

Sectors Unchained II

Industry Selection Model - Capturing Alpha

This is our second in a series of reports on industry/sector selection. This report introduces a new industry/sector selection model consisting of three complementary approaches: Bottom-Up, Lateral, and Top-Down. In our opinion, the main advantage of taking a multi-faceted approach is that it allows us to combine different types of information that drive industry returns in a consistent and coherent manner.

The Bottom-Up Factors are applications of traditional stock selection drivers (Valuation, Growth, Quality, etc.) extended to portfolios of stocks that share industry membership. The Lateral Factors, a term we coined, exploit intra-industry Fundamental and Technical stock distribution characteristics to predict forward industry performance. The Top-Down Factors use a regression approach to link macroeconomic variables to forward industry returns.

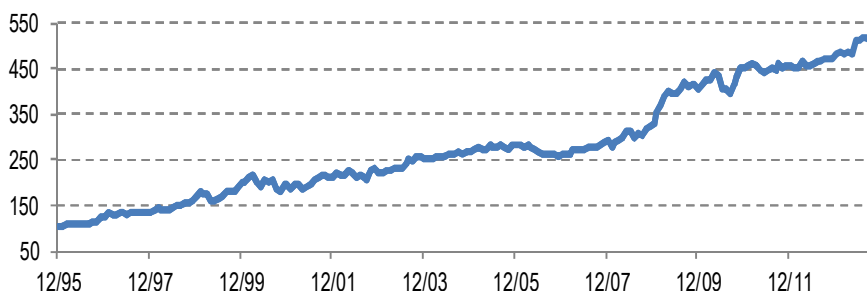
The long/short Industry Model yielded an Information Ratio (IR) of 0.95 over close to 20 years of history (1995-2013), exhibiting consistent performance (hit rate of 61%), strong Information Coefficient (IC) of 9.0%, and relatively low turnover.

In addition, the industry model has appealing properties—low correlation with equity and fixed income markets, low correlation to traditional equity styles/factors, and long volatility bias—in sum, making it an attractive overlay to traditional stock selection strategies that often struggle during risk-averse periods.

Conceptually, in our opinion, it is more efficient to express views at the Industry Group Level (GICS II) due to greater differentiation of asset characteristics. However, this investment approach is also almost equally effective at expressing views at the Sector Level (GICS I), yielding an IR of 0.84 and IC of 10.7%.

Lastly, sensitivity analysis suggests that the Industry Model exhibits relatively stable alpha decay over 1-, 3-, and 6-month investment horizons, and is relatively robust to the number of industries included in the long/short portfolios.

S&P 500 Industry Model—Cumulative Returns (IR = 0.95)



Source: J.P. Morgan Quantitative and Derivative Strategy, S&P.

Global Quantitative Strategy

Dubravko Lakos-Bujas ^{AC}
(1-212) 622-3601
dubravko.lakos-bujas@jpmorgan.com
J.P. Morgan Securities LLC

Sang H Han ^{AC}
(1-212) 622-6424
sang.h.han@jpmorgan.com
J.P. Morgan Securities LLC

Robert Smith
(852) 2800 8569
robert.z.smith@jpmorgan.com
J.P. Morgan Securities (Asia Pacific) Limited

Viquar Shaikh
(44-20) 7134-5908
viquar.x.shaikh@jpmorgan.com
J.P. Morgan Securities plc

Berowne Hlavaty
(61-2) 9003-8602
berowne.d.hlavaty@jpmorgan.com
J.P. Morgan Securities Australia Limited

Vivek G Shah
(91-22) 6157-3308
vivek.g.shah@jpmorgan.com
J.P. Morgan India Private Limited

Angelo Pessararis
(44-20) 7134-5907
angelo.pessararis@jpmorgan.com
J.P. Morgan Securities plc

Christopher Ma
(852) 2800-8530
christopher.x.ma@jpmorgan.com
J.P. Morgan Securities (Asia Pacific) Limited

Michiro Naito
(81-3) 6736-1352
michiro.naito@jpmorgan.com
JPMorgan Securities Japan Co., Ltd.

Global Head of Quantitative and Derivatives Strategy

Marko Kolanovic
(1-212) 272-1438
marko.kolanovic@jpmorgan.com
J.P. Morgan Securities LLC

See page 50 for analyst certification and important disclosures, including non-US analyst disclosures.

J.P. Morgan does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision.

