

Introducing the Barclays POINT[®] Quantitative Equity Scores

- We introduce a new proprietary model¹ that assigns Quantitative Equity Scores (POINT Scores) to global equities with respect to three key investment themes: Value, Quality, and Sentiment. **Value** measures how the market price of a stock compares to fundamental metrics of valuation. **Quality** is designed to capture the profitability, strength of the balance sheet, and the earnings quality of a company. **Sentiment** combines investor and analyst sentiment on a company during its recent history into a single score.
- The model produces scores ranging from 5 to 1 for each theme. A high/low Value score indicates attractive/unattractive valuation. A high/low Quality score indicates financial statement strength/weakness. A high/low Sentiment score indicates bullish/bearish market sentiment. These scores provide a characterization of companies that can be used in a variety of portfolio management exercises, including portfolio construction and risk management.
- The investment themes can show very distinct performances depending on the current market environment. For example, high quality companies tend to outperform during market crashes and underperform during the recovery period, especially during the initial phases of recovery.
- The model is based on variables with sound economic rationale that are intuitive and easy to interpret. This parsimonious set of variables is aggregated in a simple (non-optimized) way. We are not aiming for factor timing; rather, we are focused on simplicity and transparency. The model incorporates certain proprietary variables such as Barclays Corporate Default Probability, Residualized Forward Earnings to Price, and Discretionary Accruals.
- The POINT Scores are based on a brand new model that is devoid of legacy issues. This allowed us to utilize the most up-to-date academic and industry research, including recent research at Barclays.
- The model uses a consistent methodology across different sectors and regions, with certain exceptions for financials.

We intend to update clients on the POINT Scores in a new publication, the *POINT Quantitative Equity Score Monthly Tracker*. In addition, we plan to make the POINT Scores available on Barclays Live through POINT (Barclays global multi-asset class portfolio management platform) and Foresight (Barclays fundamental equity analytics platform).

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Introduction

Portfolio managers consider various types of inputs when making investment decisions, combining, say, the macroeconomic outlook with fundamental and quantitative analysis. The Barclays POINT Quantitative Equity Scores (POINT Scores) are based on a proprietary model that provides a systematic characterization of companies with respect to three major investment themes: Value, Quality, and Sentiment. These scores are designed to complement other inputs to the investment process and can be useful for investors in a variety of portfolio management exercises.

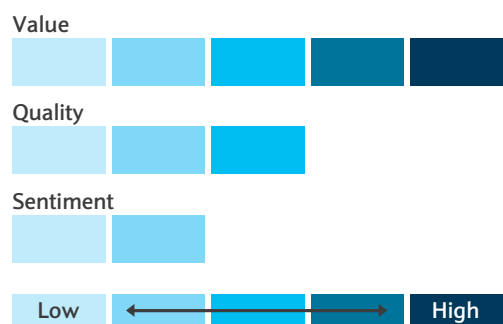
Value, Quality and Sentiment can exhibit very distinct performance characteristics depending on the market environment. High quality companies tend to outperform when the market crashes and underperform during the recovery period, especially during the initial phases of recovery. A good understanding of such behaviour can help portfolio managers to better position their portfolios depending on current market conditions, by tilting their portfolios towards or away from these themes.

Value measures how the market price of a stock compares to fundamental metrics of valuation. **Quality** is designed to capture the profitability, strength of the balance sheet, and the earnings quality of a company. **Sentiment** quantifies a combination of the investor and the analyst sentiment on a company in recent history. The model produces numbers ranging from 5 to 1 for each theme. A high/low Value score indicates attractive/unattractive valuation. A high/low Quality score indicates financial statement strength/weakness. A high/low Sentiment score indicates bullish/bearish market sentiment.

A relative analysis of the POINT scores can help investors to better characterize companies. For instance, the company in Figure 1 illustrates the case of a potential value-trap. It scores high on Value (5), but relatively low on Quality (3) and Sentiment (2). Even though the market price of the equity is cheap compared to fundamental metrics of valuation, Quality and Sentiment scores suggest the need to further analyze the underlying drivers of subpar returns and financial strength.

FIGURE 1

Quantitative Equity Scores for a Hypothetical Company



Source: Barclays Research

Figure 2 exhibits the list of variables used in computing the scores for each theme, including certain proprietary variables. It is important to emphasize that the model is based on variables with sound economic rationale that are intuitive and easy to interpret. The starting point for any candidate variable is a qualitative analysis, investigating the economic rationale and interpretation for the inclusion of the variable. Then the selected variables are tested using further quantitative and statistical analysis. We evaluate variables over a long history, across different sectors and market conditions.

FIGURE 2

List of Variables for Value, Quality, and Sentiment

Value	Quality	Sentiment
Earnings to Price	ROIC	Short-Term Momentum
Residualized Forward E/P	Change in ROIC	Long-Term Momentum
Total Yield	Capital Turnover	Last to High Ratio
Book to Price	Corporate Default Probability	Earnings Surprise - Reaction
EBITDA to EV	Change in Equity Outstanding	Earnings Revisions - Number
Free Cash Flow to Price	Change in Debt to Assets	Earnings Revisions - EPS
Sales to Price	Discretionary Accruals	

Source: Barclays Research

The POINT Scores are based on a global model that uses a consistent methodology across different sectors and regions, with certain exceptions for financials. For a given company, we first compute its ranking across all companies in its peer group with respect to each individual variable. The ranking also takes into consideration the evolution of the variables over the last five years. Then we compute the average ranking of that company within each theme that forms the basis for the theme score. In computing these, we use simple, non-optimized aggregation rules. We discuss this in more detail later.

Our back-testing suggests that tilting a market portfolio towards companies that display high Value, Quality, or Sentiment scores provides a significant improvement in risk-adjusted performance over our period of analysis. Figure 3 exhibits Return/Risk ratio for theme portfolios vs. the value-weighted (VW) and the equal-weighted (EW) market portfolio during the period 1992-2012 in the US. The market is defined as a portfolio of the largest 1000 stocks and the theme portfolios are constructed as equally-weighted baskets of 200 stocks that have the highest score for the respective theme every month. Because the theme portfolios are equal-weighted, the EW market results may be more comparable.

FIGURE 3

Performance of Theme Portfolios vs. the Market

	VW Market	EW Market	Value	Sentiment	Quality
Return	9.0%	10.8%	14.5%	12.9%	12.5%
Stdev	15.1%	17.1%	18.7%	15.3%	14.5%
Return/Risk	0.59	0.63	0.78	0.84	0.86
VaR 5%	-7.5%	-8.1%	-7.3%	-6.7%	-6.3%

Source: Barclays Research. Past performance is not necessarily indicative of future results.

Looking at performance over the long run, it is important to emphasize that each one of these themes tends to outperform/underperform under certain market conditions, as illustrated later in the paper. Therefore, for investors with a short- to medium-term horizon, it is important to understand the performance characteristics of such themes under different market conditions, in order to make more informed decisions in their portfolio management process.

