on a single metric (return, for example)
- Pick the manager in the middle of the rank (the median manager)
- Use the properties of that manager to describe the universe

The problem with this approach is that it puts too much weight on the specifics of how the particular managers actually performed during the period concerned.

The alternative approach to thinking about managers:

- Use the risk and return characteristics of all of the managers to calculate properties of the universe as a whole.
- Plot the output of this analysis to demonstrate the behavior of the universe over time visually.

Our goal is, where possible, to move away from the use of the median manager as a tool to describe the behavior of an investment management universe.

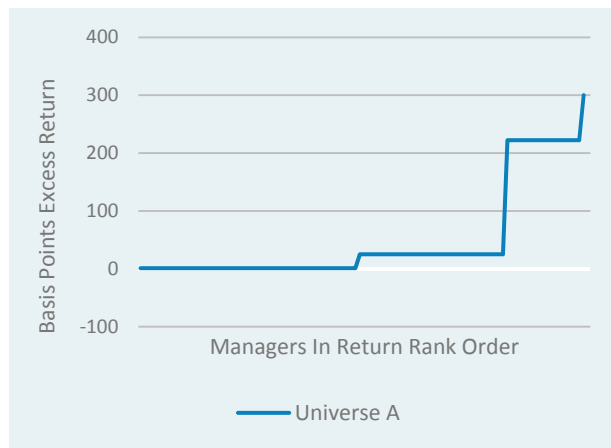
# The problem with medians

Using the median manager to describe the universe can be very misleading. To show why we can create three imaginary universes.

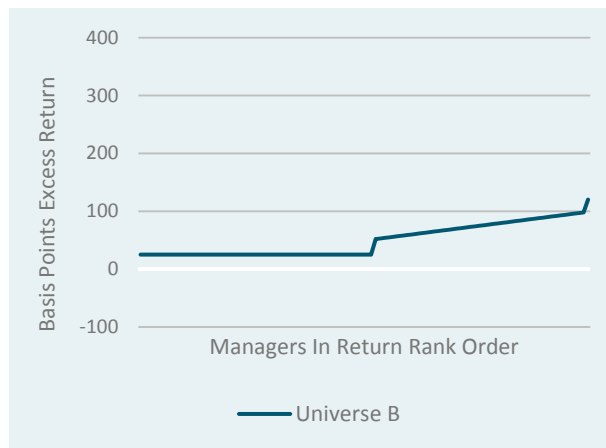
- Each universe has 100 managers
- Each universe has an average excess return of 50 basis points
- Each universe has a median excess return of 25 basis points

Simply using the median manager as a description of the universes would be highly misleading – the median manager in each case would be the same even though the behavior in each of these different universes is very different.

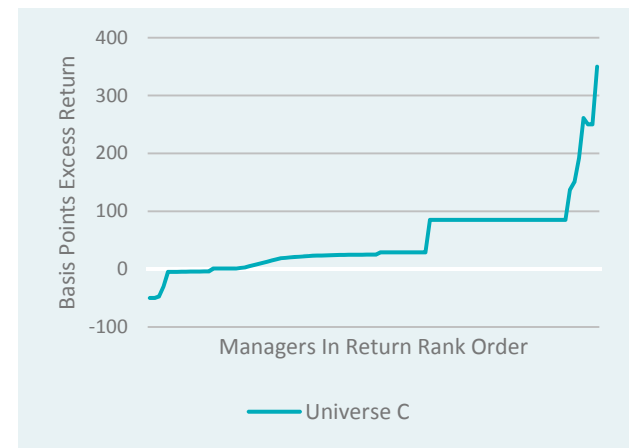
**UNIVERSE A**



**UNIVERSE B**



**UNIVERSE C**



*Representative Data Only*

# Manager behavior as sampling

## THE TRADITIONAL APPROACH

The concentration on the median manager behavior has historically forced us to throw useful information about universes away. More than that, it has forced us to focus too hard on the specific results that specific products achieved over the particular time period we are measuring.

