

THE IMPACT OF MARKET CONDITIONS ON ACTIVE EQUITY MANAGEMENT

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Since the financial crisis, investors have enjoyed generally benign conditions, with subdued volatility and strong markets - but active equity managers have remained under pressure. Yet this should not be surprising; history has shown a strong pattern of counter-cyclicality in manager excess returns relative to the equity market.

In this study, we take a close look at the relationship between equity market conditions (defined by market returns, volatility, and dispersion) and active equity manager results. Focusing on the US large cap space, we analyze over twenty years of manager and market data to determine which set of conditions are associated with more or less favorable results for active equity managers. Our key conclusions:

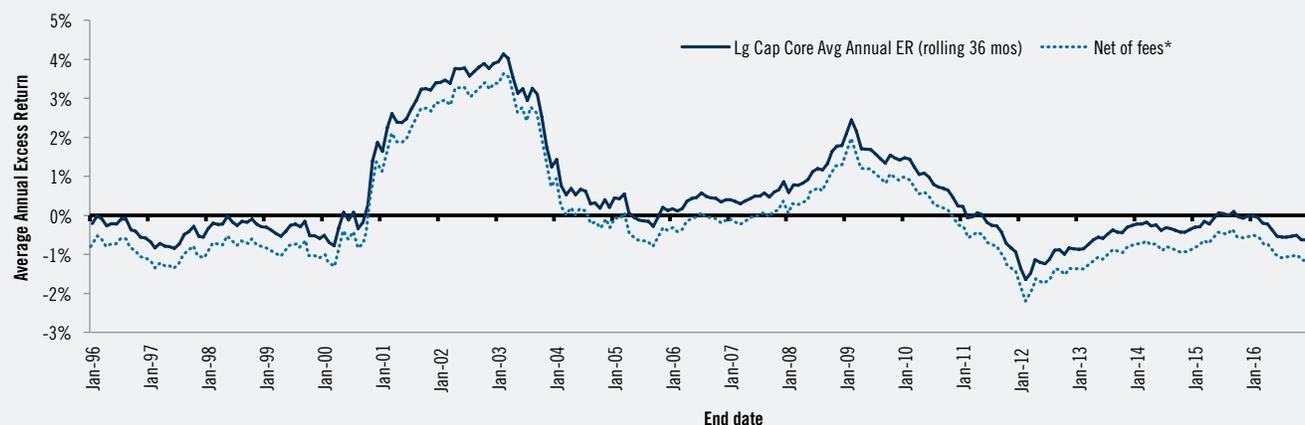
- Conditions that are conducive for active equity management have not been in place for several years, but investors should bear in mind that conditions do shift.
- There is a strong pattern of counter-cyclicality in active manager returns, with stronger excess returns generated in weak markets.
- Dispersion (the variation across stock returns at a given point in time) can also play an important role in outperformance, particularly for fundamental managers.
- In general, we find active management to be most successful in periods of “differentiated decline,” when market returns are low and dispersion is high.
- Quantitative managers are less sensitive to market conditions; investors seeking stability and consistency in outperformance across market environments should consider a combination of quantitative strategies across styles.
- Fundamental managers tend to generate higher excess returns over time; investors that are tolerant of cycles and focused on long-term outperformance should focus on a combination of more highly-active, fundamental managers in growth and value.

Introduction

Active equity management has been under siege over the past several years. A confluence of shifts in the marketplace including the slowing growth and larger payouts of traditional defined benefit pensions, and the associated surge of “do-it-yourself” investing, have contributed to net outflows in the professionally managed active equity space, particularly within US equities.

Figure 1. Excess returns have compressed in recent years (Jan. 1996 - Dec. 2016)

Rolling 36-month average of median excess returns for US institutional large cap core managers



See Appendix for range of reported fees for minimum account levels. Data set includes the monthly returns in excess of the Russell 1000 benchmark for all US large cap core managers reporting to eVestment (297 funds in 2016; see Appendix). The median manager return was determined each month, and an average annual return based on the rolling 36-month returns was calculated for each period. *Net of fees is a hypothetical series generated by subtracting 50bps from the gross of fees return series.

Source: PGIM IAS, eVestment

Additionally, the excess returns reported by active managers have been lackluster, causing many investors to question whether they can justify paying fees, particularly in the context of lower returns across the whole portfolio. Indeed, recent years have been disappointing relative to the more robust excess returns experienced in earlier periods (Figure 1).

What is not clear is whether this apparent degradation in excess returns is structural or cyclical in nature. Some potential causes may include:

- 1. Information flow** Advancements in data dissemination and processing speeds, as well as regulations promoting transparency,¹ have broadened the accessibility of information, thereby raising the bar on the kinds of differentiated insights that might be required in order to outperform. Market participants with scale and leverage have reengineered their investment processes to rapidly and consistently take advantage of new data, possibly contributing to the compression in the average manager's results.
- 2. Trend driven investing** Large scale, trend-driven investing can overpower fundamentals for some time, as we saw in the tech boom of the late nineties and in the "yield trade" of more recent years. Active managers struggled in both of these periods. The growing scale and accessibility of ETFs, dramatic advancements in communications technology, and an increasing burden on individuals to manage their own retirement assets may all serve to magnify the impact and persistence of trend-driven markets, which can be particularly challenging for active managers.²
- 3. Cyclical market conditions** We look to more cyclical factors to provide context for the compression in managers' returns. This includes market conditions such as volatility, dispersion³, and overall market performance. Quiet markets with relatively undifferentiated security returns may bear fewer opportunities to generate outperformance through security selection.

We focus here on these cyclical conditions. Our objective is to provide investors with a better understanding of the relative importance of changing market conditions, so that they can plan around potential outcomes across market cycles.

Specifically, we explore whether, and how, active manager results are related to dispersion, volatility, and market returns. We look to dispersion as a time-varying indicator of the breadth in security returns (and valuations) available to a manager.⁴ When stock valuations differ widely, there is more room to select stocks that will outperform, and skilled managers are more likely to outperform.

¹ For example, Regulation Fair Disclosure, promulgated in 2000.

² Especially those focused on valuations and/or longer term growth prospects.

³ Dispersion is the cross-sectional volatility of returns of a given universe of names over a single time period. For example, if we take all of the one-month returns of the names in the S&P 500 index and calculate the standard deviation among those return values, we will have the one-month return dispersion.

⁴ "The fundamental law of active management" (Richard C. Grinold; *The Journal of Portfolio Management* 1989.15.3:30-37), provides a useful framework by which active managers' value added can be assessed based on skill and breadth (where breadth represents the number of independent bets). Using this lens, if we assume that overall level of skill present in the active management marketplace is stable, then the variables potentially affecting value added are breadth (the number of "independent forecasts" available) and tracking error (the volatility of excess returns).

Conversely, lower dispersion, or greater uniformity across individual securities' returns, may dampen the potential for outperformance that might otherwise have been available. We also study the impact of market return volatility, as dispersion and volatility are closely related.⁵ This is logical given the potential for dispersion, or a wide range of return outcomes, in a high volatility market.