Key Features of the POINT Scores Methodology

Qualitative vs Quantitative Analysis

In the selection of the final set of variables for each theme, we used a combination of qualitative and quantitative analysis. Qualitative analysis assesses whether the variable is based on sound economic rationale, intuitive, easy to interpret, and represents well the relevant theme. Quantitative analysis focuses on the predictive power of the variable for future returns across different market conditions, sectors, and horizons, in a systematic way. A key aspect of the model-building process was the order of these two components. Only if a variable can be proven to have a sound economic rationale and is intuitive, does it qualify to be part of our quantitative analysis. Hence the qualitative analysis comes first. However, this does not imply anything about the relative importance of the two analyses. Rather, we think that this ordering helps us avoid a major flaw that many quantitative models are prone to: over-fitting to historical data. In many cases, we had to drop a certain factor from the selection set due to insufficient economic rationale (e.g., change in employees, abnormal share volume) whereas the factor actually exhibited superior historical performance. Some other factors, such as realized volatility, were also dropped because they did not represent well any of the three themes under consideration.

Once a variable passes the qualitative test, we use quantitative analysis to investigate the predictive power of the variable for future returns. We perform this analysis using various return horizons (with a focus on the 12-month horizon), under different market conditions, and for different sectors. Figure 4 illustrates a partial view from the quantitative analysis performed for EBITDA/EV. In particular, it shows the average 6-12-24 month subsequent returns of portfolios sorted by EBITDA/EV. At the beginning of every month, we sort our calibration universe (largest 1000 companies in the US) with respect to the relevant company characteristic. We then construct five equal size portfolios, Q1 to Q5, where Q1 is the portfolio of companies with the lowest value of the characteristic and Q5 the highest. We then analyze whether these sorted portfolios show distinct performance characteristics for different return horizons, market conditions, and sectors. In case of EBITDA/EV, we would expect higher values of the variable to be associated with higher future returns, which is confirmed in Figure 4. This result is consistent across return horizons of 6-12-24 months. For example, Q5 on average returned 4.9% over a 12-month horizon whereas Q1 returned -0.6%. The last row in the figure indicates the percentage of times the top portfolio (Q5) outperformed the bottom portfolio (Q1): we see that the outperformance ratio increases as the horizon increases. For the 12-month horizon, Q5 outperforms Q1 68% of the time. Please refer to Appendix A for a more complete illustration of the univariate analysis reports compiled for each variable under consideration. We also analyze the return distribution of a long-short portfolio constructed using the variable, perform cross-sectional regressions to gauge the significance of the variable in explaining returns, and analyze its alpha-decay characteristics.

FIGURE 4

Returns of Portfolios Sorted by EBITDA/EV for the Subsequent 6-12-24 Months

	6	12	24
Q1	-0.1%	-0.6%	-2.9%
Q2	-0.1%	0.0%	0.2%
Q3	0.6%	1.4%	3.1%
Q4	1.9%	3.2%	5.3%
Q5	2.7%	4.9%	9.0%
Q5-Q1	2.8%	5.6%	12.0%
Outperformance	60%	68%	76%

Source: Barclays Research. Past performance is not necessarily indicative of future results.

In addition to analyzing factors individually, a key component of factor selection is to study how different factors relate to each other. Qualitative analysis focuses on whether different factors complement each other in representing a theme and whether they cover well the sub-themes relevant for each theme. For example, for Quality, the score should measure a combination of profitability, balance sheet strength, and the quality of earnings. Sentiment should measure both investor and analyst sentiment on the company. On the other hand, quantitative analysis focuses on the correlations between individual factors and the marginal contribution of each factor to the model as a whole. In looking for a parsimonious set of variables, we want to make sure that the final set of factors does not exhibit excess correlations and that each variable adds value to the relevant theme in conjunction with the other variables in the model.

To analyze the relationship between factors from a quantitative perspective, one of the methods we use is a stepwise selection algorithm. In this procedure, the algorithm starts with no variable in the model. Then, at each step, among the variables that are not in the model, the algorithm selects the one that provides the largest contribution to the in-sample explanatory power. However, for a variable to be included in the model, it should be significant at a predetermined level. If this is the case, the variable is included; if not, the procedure looks for the variable with the second largest contribution, and so on. Whenever a new variable is included, each existing variable is checked to determine whether it is still significant at a predetermined level and is excluded from the model if it becomes insignificant. The procedure ends when there is no remaining variable that can be included in the model at the required significance level. The goal of this analysis is to understand, from a purely statistical point of view, what variables stand out in a multivariate framework. From the stepwise procedure, we analyze several statistics of interest, such as the number of months each variable is selected and under which market conditions each variable is more likely to be selected.

Figure 5 demonstrates the performance of the final selected variables for the Value theme in terms of the percentage of months each variable is selected by the procedure. For this theme, we observe a somewhat varying performance across variables with figures ranging from about 20% to about 50%. Please note that this is purely a statistical analysis and just one of the many procedures used to get a better understanding of the interaction between different candidate variables.

FIGURE 5

Stepwise Selection Algorithm for the Value Theme

Variable	% Months Selected
Earnings to Price	28%
Residualized Forward E/P	25%
Total Yield	19%
Book to Price	32%
EBITDA to EV	41%
Free Cash Flow to Price	47%
Sales to Price	48%

Source: Barclays Research

Analysis Based on Long History

Factors in the model are tested using monthly data across a long history: 1980-2011. As a result, we chose variables that have proved themselves over a long period of time, across different market conditions. Moreover, we do not aim to time the relative importance of constituent variables; variables within each theme are equally weighted. This brings further transparency and robustness into the representation of the themes. The use of fixed factor weights also leads to lower turnover for portfolios based on these scores.

Consistency

One of the major objectives in the development phase of the model was consistency across different types of companies. Therefore, we only chose variables that would ensure that the model would be consistent and replicable across sectors and regions. Furthermore, models that are optimized to each individual sector may be more prone to over-fitting issues. This aspect of the model allows us to more easily compare scores across sectors and geographies. As an example, we dropped R&D as one of the potential factors under consideration as it does not apply well to all sectors.

In the context of quantitative analysis, this consistency dictates a selection of variables that show a relatively steady performance across sectors. Figure 6 illustrates the subsequent 12-month average returns of three portfolios sorted by EBITDA/EV for different sectors where Q1 is the portfolio of stocks with the lowest value of the variable and Q3 is the portfolio with the highest value. We see that the 12-month returns consistently increase as we move from Q1 to Q3, with one single exception - Q1 for Telecom Services.

FIGURE 6

Returns of Portfolios Sorted by EBITDA/EV for Different Sectors

	Q1	Q2	Q3	Q3-Q1
Energy	0.3%	4.1%	6.2%	5.9%
Materials	0.1%	0.6%	5.3%	5.2%
Industrials	-2.1%	0.5%	3.9%	6.0%
Consumer Discretionary	-0.5%	0.5%	4.7%	5.2%
Consumer Staples	-0.1%	2.3%	5.8%	5.9%
HealthCare	3.1%	3.3%	6.4%	3.3%
Financials	0.6%	1.9%	3.6%	2.9%
Information Technology	4.1%	4.4%	8.6%	4.5%
Telecom Services	6.9%	-0.2%	2.7%	-4.3%
Utilities	-1.2%	0.2%	2.4%	3.6%

Source: Barclays Research. Past performance is not necessarily indicative of future results.