Doing this forces us to discard almost all the information about all of the products other than those at the median and quartile breaks, and to concentrate in detail on the characteristics of those specific products which happen to fall on those break lines. Those products, however, may provide little useful insight for us to help guide the decision process about use of active management.

This combination of too little information being used about most products in a universe and too much being used about a very small number of products selected simply because of their rank order in the universe is likely to lead to misunderstandings about the nature of active management.

## THE UNIVERSE AS A WHOLE

The alternative approach that we propose in this document, and which will be covered more fully in an upcoming paper, takes a different approach, and uses a tool which is broadly used in the scientific community – the joint probability density function. Details of the

calculation methodology used can be found on page 31 of this document.

What we are trying to do is to produce a description of the universe as a whole: we regard individual products as having no particular value on their own, but simply as random samples from the true universe. No particular portfolio is important in itself, but each portfolio adds a small amount of information about the likely true characteristics of the universe that they represent. Each portfolio is simply a random draw from an infinite universe of active managers in that asset class.

## A GRAPHICAL ANALYSIS

We use this information to plot an area representing the characteristics of the universe on a standard risk-return chart. This area represents the true characteristics of the active management universe – not simply the behavior of one product in that universe. It uses information about all of the managers in the universe and avoids concentrating on any single portfolio. It allows us for the first time to describe manager universes in their own terms, clearly, visually and in a robust fashion.

Maybe the most important characteristic of these ranges is that it provides us with a much clearer view of the investment opportunity set available to investors as a whole. That opportunity set is not a single point on the chart, as represented by a benchmark or a median: it is in fact an area, and for many universes quite an extensive one.



# Methodological note

As a means of describing the distribution of managers in risk-return space, we estimate joint probability distribution functions (PDF) using manager reported performance. The joint PDF is a mathematical description of the probability of observing a given outcome within some region of risk-return space, such that the integral of the function over all possible outcomes is one.

To estimate the PDF, we assume the reported manager performance numbers represent an independent, random sampling of outcomes from the opportunity set within the asset class considered. While this is not perfectly true, as commonalities in strategy and imitation will lead to clustering, it is a reasonable approximation. We apply multivariate kernel density estimation, which effectively smooths the point-wise sampling of outcomes. We choose the Gaussian kernel density estimator implemented in Python within the SciPy library<sup>1</sup>, where the bandwidth (a parameter governing the smoothing) is estimated by Scott's Rule<sup>2</sup>. This approach is non-parametric and makes no specific assumption about the underlying probability distribution (as opposed to fitting e.g. a multivariate normal distribution).

Probability contours are defined as curves enclosing the designated percentage of most likely outcomes (e.g. the 75% probability contour encloses the outcomes most likely to be observed 75% of the time). We determine these using Monte Carlo integration by resampling the kernel density estimate and iteratively converging the result using the Newton-Raphson method.

1) <http://www.scipy.org/>

2) D.W. Scott, "Multivariate Density Estimation: Theory, Practice, and Visualization", John Wiley & Sons, New York, Chichester, 1992.

# Some possible scenarios

Active managers were able to add volatility, but rarely were able to generate compensation for that volatility.



Active managers who reduced volatility had to give up significant return to do so.

Active managers were rarely able to produce much more return than the benchmark in absolute terms.



Volatility reduction by active managers resulted in little or no return reduction.

Active managers had opportunities to add return, both at similar levels of volatility to the benchmark and incrementally at higher volatility levels.



Few managers took advantage of the opportunities available to reduce volatility relative to the benchmark.

Active managers had significant ability to add return relative to the benchmark at similar and lower levels of volatility.



Most of the active manager universe chose to reduce volatility relative to the benchmark.

# Possible investor behaviors

Investors with high risk tolerance and a need for high return might consider significant volatility increase.



Other investors would be more likely to be best served by passive approaches.