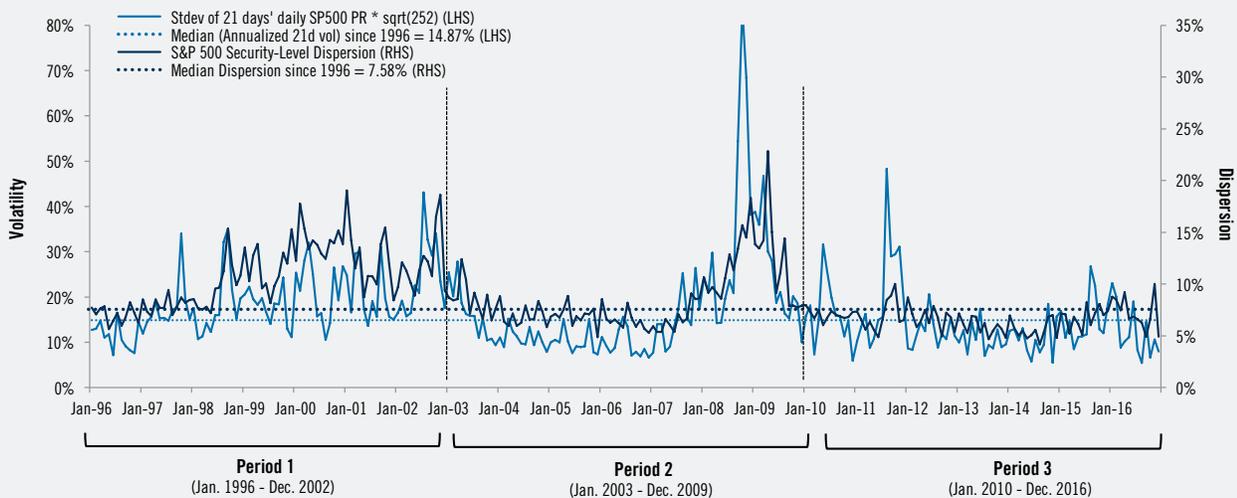
Dispersion and volatility have been subdued in recent years, with a notable absence of any major market decline.

Historical Perspective on Market Conditions

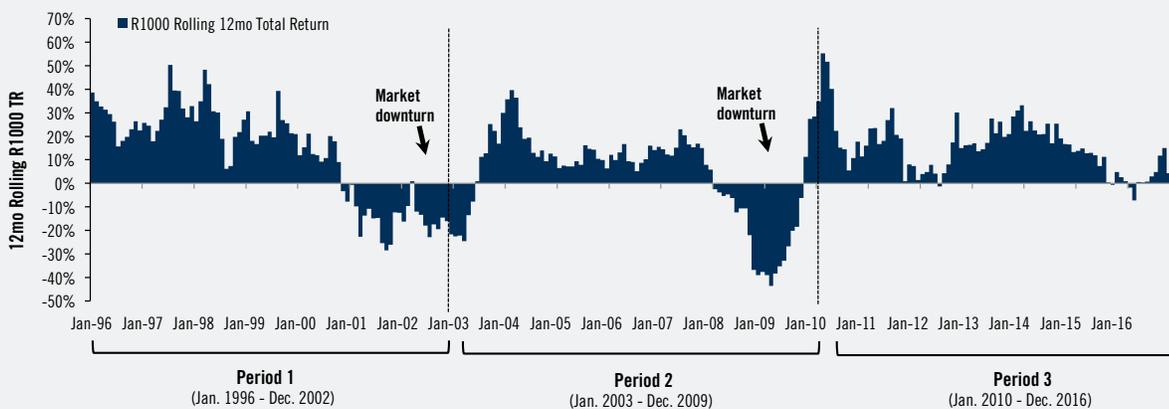
Both volatility and dispersion have been subdued in recent years. If we divide the past 21 years into 7-year cycles (Jan. 1996 - Dec. 2002, Jan. 2003 - Dec. 2009, Jan. 2010 - Dec. 2016, as in Figure 2A), we can see that the first two cycles exhibited sustained periods of moderate volatility and dispersion that either gradually (Period 1) or suddenly (Period 2) inflated, in conjunction with market downturns (Figure 2A). In contrast, both volatility and dispersion have remained relatively subdued over recent years (Period 3), **with a notable absence of major market declines** (Figure 2B).

Figure 2. Dispersion and volatility are closely related, and have been subdued relative to earlier periods

(A) US large cap dispersion and volatility levels (Jan. 1996 - Dec. 2016)



(B) Rolling 12-month market returns (Jan. 1996 - Dec. 2016)



Source: PGIM IAS, Datastream, eVestment

5 See Appendix for correlations amongst these market conditions.

Figure 3. Manager results are counter-cyclical (Jan. 1996 - Dec. 2016)

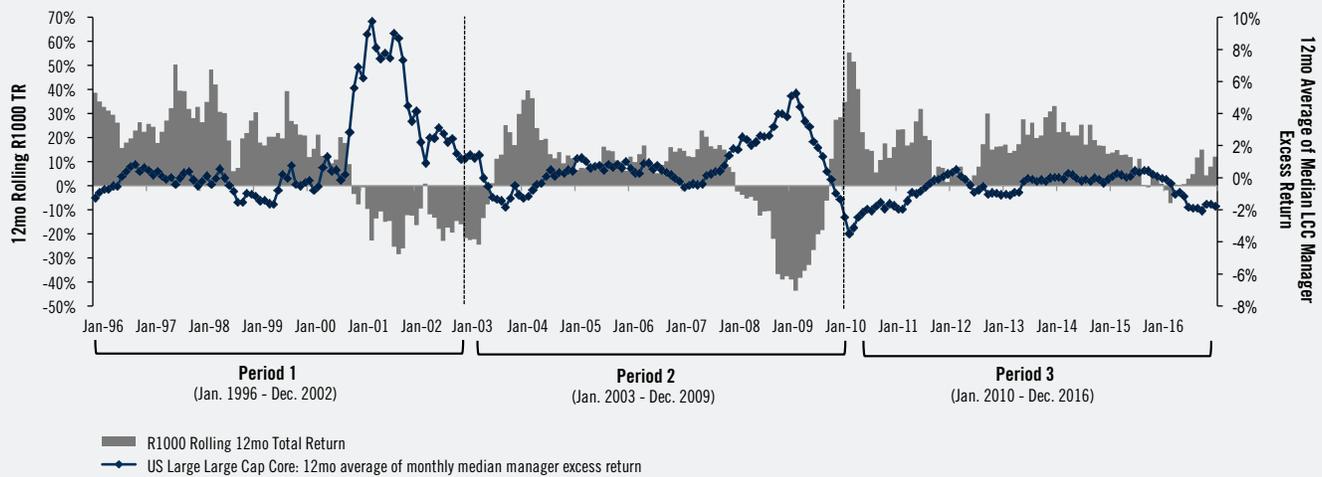
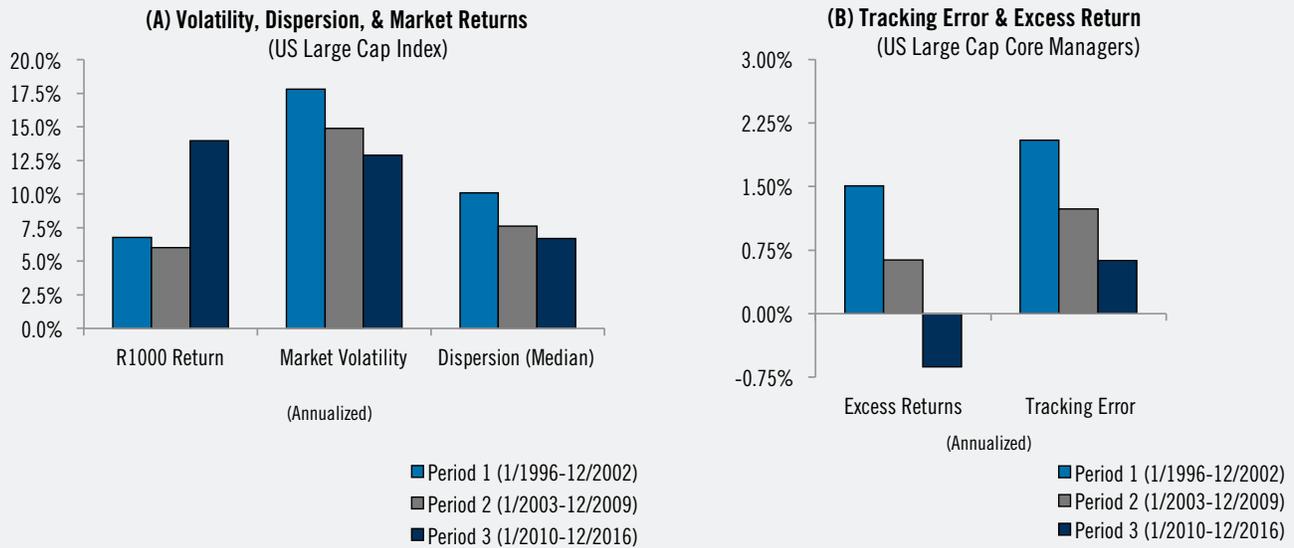


Figure 4. Volatility, dispersion, tracking error and excess returns are all low relative to prior periods



Source: PGIM IAS, Datastream, eVestment

Further, while manager excess returns have been disappointing, their results appear to be strongly counter-cyclical to the market.