The only exception to the consistency of the model across sectors and regions refers to the Financials sector. For this sector, certain input variables are either not well defined or have a very different interpretation for financial companies. For example, debt for banks can be considered as more of a raw material for the company rather than a source of capital. Thus, for financials, we replace certain variables with simple and intuitive alternatives. When that is not possible, we drop the variable. In the end, although the set of variables is different, we believe that the theme's intuition is still the same. Figure 7 illustrates these exceptions.

FIGURE 7

Variables Replaced or Dropped for Financials

Variable	Replace by / Dropped
ROIC	ROE
Change in ROIC	Change in ROE
Capital Turnover	Dropped
Discretionary Accruals	Tax Paid to Pretax Income
Change in Debt to Assets	Dropped
Free Cash Flow to Price	Tax Paid to Price
Sales to Price	Dropped

Source: Barclays Research

Representative vs Parsimonious

We need a certain minimum number of variables per theme in order for it to be well represented. This also allows us to better diversify across different signals coming from each variable. As an example, for the Quality theme, we wanted to incorporate variables that represent profitability, strength of the balance sheet, and the persistence of earnings. Certain variables tend to work better than others under certain conditions and therefore diversification across these variables helps produce more robust scores for companies.

On the other hand, another major objective in the model building process is parsimony: an overcrowded model has the tendency to double-count the same type of information. This reveals itself in the form of excess correlations in the context of quantitative analysis. We think having 6-7 variables per theme is a good tradeoff between the representativeness and parsimony we are looking after. Having a smaller set of variables also increases the potential coverage of companies across the globe, especially for smaller markets.

Description of Variables

In this section, we define the individual variables for each theme. All flow variables (from the income statement or the statement of cash flows) in the descriptions are trailing 12-month numbers. As an example, earnings in the Earnings to Price ratio represents a trailing 12-month earnings figure.

Value

Book to Price is the book value of equity divided by its market value.

Earnings to Price is the ratio of income before extraordinary items to the market value of equity.

EBITDA to EV is the ratio of earnings before interest, taxes, depreciation, and amortization to the enterprise value. Enterprise value is defined as the sum of the market value of equity and debt, minus cash holdings. This metric allows us to better compare the earnings yield of companies with different capital structures and tax rates.

Sales to Price is revenues divided by the market value of equity.

Total Yield is the sum of dividends and net repurchases (of common and preferred stock) divided by the market value of equity (i.e., sum of the dividend yield and the repurchase yield). This is regarded as a more complete measure of the company's payout to equity holders in comparison to the dividend yield.

Free Cash Flow to Price is the ratio of cash remaining in the company after taking into account the payments related to taxes, dividends, and interest expenses to the market value of equity.

Tax Paid to Price is the ratio of income taxes paid to the market value of equity.

Residualized Forward E/P is the component of next 1 year consensus E/P forecast that is orthogonal to the historical E/P ratio of the company. It is a proprietary variable originally employed in the Barclays US Equity Risk Model (A.B. Silva, A.D. Staal, and C. Ural (2009)) and represents the additional predictive power provided by consensus estimates.

Quality

Return on Equity (ROE) is income before extraordinary items divided by the book value of equity.

Return on Invested Capital (ROIC) is net operating profit after tax (NOPAT) divided by invested capital. Invested capital is defined as the book value of capital invested in the operating activities of the firm. Having invested capital in the denominator allows for a better comparison of the ratio across companies with different capital structures.

Change in ROE and **Change in ROIC** represent the change in these metrics over the last one year.

Change in Equity Outstanding is the percentage change in shares (adjusted for splits) over the last one year.

Discretionary Accruals is a proprietary variable that represents the component of earnings that is subject to the discretion of the management of the company. First, we calculate the accrual-based earnings by taking out the cash component from the earnings numbers and then we find the component of accruals that cannot be explained by industry-wide factors, i.e., the firm-specific component that is subject to the discretion of the company management.

Taxes Paid to Pretax Income is the ratio of income taxes paid to the pretax income of the company.

Change in Debt to Assets is the sum of the change in short-term and long-term debt divided by the total assets of the company.

Corporate Default Probability (CDP) is based on a proprietary model and represents the default probability of the company over the next one year. It performs significantly better than the traditional measures of identification of distressed firms. CDP was developed by and is widely used in POINT to gauge the default risk of corporate bonds in the Barclays Global Risk Model. In computing these default probabilities, the model takes into account the specific circumstances of the firm, its equity market performance, the state of the economy, and certain industry effects. Please refer to A. Asvanunt and A. Staal (2009) for a detailed discussion of the model.

Capital Turnover is the ratio of revenues to invested capital. Invested capital is defined as the book value of capital invested in the operating activities of the firm.

Sentiment

Earnings Revision (Number) is the percentage of analysts that have revised their (next 1 year) earnings estimates upwards minus the percentage of analysts that have revised their earnings estimates downwards in the last three months.

Earnings Revision (EPS) is the percentage change in the consensus next 1 year earnings forecast within the last three months.

Earnings Surprise (Reaction) quantifies the market reaction to the most recent earnings announcement of the company. The reaction is measured as the return of the company in a 3-day window around the earnings announcement day net of its sector.

Long-Term Momentum measures the cumulative total return of the company in the last 12 months (excluding the last month) adjusted for the volatility of returns during the same period.

Short-Term Momentum measures the cumulative total return of the company in the last three months (excluding the last month) adjusted for the volatility of returns during the same period.

Last to High Ratio is the ratio of the current price of the stock to its high price (adjusted for corporate actions) within the last 12 months.

Computing the POINT Scores

To compute the final POINT Score for a given company, we start by computing the ranking of that company for each variable under the relevant theme. In particular, for each underlying variable, we compute the ranking of that company within its peer group (sector in the relevant region for Value and Quality, region for Sentiment) across the last five years. Once we have the ranking for each individual variable, we find the average ranking of that company across all variables within the theme under consideration. As some of the variables used to construct the themes can show very erratic distributions, this simple methodology allows for a robust and transparent computation of the theme scores.

As a result of the above methodology, every company is assigned a ranking between 0 and 100 for each theme: Value, Quality, and Sentiment. Each company is then assigned a score in the 1-5 range for each theme, as a function of its ranking in the respective themes. The use of last five years of history for ranking purposes allows us to capture the time-series dynamics of the underlying variables and hence compute scores that have an absolute (not relative) interpretation. As an example, the model can indicate that the majority of stocks in a given sector are overvalued at a given point in time, even though the rankings are computed relative to the sector.

As we mentioned above, ranking is done relative to the sector in the relevant region for Value and Quality, but relative to the region only in the case of Sentiment. We previously emphasized that the underlying variables are chosen in such a way that they can be easily applied to all sectors and regions. For example, the Earnings to Price ratio is a metric that is well defined and has a comparable interpretation across different sectors but a ratio of, say, 0.1 can potentially be considered as undervalued in one sector and overvalued in another. Many of the variables under Value and Quality are not comparable across sectors in terms of their raw values due to the differences between sectors in terms of their growth prospects and accounting standards. This is not the case for Sentiment, where the comparison is easier for the underlying variables. As a result, we decided to compute the ranking on a sector relative basis for Value and Quality, but not for Sentiment.

Performance of the Model

We performed extensive quantitative analyses to gauge the predictive power and other important characteristics of individual factors and the model as a whole. In this section, we present a high level analysis of the historical performance of scores for each individual theme. In order to illustrate that, we use the largest 1000 stocks in the US in terms of market capitalization and a time period of 1992-2012². This period extends across a variety of market conditions, including the growth-driven market of the late 1990s and the recent credit crisis, leading to some interesting insights.