Investors prepared to run some downside risk might consider active managers offering modest risk reduction although passive management a good alternative.



Other investors might well choose passive approaches to this universe.

Investors with high risk tolerance might consider active managers with markedly higher risk investment styles.



Investors who would normally invest passively might think about active managers with volatility levels similar to the benchmark.

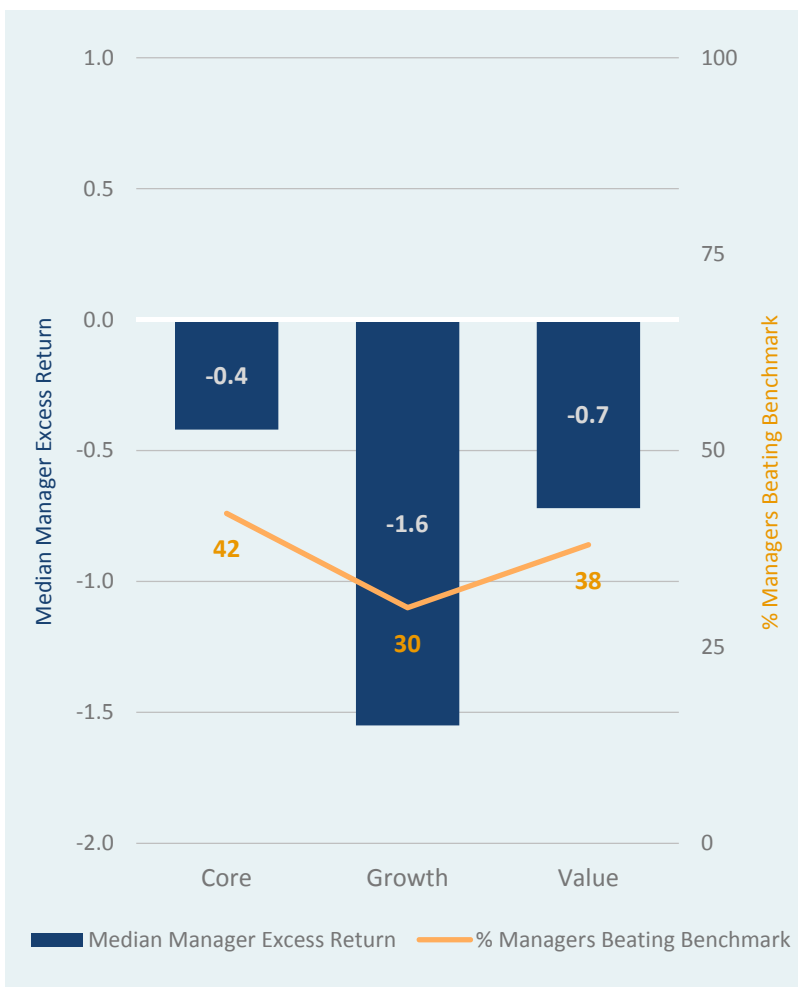
Investors with at or above market levels of risk tolerance might hire active managers with those strategies in the expectation of higher return.