Historical patterns reveal that, at the median level, large cap core managers delivered stronger excess returns when markets were down, and weaker excess returns in strong markets (Figure 3).

Of course, the entirety of this last cycle (2010 through 2016, following the Global Financial Crisis) has been dominated by historically low interest rates, induced by an unprecedented program of easing on behalf of the U.S. Federal Reserve and other central banks. As these accommodative measures helped to drive market returns up, market volatility and dispersion dropped (Figure 4A), pulling tracking errors down as well (Figure 4B). Excess returns suffered relative to prior periods, no doubt in part due to the lack of differentiation available in the market.

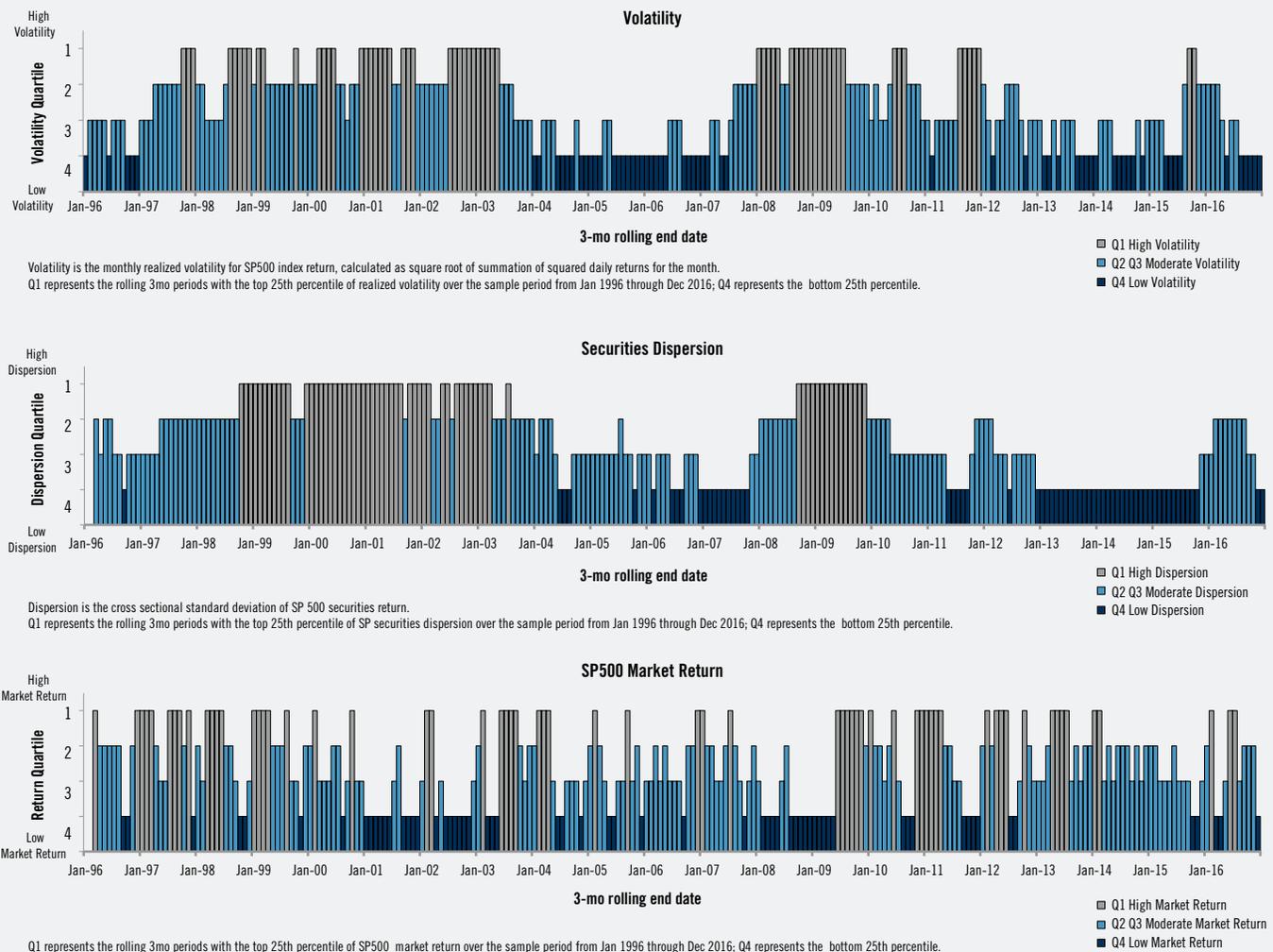
Managers' excess returns appear to be strongly counter-cyclical to the market.

In order to visualize the conditions present in the market over time, we rank them by quartiles. Parsing the past 21 years into three-month periods, we rank them by the level of volatility (or dispersion, or market return, depending on what is being measured) experienced, and label them by quartile. For example, quartile 1 (Q1) comprises the 25% of periods exhibiting highest volatility (or dispersion, or market return) relative to history,⁶ and quartile 4 (Q4) comprises those periods exhibiting the lowest volatility. We do the same for dispersion and for market returns; each of these three measures are shown, ranked over time, in Figure 5.

Unusually sustained, low levels of dispersion were exhibited in the market post-crisis.

This sorting allows us to make some observations with respect to the past and more recent experiences. For example, the market run-up over 1998-1999 was characterized by high levels of volatility and dispersion (consistent with the breakout performance of a select portion of the market). In contrast, the market in 2004-2007 progressed steadily, with low volatility and dispersion.

Figure 5. Low levels of volatility and dispersion in recent years (Jan. 1996 - Dec. 2016)



Source: PGIM IAS, Datastream

6 Since 1996.

In 2008, volatility and dispersion surged once again, as securities moved in the same direction (down), but with wide variation across individual returns. Finally, the post-crisis years from 2012-2015 exhibited sustained, low levels of dispersion over an unusually long period, before beginning to revert in 2016.