To construct any theme portfolio, at the beginning of each month, we rank stocks in our universe with respect to their POINT Score and construct five buckets through this ranking. Within each of these buckets, companies are equally weighted and positions are rebalanced monthly. We call the bucket with the lowest scores Q1 (quintile 1) and the one with the highest scores Q5 (quintile 5). We then analyze the performance of Q1 and Q5 over time in comparison to the market portfolio. As these buckets are equally weighted, we compare their performance with the equally-weighted market portfolio. In line with our definition of POINT Scores, Q5 is the bucket of undervalued, high quality, and bullish sentiment companies, respectively, for Value, Quality, and Sentiment themes and vice versa for Q1.

² The back-testing for the overall model starts in 1992 due to the unavailability of some of the scores' underlying variables.

We analyze both the overall performance of the buckets and their performance under different market conditions. We separate the entire period into 6 sub-periods, where the cut-off points are chosen purely as a function of the evolution of the market, by looking into turning points. This is especially important to better understand the characteristics of the themes under different market conditions.

As we have shown previously in Figure 3, tilting towards the Value theme provides a significant improvement in the risk-adjusted performance over a long history. The improvement comes mainly from the returns, analyzed in more detail in Figure 8. The figure illustrates the cumulative returns of overvalued (Q1) and undervalued (Q5) buckets in comparison to the equally-weighted market portfolio over the entire history. We see that the undervalued bucket outperforms over the long run and the performance difference is especially striking around the burst of the technology bubble. Figure 9 shows that during this period (Mar-2000 to Sep-2002) the undervalued bucket significantly outperforms the market (12% vs. -10%) whereas the overvalued bucket significantly underperforms, due to market correction being driven by growth companies. The recent drawdown of the credit crisis (Oct-2007 to Mar-2009) is driven by other considerations and is reflected in the performance of Value buckets being very similar to the market (-45% and -41% vs. -41%). It is also worth noting that the Value theme does not necessarily underperform in bull markets. On the contrary, we observe modest outperformance during the bull market of mid-2000s and the recovery phase after the recent credit crisis.

FIGURE 8

Performance of the Value Theme (Cumulative Returns)



Source: Barclays Research. Past performance is not necessarily indicative of future results.

FIGURE 9

Performance of the Value Theme (Annualized Returns)

Period	Q1	Q5	Market
Before Technology Bubble (Mar-1992 to Dec-1994)	6%	13%	10%
Run-up to Technology Bubble (Dec-1994 to Mar-2000)	24%	21%	22%
Burst of the Bubble (Mar-2000 to Sep-2002)	-39%	12%	-10%
Mid-2000s Bull Market (Sep-2002 to Oct-2007)	19%	21%	20%
Credit Crisis Drawdown (Oct-2007 to Mar-2009)	-41%	-45%	-41%
Market Rally After Credit Crisis (Mar-2009 to Sep-2012)	23%	28%	25%

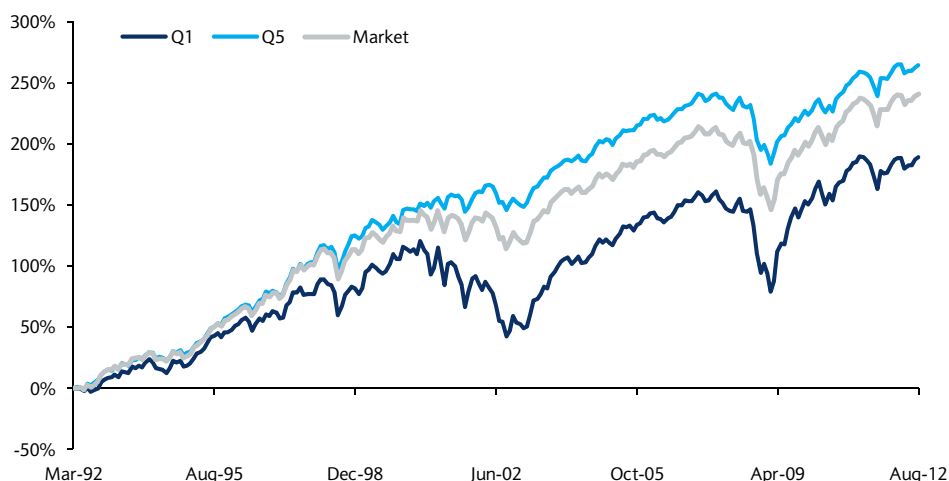
Source: Barclays Research. Past performance is not necessarily indicative of future results.

We now turn to the analysis of the Quality theme. As we have shown previously in Figure 3, our back-testing suggests that tilting towards high quality provides a significant improvement in the risk-adjusted performance over a long history. Contrary to Value, though, the majority of the improvement comes from a reduction in volatility. In terms of returns, high quality companies tend to outperform the market over long periods of time. This is also generally true during times of market turbulence and when entering into a crisis. However, quality might lag the market during market rallies, especially in the earlier phases of a market recovery.

Figure 10 illustrates the cumulative returns of low quality (Q1) and high quality (Q5) buckets in comparison to the equally-weighted market portfolio over the entire history. Not surprisingly, the high quality bucket outperforms in both major market drawdowns as can be seen in Figure 11. Specifically, it returns 0% vs. -10% for the market during the burst of the tech bubble and -35% vs. -41% for the market during the recent credit crisis. When compared with the Value theme, the outperformance of Quality is more consistent between the two market corrections. It is worth noting that our Quality theme keeps up with the market during market rallies too, the exception being the most recent market rally, when it trailed the market by 5% during a period of strong returns.

FIGURE 10

Performance of the Quality Theme (Cumulative Returns)



Source: Barclays Research. Past performance is not necessarily indicative of future results.

FIGURE 11

Performance of the Quality Theme (Annualized Returns)

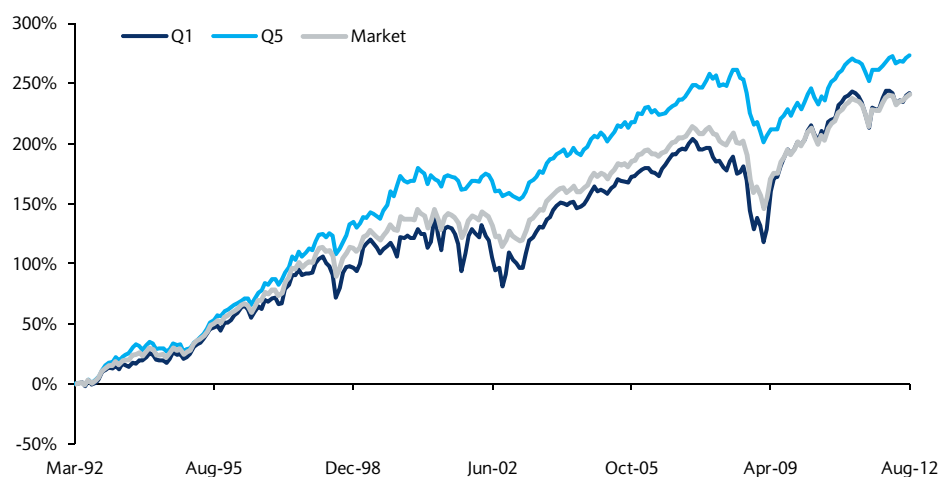
Period	Q1	Q5	Market
Before Technology Bubble (Mar-1992 to Dec-1994)	7%	11%	10%
Run-up to Technology Bubble (Dec-1994 to Mar-2000)	18%	22%	22%
Burst of the Bubble (Mar-2000 to Sep-2002)	-29%	0%	-10%
Mid-2000s Bull Market (Sep-2002 to Oct-2007)	23%	19%	20%
Credit Crisis Drawdown (Oct-2007 to Mar-2009)	-52%	-35%	-41%
Market Rally After Credit Crisis (Mar-2009 to Sep-2012)	29%	20%	25%

Source: Barclays Research. Past performance is not necessarily indicative of future results.