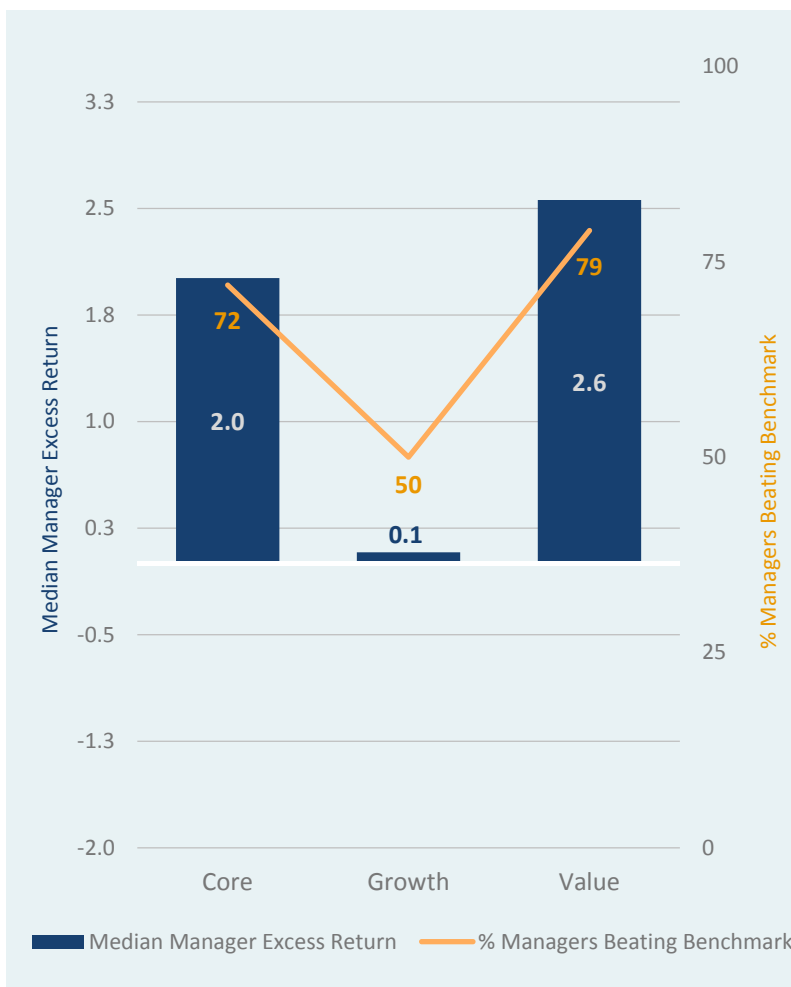
Other investors might hire active lower volatility managers. Passive management is unlikely to be appropriate.

# Supplemental charts

US LARGE CAP ACTIVE MANAGER PERFORMANCE YTD  
(9/30/14)



US SMALL CAP ACTIVE MANAGER PERFORMANCE YTD  
(9/30/14)



# Supplemental charts

## PERCENTILE RANK OF LARGE CAP STYLE BENCHMARK RELATIVE TO LARGE CAP STYLE UNIVERSE (AS OF 9/30/14)

Performance as of 9/30/14	MRQ	6 months	YTD	1	3	5	7	10		
R1000 relative to eA Large Cap Core Universe	48	37	42	44	42	38	63	67		
R1000G relative to eA Large Cap Growth Universe	40	29	30	34	45	34	37	55		
R1000V relative to eA Large Cap Value Universe	51	42	38	39	38	50	81	73		
Calendar Year Performance	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
R1000 relative to eA Large Cap Core Universe	49	34	50	30	43	70	68	45	66	55
R1000G relative to eA Large Cap Growth Universe	58	54	23	47	37	47	65	49	70	79
R1000V relative to eA Large Cap Value Universe	58	30	52	39	79	64	78	14	57	32

## PERCENTILE RANK OF SMALL CAP STYLE BENCHMARK RELATIVE TO SMALL CAP STYLE UNIVERSE (AS OF 9/30/14)

Performance as of 9/30/14	MRQ	6 months	YTD	1	3	5	7	10		
R2000 relative to eA Small Cap Core Universe	79	75	72	74	67	78	76	85		
R2000G relative to eA Small Cap Growth Universe	69	43	50	53	54	71	59	72		
R2000V relative to eA Small Cap Value Universe	84	83	79	79	73	86	88	92		
Calendar Year Performance	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
R2000 relative to eA Small Cap Core Universe	62	58	74	56	69	39	66	23	81	69
R2000G relative to eA Small Cap Growth Universe	67	51	61	45	62	30	64	40	78	43
R2000V relative to eA Small Cap Value Universe	74	44	70	69	86	27	81	15	80	53

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