Characterizing the Market/Manager Relationship

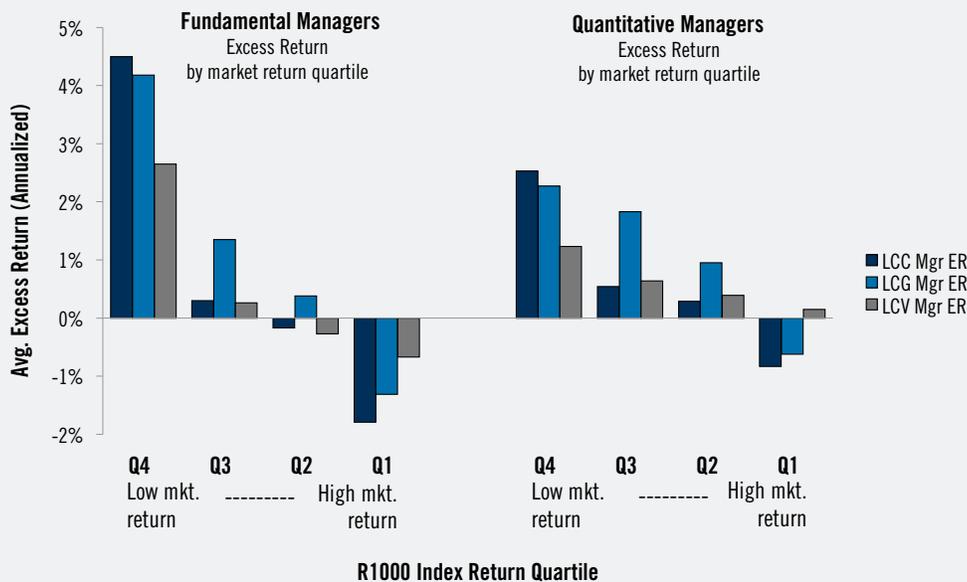
Which of these market conditions are important for active equity managers to succeed? We begin to address this by measuring manager returns directly against these three measures (market return, dispersion, and volatility). We consider both fundamental and quantitative managers in the US large cap space, including core, growth and value styles.⁷

First, there is a clear inverse relationship to market returns. We find that the average excess return levels for all of these manager types were quite sensitive to underlying market returns (Figure 6). In the most positive markets (Q1- high market return), the average excess return tended to be quite low, or even negative, while excess returns tended to reach their highest levels in the most negative markets (Q4- low market return). Quantitative manager results were less sensitive to market returns than their fundamental counterparts, consistent with their generally lower active-risk profile.

While there is a clear inverse relationship between excess returns and market returns, quantitative managers are somewhat less sensitive to the market than their fundamental counterparts are.

Figure 6. US large cap manager excess returns are inversely related to index returns

Average of the median manager excess return (annualized), by market return quartile

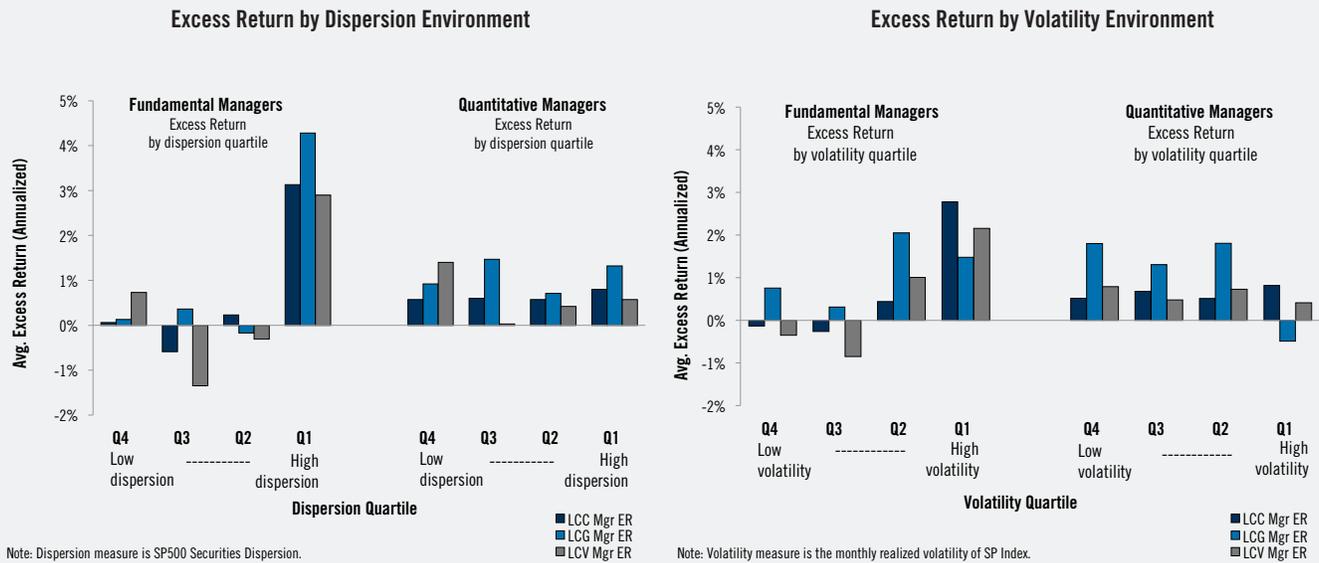


Analysis conducted using rolling 3-month periods from January 1996-December 2016. Excess return values are reported gross of fees. 3-month excess returns are calculated by summing three consecutive months' median manager returns, where the median manager may differ each month. These values do not represent any single investable portfolio. "Average of Median Managers' Excess Return" represents the average, across all instances of a given market return quartile, of the observed 3-month excess returns, annualized.

Source: PGIM IAS, Datastream, eVestment

⁷ Manager data source: eVestment. All data are gross of fees. Manager excess returns are calculated relative to the appropriate style benchmark (Russell 1000, Russell 1000 Growth, or Russell 1000 Value). eVestment database is self-reported and managers designate their investment category and process.

Figure 7. Average excess return for median US large cap managers, by market dispersion and volatility quartiles
Average excess return is annualized from 3-month data, from Jan. 1996 - Dec. 2016



Analysis conducted using rolling 3-month periods from January 1996-December 2016. Excess return values are reported gross of fees. 3-month excess returns are calculated by summing three consecutive months' median manager returns, where the median manager may differ each month. These values do not represent any single investable portfolio. "Average of Median Managers' Excess Return" represents the average, across all instances of a given dispersion or volatility quartile, of the observed 3-month excess returns, annualized.

Source: PGIM IAS, Datastream, eVestment

Fundamental managers are also more sensitive to dispersion and volatility than quantitative managers are. When we measure excess returns against dispersion and volatility, the most striking takeaway is that fundamental managers (Figure 7, left chart) and quantitative managers (right chart) had very different responses to these measures. Fundamental managers exhibited a dramatic increase in the average excess return associated with periods of higher dispersion and volatility, and low-to-negative results in other environments. In contrast, quantitative managers appeared to be neutral to dispersion, and only mildly sensitive to volatility.⁸

How would these strategies be expected to perform under more nuanced market conditions? To address this, we consider market return and dispersion conditions together, to evaluate their *joint* relationship with manager excess return.⁹ The framework we use is a 4x4 matrix representing the historical intersection of market return quartiles with dispersion quartiles, each measured on a rolling three-month basis.

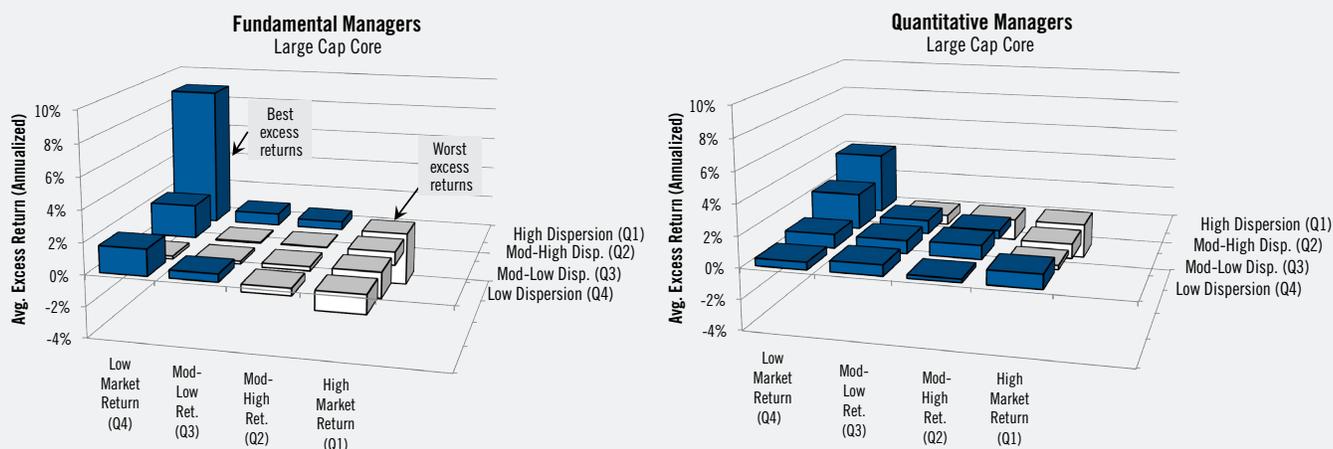
Examples of some historical periods that fall into the highest and lowest quartile combinations include:¹⁰