Sentiment, including the widely-used momentum strategy, tends to perform well in markets with stable market sentiment and underperform when market sentiment fluctuates often (market trading within bands). Figure 12 illustrates the cumulative returns of bearish

sentiment (Q1) and bullish sentiment (Q5) buckets in comparison to the equally-weighted market portfolio over the entire history. Figure 13 shows that the bullish sentiment bucket exhibits outperformance during the run-up to the technology bubble, primarily driven by the consistent outperformance of growth stocks during that period. When the bubble bursts, it cannot avoid the crash as much as Value and Quality do, underperforming both themes. Generally speaking, the Sentiment theme shows less differentiated performance compared with the other two themes.

FIGURE 12

Performance of the Sentiment Theme (Cumulative Returns)

Source: Barclays Research. Past performance is not necessarily indicative of future results.

FIGURE 13

Performance of the Sentiment Theme (Annualized Returns)

Period	Q1	Q5	Market
Before Technology Bubble (Mar-1992 to Dec-1994)	8%	11%	10%
Run-up to Technology Bubble (Dec-1994 to Mar-2000)	19%	27%	22%
Burst of the Bubble (Mar-2000 to Sep-2002)	-16%	-7%	-10%
Mid-2000s Bull Market (Sep-2002 to Oct-2007)	23%	20%	20%
Credit Crisis Drawdown (Oct-2007 to Mar-2009)	-48%	-36%	-41%
Market Rally After Credit Crisis (Mar-2009 to Sep-2012)	32%	19%	25%

Source: Barclays Research. Past performance is not necessarily indicative of future results.

Having illustrated the historical performance of the model in the US, we now discuss the performance of the themes in Europe and Asia. Figure 14 compares the performance of theme buckets in Europe and Asia against equal-weighted market portfolios for the respective regions during the period 2001-2012³. The buckets are constructed in the same way as described before, as an equal-weighted basket of companies with the highest scores (top 20% - Q5) for the respective themes and regions every month. Our results show that buckets tilted towards these themes outperformed the market on a risk-adjusted basis. The results are consistent with those from the US, with the outperformance being even stronger in Europe and Asia (please note that the historical data periods are different between the US and the other regions). The improvement in the risk-adjusted performance comes primarily from a substantial increase in annualized returns across the three themes, especially for Value. However, there is generally also an improvement in the volatility of buckets tilted towards Sentiment and Quality in both regions.

³ Period is shorter compared to the US due to data availability.

FIGURE 14

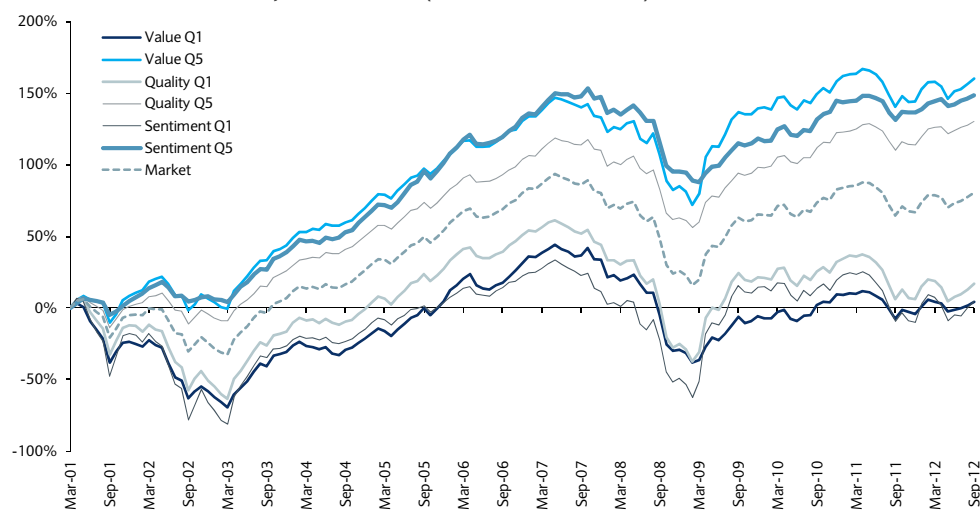
Performance of Themes vs. the Market

	Europe				Asia			
	EW Market	Value	Sentiment	Quality	EW Market	Value	Sentiment	Quality
Return	5.5%	12.7%	12.5%	10.6%	5.2%	16.2%	9.6%	8.3%
Stdev	17.8%	19.5%	14.6%	15.4%	16.7%	17.1%	15.5%	14.8%
Return/Risk	0.31	0.65	0.86	0.69	0.31	0.95	0.62	0.56

Source: Barclays Research. Past performance is not necessarily indicative of future results.

Figure 15 depicts the evolution of cumulative returns for the overvalued (Value Q1), undervalued (Value Q5), low quality (Quality Q1), high quality (Quality Q5), bearish sentiment (Sentiment Q1), and bullish sentiment (Sentiment Q5) buckets in Europe. We compare them versus the market over the entire time period. Figure 16 provides the same evidence, but applied to the Asian market. The signals seem quite strong: not only does the top bucket (Q5) for each theme outperform the market in both regions, but the bottom bucket (Q1) for each theme also underperforms, in most cases significantly. Value in Asia is the theme with the strongest performance difference between the bottom and the top buckets.

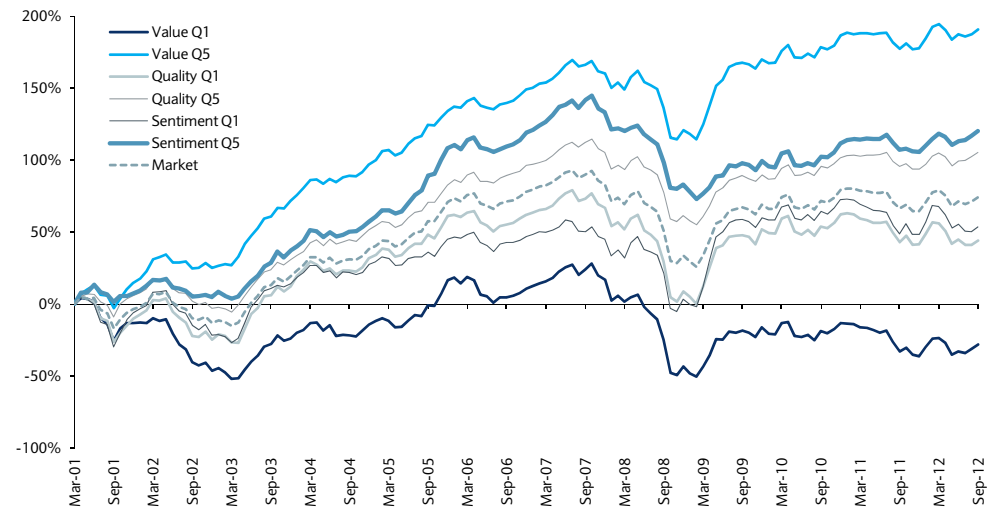
FIGURE 15

Performance of the European Themes (Cumulative Returns)