| | | |
|---------------------------------|------------------------------------|--|
| Differentiated strength: | High market return/high dispersion | [Late 1998, 1999; mid-2009] |
| Coordinated strength: | High market return/low dispersion | [Late 2006/early 2007; 2013] |
| Differentiated decline: | Low market return/high dispersion | [2000-2002; mid-2008/early 2009] |
| Coordinated decline: | Low market return/low dispersion | [Jun.-Aug. 2007, May.-Jul. 2011, Jun.-Aug. 2015] |

The frequencies associated with each of these environments varied.¹¹ However, there were more instances of "differentiated decline" (lowest levels of market return combined with the highest levels of dispersion) than of any other quartile combination.

⁸ In additional analyses, we found quantitative managers' excess returns to have a distinct inverse relationship to *correlation* among securities' returns, rising when correlation falls. In other words, quantitative managers appeared to do particularly well in low-correlation environments. We did not find any such relationship for fundamental managers.
⁹ We focus specifically on the joint distribution of "market return and dispersion", rather than on "market return and volatility", since we already know that market return and volatility have a strong inverse relationship.
¹⁰ The examples provided here are four of sixteen possible "market quartile/dispersion quartile" combinations. See Appendix for the number of historical periods associated with each, and for further detail on the specific dates referenced in these four examples. Each period cited is a three-month period ending at the designated date.
¹¹ See Appendix for further detail on the number of periods associated with each set of market and dispersion quartiles. If each had been equally likely, then each of these sixteen environments would occur 1/16th (or 6.25%) of the time. In fact, each had a different level of frequency over the period studied, with some more, and others less, likely than 6.25%. The intersection of quartile 1 (highest) dispersion with quartile 4 (lowest) market return ("differentiated decline") was the most frequent case, occurring more than 10% of the time (27/252 cases).

Figure 8. Average annualized excess return for median fundamental and quantitative US large cap core managers
By market return and dispersion quartiles



Analysis conducted using 3-month periods from January 1996–December 2016. Excess return values are reported gross of fees. 3-month excess returns are calculated by summing three consecutive months’ median manager returns, where the median manager may differ each month. These values do not represent any single investable portfolio. “Avg. Excess Return (Annualized)” represents the average, across all instances of a given set of market conditions (defined by market return quartile and dispersion quartile), of the observed 3-month excess returns, annualized.

Source: PGIM IAS, Datastream, eVestment

We take all of the median manager excess returns over each of these three-month periods and calculate the annualized average excess return associated with each market/dispersion quartile combination.¹² By analyzing manager returns under specific sets of market conditions, we can determine whether, and when, specific directional relationships exist, in order to provide some intuition around potential portfolio construction.

A distinct pattern emerges. When dispersion is taken together with market returns, a distinct pattern emerges with respect to manager excess returns (Figure 8). Consistent with our earlier results, we see the **strongest excess returns in periods of differentiated decline, when markets are at their lowest, and dispersion is high.**¹³ This is particularly true for fundamental managers, although quantitative managers, too, demonstrate this pattern when these two dimensions are taken together.

But dispersion can cut the other way. Importantly, we see that both of these manager types also realized their *lowest* excess returns in the highest dispersion environment – when it coincided with the strongest markets. So not only are strong markets less conducive to manager returns, but periods of differentiated strength, with strong and highly dispersed markets, appeared to be particularly difficult for managers. Examples include some periods in late 1998 and early 1999, when the market was quite strong, and returns were driven by a select group of names.

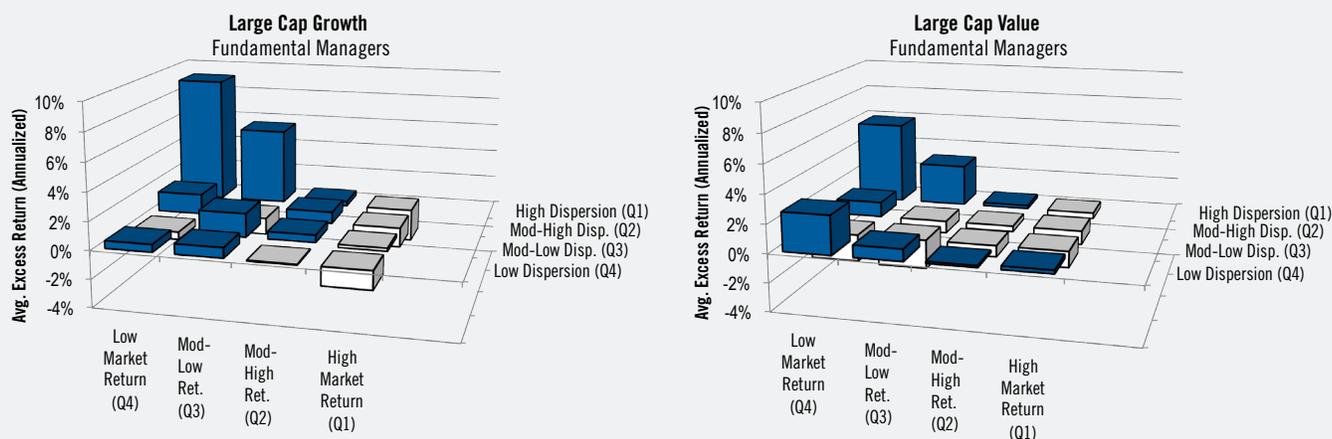
Regardless of dispersion, and particularly for fundamental managers, it is clear that stronger markets are associated with poor excess returns. Referring back to the historical market condition quartiles introduced in Figure 5, we can see a period of coordinated strength (low dispersion, strong markets) over 2012–2015, moving to more differentiated strength (higher dispersion, strong markets) in 2015–2016. Neither were particularly favorable for active managers.

Strongest excess returns were seen in periods of “differentiated decline,” when markets were at their lowest, and dispersion was high.

¹² It is important to note that these annualized results are constructed from rolling 3-month median manager results in each of the categories; there will be much greater variability when dealing with individual managers. Results were presented gross of fees in recognition of wide range of potential fees that might be experienced by any given institution, depending on manager, vehicle type, and account size.

¹³ Examples of such periods include the dramatic market downturns of 2000–2002 and 2008–2009, when a subset of names (mainly telecom in the first case, financials in the second) suffered particularly dramatic declines. Under such conditions, the benefits of security selection (including the skilled avoidance of certain names and/or sectors), as well as style/factor positioning, appear to be particularly valuable.

Figure 9. Average annualized excess return for median fundamental US large cap growth and value managers
By market return and dispersion quartiles



Analysis conducted using 3-month periods from January 1996-December 2016. Excess return values are reported gross of fees. 3-month excess returns are calculated by summing three consecutive months' median manager returns, where the median manager may differ each month. These values do not represent any single investable portfolio. "Avg. Excess Return (Annualized)" represents the average, across all instances of a given set of market conditions (defined by market return quartile and dispersion quartile), of the observed 3-month excess returns, annualized.

Source: PGIM IAS, Datastream, eVestment

We also compare results across fundamental growth and fundamental value managers within the large cap space to determine whether there are any appreciable differences in style (Figure 9).¹⁴ We find that while both of these manager types also delivered relatively strong results¹⁵ in periods of low market return/high dispersion, there were some differences. Growth managers demonstrated higher excess returns overall,¹⁶ with a return pattern that was similar to fundamental core managers. But value managers demonstrated resilience not only in periods of differentiated decline, but also in coordinated declines (low market return/low dispersion).¹⁷

Implications for Portfolio Construction

In reality, manager differentiation runs deeper than style categories alone. For example, within a given category, managers may be more or less active, where "activeness" can be measured in several ways (including active share, concentration, turnover, and tracking error). Investors need to consider what level of "activeness" would work best relative to their overall objectives, alongside their decisions around asset allocation and style. To reflect this level of differentiation, we further divide our universe into "high", "moderate", and "low" active categories within each style, using each manager's realized tracking error.¹⁸

With such a breadth of styles to consider, the natural question is: Which strategy, or combination of strategies, is best suited to satisfy a particular objective?

To address this, we model an array of potential combinations across the active US large cap space, including quantitative, fundamental, core, growth and value, at various level of "activeness." Our goal was to evaluate a broad range of potential large cap portfolios, each constructed from a different set of manager exposures, in order to better understand their characteristics when combined in a portfolio. Sample portfolios were constructed in 10% increments of large cap core, with the remaining amount allocated equally to large cap growth and value (keeping the results style-neutral), summing to a full (100%) investment in large cap.

14 While quantitative managers in the study universe were predominantly categorized as "core," the majority of fundamental managers were either "growth" or "value." See Appendix for number of managers in each category.

15 Excess returns for growth managers were measured vs. the R1000 Growth index; value managers were measured vs. the R1000 Value index.

16 Fundamental large cap growth managers had an annualized weighted average excess return of 1.13%. Fundamental large cap value managers had an annualized weighted average excess return of 0.49%. Excess returns are reported gross of fees.

17 This suggests that in those periods when most securities are declining together, investment disciplines that focus on a subset of companies with solid value and stable cash flows may pay off.

18 "Activeness" (low, moderate or high) was determined by calculating the tracking error of every manager within a given large cap style universe (core, growth or value), relative to the relevant style benchmark. The tracking error for each manager was calculated using over the longest time period for which that manager's return data were available over the period from Jan.1996 through Dec.2016. Therefore, managers' tracking errors may be based on different time periods, depending on data availability. Managers were then ranked by tracking error relative to the other managers' tracking errors within their own style universe, and separated into the top, middle and bottom one-third of tracking error levels, which were then classified, respectively, as "high", "moderate" and "low" activeness. Since the number of quantitative managers in the "moderate" and "high" active categories were quite low, we excluded these from our analysis. Please see Appendix for the number of managers that fell into each category.

Thus, the portfolio combinations we modeled included the following range of allocations:

10% core/45% growth/45% value
 20% core/40% growth/40% value
 30% core/35% growth/35% value

40% core/30% growth/30% value
 50% core/25% growth/25% value
 60% core/20% growth/20% value

70% core/15% growth/15% value
 80% core/10% growth/10% value
 90% core/5% growth/5% value

Each style (core, growth, value) in a given combination was modeled as either quantitative or fundamental, and as “high”, “moderate” or “low” active (or “all”, for a range of active levels). Because only a handful of quantitative managers ranked as “moderate” or “high” active, these were excluded from the analysis.¹⁹ In all, this resulted in more than 1,100 portfolio combinations. Excess returns were calculated as in the preceding analysis, but here we used combinations of manager types rather than single styles, and determined the weighted average excess returns across all outcomes.

Different Combinations Satisfy Different Investor Objectives

We plot the resulting combinations’ weighted average excess returns against the volatility of those excess returns in Figure 10. The “volatility of average excess return” measure that we use is the volatility of a given portfolio combination’s excess returns across all outcomes, based on the frequency of occurrence.

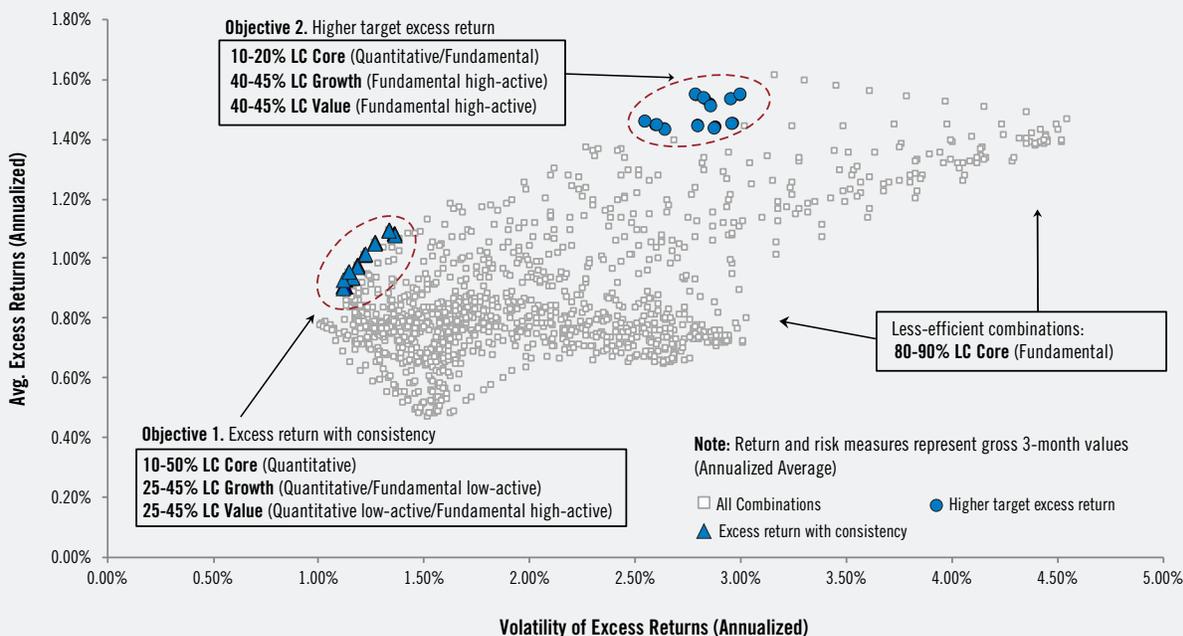
Using this perspective of relative risk and return, we can focus in on different profiles that might satisfy different kinds of investor objectives. For example, two different investors might have different objectives for their active return program:

Objective 1: Stable, consistent excess return (with maximum efficiency)

Objective 2: Higher target level of excess return (with optimum efficiency at that level)

Figure 10. Combinations across a range of US large cap core, growth and value strategies

Plotted by excess return and volatility of excess return across markets



Objective 1 & 2 are shown for illustrative purposes only. Analysis conducted using rolling 3-month periods from January 1996-December 2016. Excess return values are reported gross of fees. 3-month excess returns are calculated by summing three consecutive months’ median manager returns, where the median manager may differ each month. These values do not represent any single investable portfolio. “Avg. Excess Return (Annualized)” represents the average, across all instances of a given set of market conditions (defined by market return quartile and dispersion quartile), of the observed 3-month excess returns, annualized.

Source: PGIM IAS, Datastream, eVestment

¹⁹ Eighteen strategy types (six each in large cap core, growth and value) were included in this analysis. For each, results were based on the average of the median manager results within a given category. Please see Appendix for the number of managers that fell into each category.

Objective 1 seeks excess return consistency and efficiency, with a high ratio of excess return per unit of risk (as indicated in the lower left of the chart, Figure 10). We find that the sample combinations that best satisfy this objective (dark blue triangles) include a range of core (10-50%), growth (25-45%) and value (25-45%), **tilting primarily toward quantitative and low-active approaches**. Large cap value fundamental high-active, however, worked when paired with quantitative low-active in large cap core and growth.