Source: Barclays Research

FIGURE 16

Performance of the Asian Themes (Cumulative Returns)



Source: Barclays Research

APPENDIX 1: UNIVARIATE ANALYSIS FOR CANDIDATE VARIABLES

EBITDA to EV

Full Period

	1	3	6	12	24	36
Q1	-0.1%	-0.1%	-0.1%	-0.6%	-2.9%	-3.6%
Q2	0.0%	-0.1%	-0.1%	0.0%	0.2%	-0.2%
Q3	0.1%	0.3%	0.6%	1.4%	3.1%	3.7%
Q4	0.4%	1.0%	1.9%	3.2%	5.3%	6.8%
Q5	0.6%	1.4%	2.7%	4.9%	9.0%	8.7%
Q1.Q5	0.7%	1.5%	2.8%	5.6%	12.0%	12.3%
Factor	0.2%	0.5%	0.9%	1.7%	3.5%	3.8%
tstats.Q1	-0.4	-0.2	-0.2	-0.4	-1.1	-0.9
tstats.Q5	3.5	2.8	2.3	2.1	1.8	1.2
tstats.Q1.Q5	3.0	2.2	1.8	2.1	2.9	2.2
tstats.Factor	3.4	2.6	2.1	2.3	3.0	2.1
outperformance	59%	60%	60%	68%	76%	74%

Sub-Periods

	Last 10 Years	High Market	Medium Market	Low Market	High VIX	Medium VIX	Low VIX
Q1	2.4%	-0.2%	4.2%	-5.9%	-1.3%	-0.8%	0.2%
Q2	2.6%	-2.2%	1.0%	1.2%	1.0%	0.0%	-1.2%
Q3	4.2%	-0.7%	0.5%	4.5%	3.4%	0.4%	0.4%
Q4	7.5%	0.5%	2.1%	7.1%	5.7%	1.5%	2.5%
Q5	10.3%	3.6%	3.6%	7.6%	8.9%	2.2%	3.7%
Q1.Q5	8.0%	3.8%	-0.6%	13.5%	10.2%	3.0%	3.5%
Factor	2.3%	1.0%	0.1%	3.9%	2.9%	0.7%	1.4%
tstats.Q1	1.2	(0.1)	2.2	(4.0)	(0.5)	(0.6)	0.2
tstats.Q5	2.8	1.1	2.2	2.9	2.3	1.0	3.2
tstats.Q1.Q5	2.5	1.5	(0.3)	3.7	2.2	1.4	3.2
tstats.Factor	2.7	1.4	0.2	3.9	2.3	1.3	3.9
outperformance	80%	59%	60%	85%	73%	63%	69%

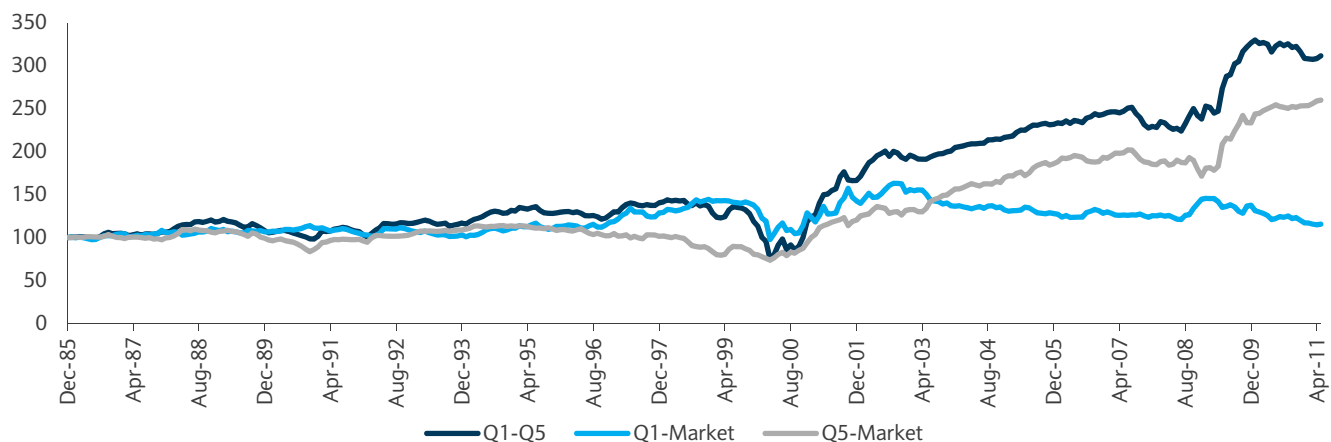
Sectors

	Q1	Q2	Q3	Q1.Q3	tstats.Q1.Q3
Energy	0.3%	4.1%	6.2%	5.9%	2.2
Materials	0.1%	0.6%	5.3%	5.2%	2.8
Industrials	-2.1%	0.5%	3.9%	6.0%	2.5
Consumer Discretionary	-0.5%	0.5%	4.7%	5.2%	2.0
Consumer Staples	-0.1%	2.3%	5.8%	5.9%	3.1
HealthCare	3.1%	3.3%	6.4%	3.3%	0.8
Financials	0.6%	1.9%	3.6%	2.9%	2.2
Information Technology	4.1%	4.4%	8.6%	4.5%	1.0
Telecom Services	6.9%	-0.2%	2.7%	-4.3%	(0.8)
Utilities	-1.2%	0.2%	2.4%	3.6%	2.0