Quantitative, low-active strategies provided consistency in excess returns, while fundamental, high-active allocations to growth and value were better aligned with higher excess return targets.

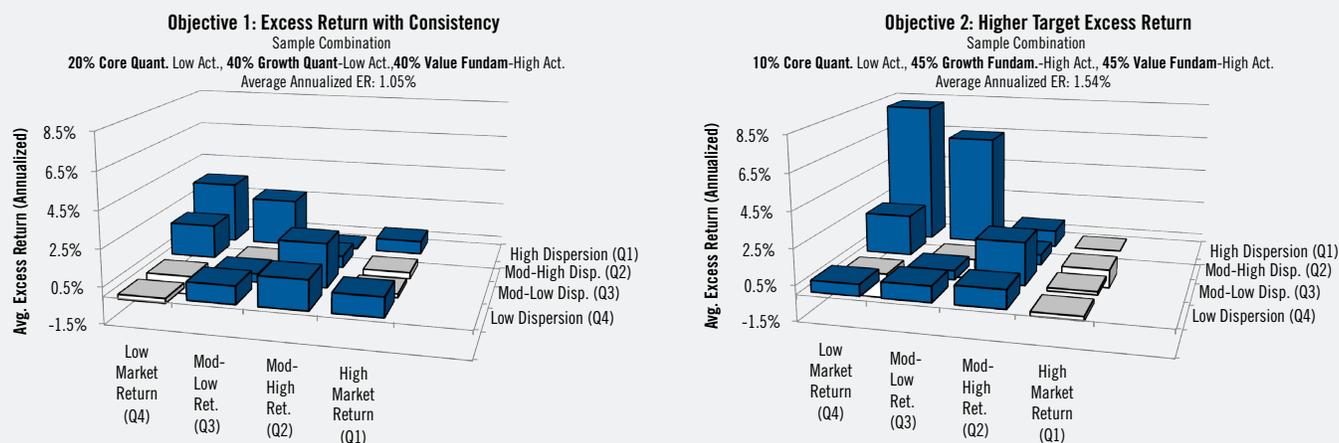
In contrast, **Objective 2** targets a higher minimum level of excess return (in this example, >1.5%/year) while maintaining efficiency. The manager combinations more likely to satisfy this return-seeking objective (blue circles in Figure 10) have lower allocations to large cap core (10-20%) and higher allocations to growth (40-45%) and value (40-45%). **Fundamental, high-active strategies were preferred for these larger allocations to growth and value**, while quantitative or fundamental, in a range of active levels, worked for the smaller allocation to core.

In the following charts (Figure 11), we plot one sample combination drawn from each of these groups to illustrate their results in the market return/dispersion matrix.

Each combination is aligned with its associated objective. The sample portfolio combination on the left demonstrates greater return consistency across the market/dispersion matrix (consistent with Objective 1), while the combination on the right demonstrates a higher overall level of excess return, but with relatively controlled levels of drawdown (consistent with Objective 2).

These provide tangible examples of portfolio construction driven by particular needs; other possible objectives might be to target greater outperformance in down-markets, or to limit downside in down-markets. Given these findings, we encourage investors to reflect upon their own needs in order to facilitate a portfolio design that is more likely to meet expectations under different market conditions.

**Figure 11. Average annualized excess return for sample US large cap combinations aligned with Objectives 1 and 2
By market return and dispersion quartiles**



Objective 1 & 2 are shown for illustrative purposes only. The two sample combinations presented above were drawn from the highlighted combinations in Figure 10. Analysis conducted using rolling 3-month periods from January 1996-December 2016. Excess return values are reported gross of fees. 3-month excess returns are calculated by summing three consecutive months' median manager returns, where the median manager may differ each month. These values do not represent any single investable portfolio. "Avg. Excess Return (Annualized)" represents the average, across all instances of a given set of market conditions (defined by market return quartile and dispersion quartile), of the observed 3-month excess returns, annualized.

Source: PGIM IAS, Datastream, eVestment

Concluding Thoughts

In summary, there is differentiation in the patterns of excess return across manager styles, and specific combinations may satisfy different investors' objectives with respect to the consistency and level of overall excess return that they may seek. Since quantitative managers demonstrate a high level of consistency across market environments, our results in the large cap space indicate that investors seeking moderate but consistent excess returns should focus on a combination of quantitative strategies across styles. Investors targeting higher levels of excess return would be advised to focus on a combination of more highly-active, fundamental managers in both growth and value. Given these findings, we encourage investors to reflect upon their own needs and expectations; developing clarity around objectives will enable better portfolio design and a greater satisfaction with results over various market environments.

We have enjoyed an extended period of market strength over the past several years. And while these results have been welcome to most investors, it has also been a challenging time for active managers. Yet this should not be surprising; history has shown a strong pattern of counter-cyclicality in manager excess returns. When markets do falter, particularly when accompanied by dispersion, there tends to be a significant upswing in active management results. And while these conditions have not been in place for several years, investors should bear in mind that conditions can, and do, shift. If the rewards of active managers are cyclical, they may be well-positioned for a turn in the cycle.

Developing greater clarity around objectives will lead to greater satisfaction with results over various market environments.

PGIM Institutional Advisory & Solutions

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PGIM

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²⁰ Prudential Financial, Inc. (PFI), a company with corporate headquarters in the US, is not affiliated in any manner with Prudential plc, a company incorporated in the United Kingdom.

²¹ Pensions & Investments Top Money Managers list, May 30, 2016; based on PFI total worldwide assets under management as of December 31, 2015.

APPENDIX

Table 1. Market returns exhibit a negative correlation to both active returns and to volatility

Monthly correlations (Jan. 1996 - Dec. 2016)

| | R1000 Monthly Total Return | Median Large Cap Core Mgr. Monthly Excess Return | Rolling 21-day SP500 PR vol, annualized | S&P 500 Security-Level Dispersion |
|--|----------------------------|--|---|-----------------------------------|
| R1000 Monthly Total Return | 1.00 | -0.58 | -0.40 | -0.03 |
| Median Large Cap Core Mgr. Monthly Excess Return | -0.58 | 1.00 | 0.18 | 0.07 |
| Rolling 21-day SP500 PR vol, annualized | -0.40 | 0.18 | 1.00 | 0.59 |
| S&P 500 Security-Level Dispersion | -0.03 | 0.07 | 0.59 | 1.00 |

Market return: Russell 1000 monthly total returns. Manager excess return: Large cap core median manager monthly excess return. Market volatility: Rolling 21-day S&P 500 price volatility, annualized. Securities dispersion: Cross-sectional volatility of monthly S&P 500 securities' returns.