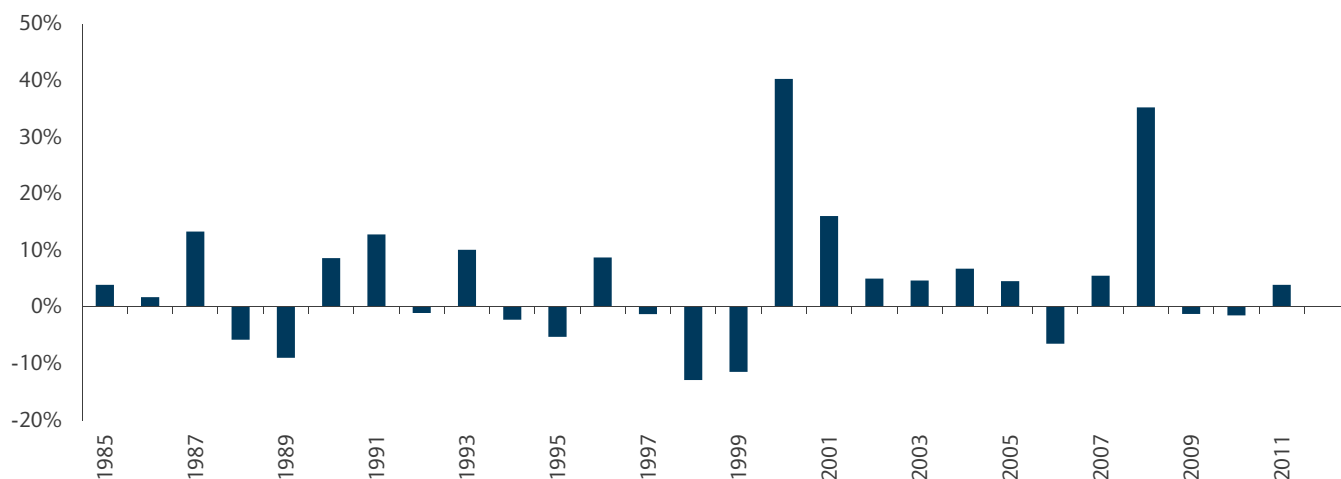
Source: Barclays Research

Total Return Index

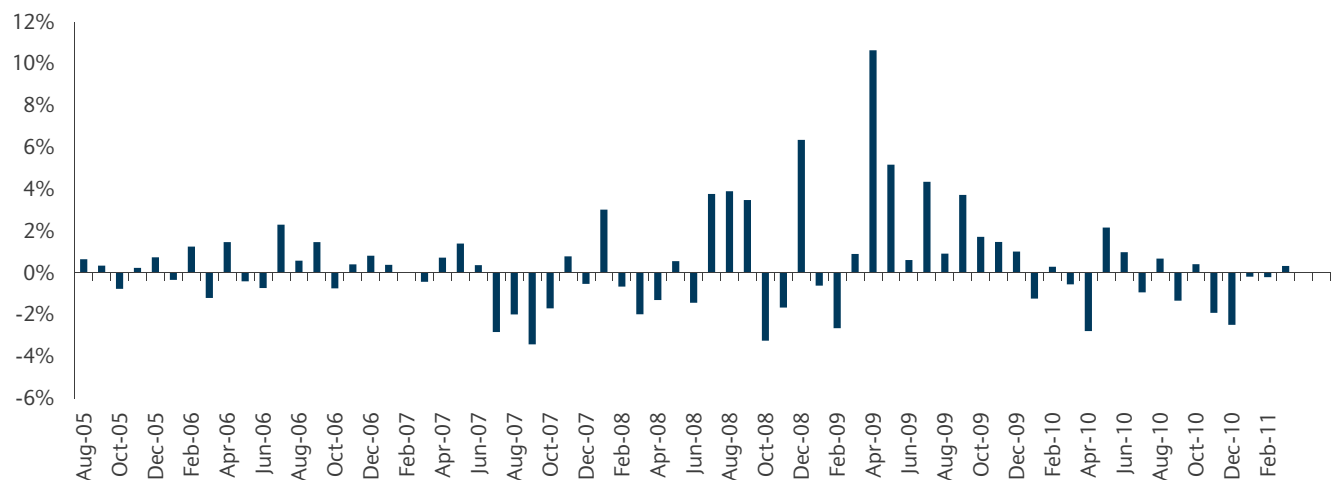
Index Value



Annual Q1-Q5 Returns

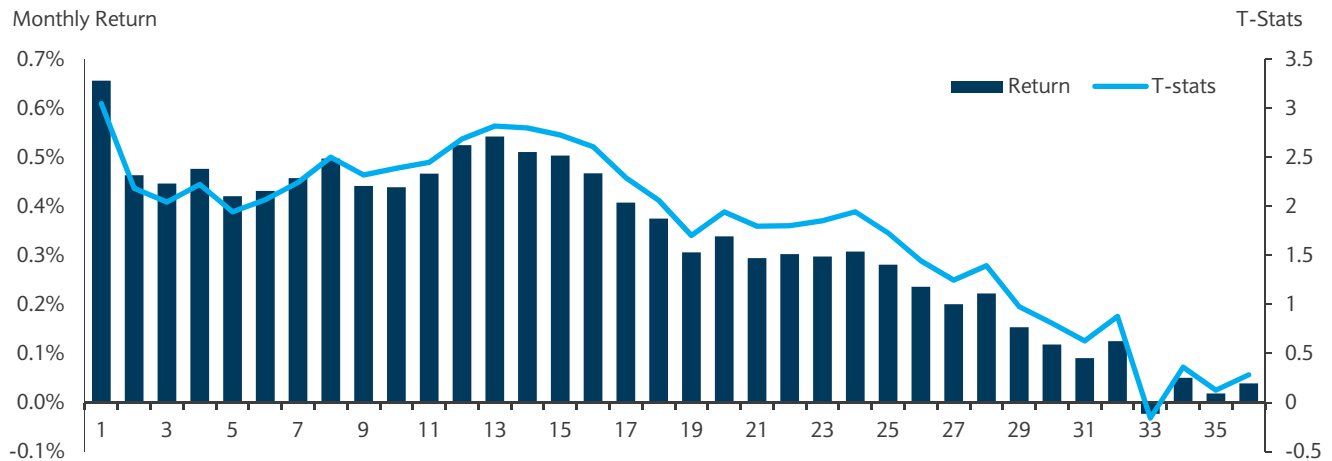


Monthly Q1-Q5 Returns

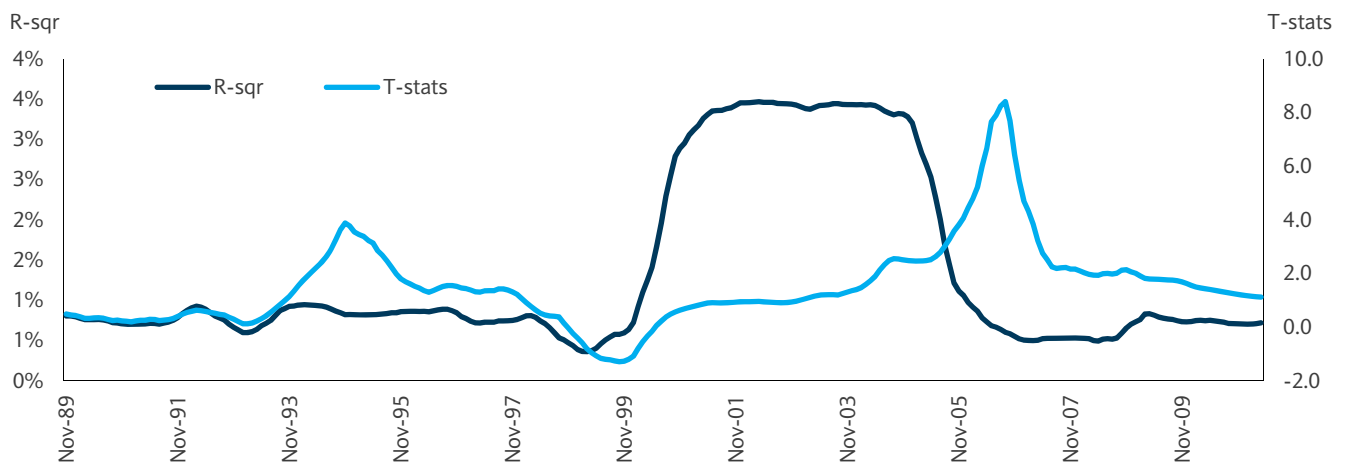


Source: Barclays Research

Q1-Q5 Return and T-stats Decay



Cross-Sectional R-sqr & Factor T-stats (60m MA)



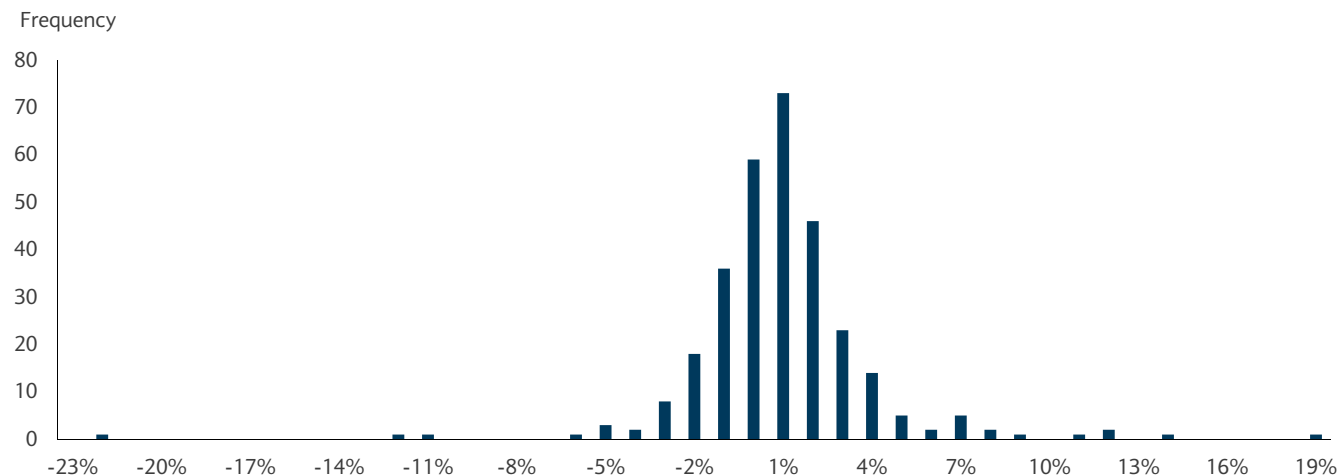
Distribution of Monthly Returns

			Return	in Stdev
Mean	0.4%	VaR 1%	-6.9%	(2.2)
Stdev	3.2%	VaR 5%	-3.1%	(1.0)
Skewness	-0.26	Max Drawdown	48%	15.2
Kurtosis	13.77			

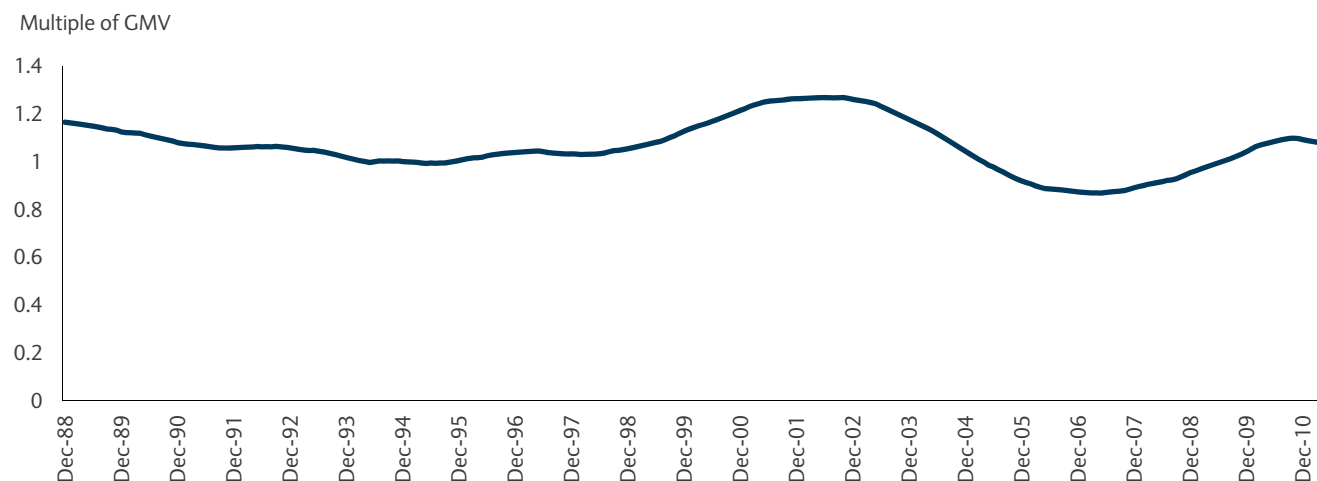
	Corr Market	Beta Market	Corr VIX
Full Period	-0.11	-0.08	0.06
Up Market	-0.08	-0.08	0.11
Down Market	-0.07	-0.09	-0.02

Source: Barclays Research

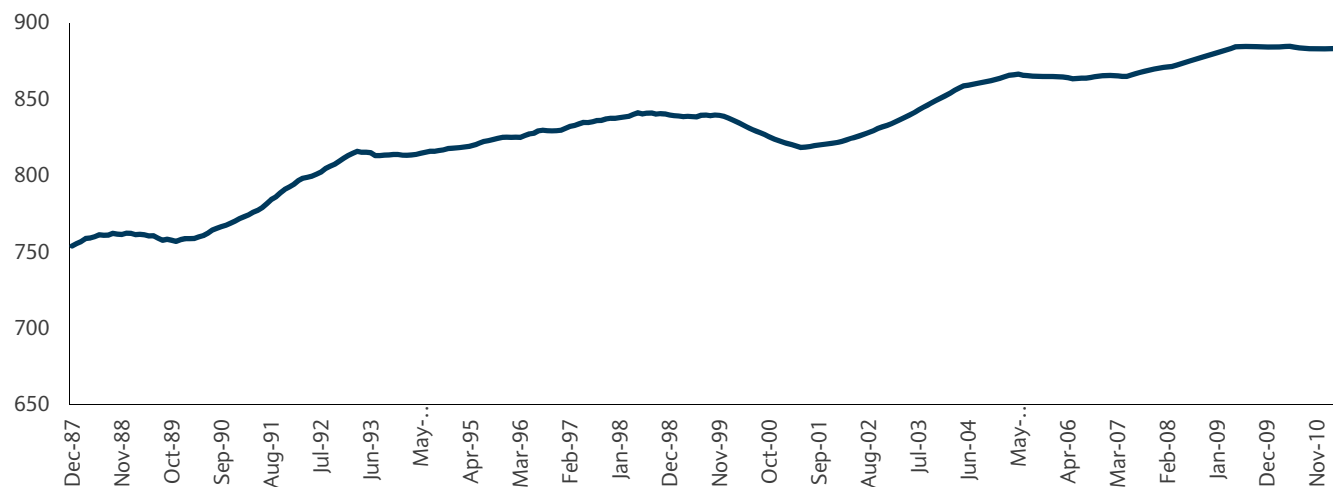
Distribution of Monthly Returns



Monthly Turnover (36m MA)



Variable Coverage (36m MA)



Source: Barclays Research

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