Table 2. Number of funds evaluated, by category

| Large Cap Core | Jan. 1996 | Jan. 2006 | Jan. 2016 | Large Cap Growth | Jan. 1996 | Jan. 2006 | Jan. 2016 | Large Cap Value | Jan. 1996 | Jan. 2006 | Jan. 2016 |
|---------------------------|------------|------------|------------|---------------------------|------------|------------|------------|---------------------------|------------|------------|------------|
| Fundamental | | | | Fundamental | | | | Fundamental | | | |
| High Active | 41 | 73 | 42 | High Active | 47 | 122 | 62 | High Active | 35 | 104 | 90 |
| Moderate Active | 27 | 88 | 61 | Moderate Active | 47 | 114 | 81 | Moderate Active | 45 | 106 | 88 |
| Low Active | 16 | 52 | 44 | Low Active | 12 | 78 | 74 | Low Active | 18 | 72 | 67 |
| Fundamental (all) | 84 | 213 | 147 | Fundamental (all) | 106 | 314 | 217 | Fundamental (all) | 98 | 282 | 245 |
| Quantitative | | | | Quantitative | | | | Quantitative | | | |
| High Active | 5 | 18 | 18 | High Active | 2 | 14 | 4 | High Active | 2 | 16 | 11 |
| Moderate Active | 10 | 25 | 19 | Moderate Active | 1 | 10 | 4 | Moderate Active | 10 | 24 | 20 |
| Low Active | 16 | 61 | 50 | Low Active | 5 | 34 | 19 | Low Active | 14 | 48 | 31 |
| Quantitative (all) | 31 | 104 | 87 | Quantitative (all) | 8 | 58 | 27 | Quantitative (all) | 26 | 88 | 62 |
| Other | | | | Other | | | | Other | | | |
| High Active | 23 | 45 | 13 | High Active | 23 | 27 | 11 | High Active | 13 | 19 | 16 |
| Moderate Active | 29 | 44 | 25 | Moderate Active | 20 | 35 | 18 | Moderate Active | 19 | 33 | 20 |
| Low Active | 12 | 31 | 25 | Low Active | 15 | 30 | 26 | Low Active | 14 | 29 | 23 |
| Other (all) | 64 | 120 | 63 | Other (all) | 58 | 92 | 55 | Other (all) | 46 | 81 | 59 |
| LCC (all) | 179 | 437 | 297 | LCG (all) | 172 | 464 | 299 | LCV (all) | 170 | 451 | 366 |

Table 3. Sample fees

For reference; all results were presented gross of fees.

| | | | Fees (bps) | | |
|-----------|--------|--------------|------------|--------|------|
| | | | 25th | Median | 75th |
| Large Cap | Core | All | 50 | 60 | 65 |
| | | Fundamental | 55 | 60 | 75 |
| | | Quantitative | 40 | 50 | 55 |
| Large Cap | Growth | All | 60 | 65 | 75 |
| | | Fundamental | 60 | 66 | 75 |
| | | Quantitative | 50 | 52 | 61 |
| Large Cap | Value | All | 55 | 62 | 70 |
| | | Fundamental | 60 | 65 | 75 |
| | | Quantitative | 40 | 50 | 60 |
| Small Cap | Core | All | 75 | 88 | 95 |
| | | Fundamental | 85 | 90 | 100 |
| | | Quantitative | 66 | 80 | 89 |

Fees in bps for \$20 mil separate account.

Table 4. Manager “Activeness” (Jan. 1996 - Dec. 2016)

Manager activeness was determined by tracking error relative to the style universe. Tracking error was calculated relative to respective universe benchmarks using all available manager data over full sample.

| Median Tracking Error | LCC | LCG | LCV |
|-----------------------|------|------|------|
| High | 6.8% | 8.7% | 7.3% |
| Moderate | 4.4% | 6.1% | 4.8% |
| Low | 2.8% | 3.9% | 3.3% |

| Tracking Error Lower Bound | LCC | LCG | LCV |
|----------------------------|------|------|------|
| High | 5.4% | 7.2% | 5.5% |
| Moderate | 3.5% | 5.1% | 4.1% |
| Low | 0.8% | 1.1% | 1.1% |

Table 5. Number of rolling quarters in each market segment (Jan. 1996 - Dec. 2016)

| Market | | Dispersion | | | | |
|--------------|------|------------|----|----|--------|-------|
| Return | | Q1 High | Q2 | Q3 | Q4 Low | Total |
| Q1 | High | 16 | 21 | 16 | 10 | 63 |
| Q2 | ↓ | 9 | 13 | 21 | 20 | 63 |
| Q3 | | 11 | 13 | 13 | 26 | 63 |
| Q4 | | Low | 27 | 16 | 13 | 7 |
| Total | | 63 | 63 | 63 | 63 | 252 |

Table 6. Historical median excess returns, by category

| Median Excess Return | | | | |
|-----------------------------------|------------------|------------|------------|------------|
| Date Range | Fund Type | LCC | LCG | LCV |
| 1996-2002 | Fundamental | 1.9% | 3.6% | 1.1% |
| | Quantitative | 1.4% | 2.4% | 0.7% |
| 2003-2009 | Fundamental | 1.1% | 0.9% | 1.1% |
| | Quantitative | 0.4% | 0.6% | 0.8% |
| 2010-2016 | Fundamental | -0.9% | -1.1% | -0.8% |
| | Quantitative | 0.1% | 0.4% | 0.3% |
| 1996-2016 | Fundamental | 0.7% | 1.1% | 0.5% |
| | Quantitative | 0.7% | 1.2% | 0.6% |
| Median ER, High-active | | | | |
| Date Range | Fund Type | LCC | LCG | LCV |
| 1996-2002 | Fundamental | 3.2% | 5.0% | 2.4% |
| | Quantitative | 5.4% | 3.7% | 2.3% |
| 2003-2009 | Fundamental | 1.4% | 1.2% | 1.6% |
| | Quantitative | 1.6% | 1.4% | 2.5% |
| 2010-2016 | Fundamental | -1.2% | -1.0% | -1.1% |
| | Quantitative | -0.6% | -1.6% | -1.6% |
| 1996-2016 | Fundamental | 1.2% | 1.8% | 1.0% |
| | Quantitative | 2.2% | 1.2% | 1.2% |
| Median ER, Moderate-active | | | | |
| Date Range | Fund Type | LCC | LCG | LCV |
| 1996-2002 | Fundamental | 0.9% | 3.2% | 0.8% |
| | Quantitative | 2.6% | 8.6% | 0.8% |
| 2003-2009 | Fundamental | 1.1% | 0.6% | 1.1% |
| | Quantitative | 0.9% | -0.2% | 0.6% |
| 2010-2016 | Fundamental | -0.8% | -1.2% | -0.8% |
| | Quantitative | 0.3% | -0.4% | 0.0% |
| 1996-2016 | Fundamental | 0.4% | 0.9% | 0.4% |
| | Quantitative | 1.3% | 2.8% | 0.5% |
| Median ER, Low-active | | | | |
| Date Range | Fund Type | LCC | LCG | LCV |
| 1996-2002 | Fundamental | 0.7% | 2.4% | 0.6% |
| | Quantitative | 0.9% | 1.2% | 0.9% |
| 2003-2009 | Fundamental | 0.5% | 1.0% | 1.0% |
| | Quantitative | 0.3% | 0.4% | 0.7% |
| 2010-2016 | Fundamental | -0.7% | -0.9% | -0.7% |
| | Quantitative | 0.2% | 0.5% | 0.4% |
| 1996-2016 | Fundamental | 0.2% | 0.9% | 0.3% |
| | Quantitative | 0.5% | 0.7% | 0.6% |

Table 7. Historical rolling 3-mo periods in selected market segments, by end date (Jan. 1996 - Dec. 2016)

| | High Dispersion (Q1) | Low Dispersion (Q4) |
|--------------------------------|---|--|
| High Market Return (Q1) | Nov '98, Dec '98, Jan '99, Feb '99, Jun '99, Dec '99, Aug '00, Dec '01, Dec '02, May '03, Apr '09, May '09, Jun '09, Jul '09, Aug '09, Sep '09 | Oct '06, Nov '06, May '07, Apr '12, Feb '13, Mar '13, Apr '13, May '13, Nov '13, Dec '13 |
| Low Market Return (Q4) | Aug '98, Sep '98, Jun '00, Nov '00, Dec '00, Jan '01, Feb '01, Mar '01, Apr '01, Aug '01, Sep '01, Oct '01, Apr '02, Jun '02, Jul '02, Aug '02, Sep '02, Jan '03, Jul '08, Aug '08, Sep '08, Oct '08, Nov '08, Dec '08, Jan '09, Feb '09, Mar '09 | Jul '96, Apr '04, May '04, Aug '07, Jul '11, Aug '15, Oct '16 |

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