Table of Contents

| | |
|---|-----------|
| Industry Alpha Building Blocks | 3 |
| Bottom-Up: Selected Equity Factors | 7 |
| Summary of Bottom-Up Factors | 10 |
| Mid-Level: Lateral Drivers | 11 |
| Volatility Skew | 13 |
| Momentum with Traded Value Spread (MTV Spread) | 16 |
| Risk Concentration | 19 |
| Profit Skew | 23 |
| Top-Down: Macro Factors | 25 |
| Summary of Top-Down Factors | 27 |
| Sensitivity to Portfolio Size and Rebalance Frequency | 30 |
| Future Research | 32 |
| Appendix | 34 |
| A: Exposure of Industry Factors to Market Returns and Styles | 34 |
| B: Correlation Matrix of Industry Factors | 35 |
| C: Bottom-Up Factors—Performance Summary | 36 |
| D: Top-Down Factors — Performance Summary | 40 |
| E: Top-Down Macro Heat Map (7/1993-10/2013) | 42 |
| F: Sector GICS Level I Model—Using Same Factors as the Industry Model | 49 |

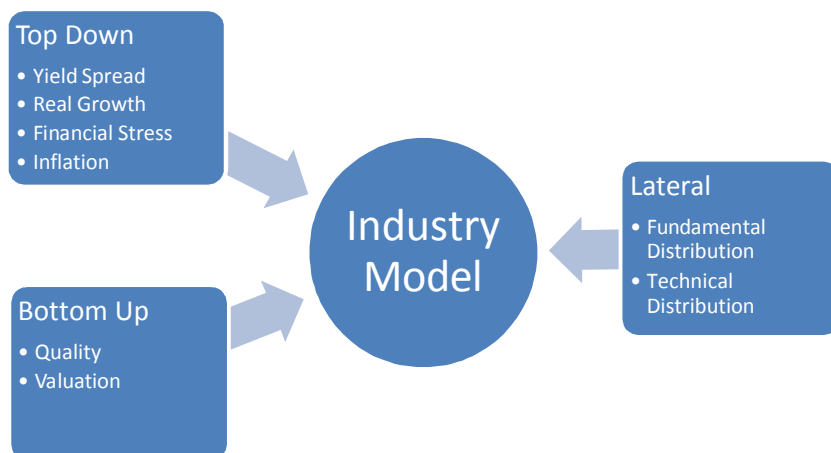
Industry Alpha Building Blocks

Introducing a new industry alpha model consisting of three blocks: Bottom-Up, Lateral, and Top-Down. Each block in turn is built using elemental factors like Aggregate Valuation and Quality, Cross-Sectional Distribution of Fundamental and Technical Variables, and Macroeconomic Indicators like Yield, Growth, and Inflation.

This is our second report on modeling industry/sector selection.¹ In the first report² our focus was on the changing importance of industries in explaining stock returns over time—essentially we made the case for industry selection. As we noted, the share of industry-specific idiosyncratic variation has been relatively stable over the last 20 years, accounting for 21% of total stock variation. Stock-specific idiosyncratic variation accounted for the largest share, representing 54% of total variation, but its share has been on a declining trend with the exception of the most recent history. By contrast, contribution of market variation, averaging 25%, has been rising. We also presented alternate ways of examining co-movement among industries and cohesiveness within industries, which may have implications for alpha generation, portfolio construction, and risk management. We plan to address risk management and portfolio construction in a subsequent study. This report’s attention is on alpha generation. Our asset universe is primarily GICS Level 2 Industry Group and Level 1 Sectors, which remains the most common classifications for investors. Like many of the clients we met in the past several months, we suspect there might be more efficient ways to combine stocks into “industry-like” buckets to build more robust portfolios. We plan to cover that topic in the future.

Figure 1 shows the high-level map of the structure of our US Industry model. The rest of the report systematically covers the rationale and the details of the building blocks of this structure.

Figure 1: DNA Map of the Industry Model



Source: J.P. Morgan Quantitative and Derivatives Strategies.

There are three primary building blocks to our model: Bottom-Up Factors, Lateral Factors, and Top-Down Factors. Each primary block in turn consists of two or more sub-blocks made of conceptually similar factors. The rationale underlying this approach is to combine factors that have *long-term* predictive power for the relative

¹ The authors wish to thank Narendra Singh of J.P. Morgan Securities LLC, member of the US Quantitative Strategy team, for his invaluable contribution to this report.

² See our report, [Sectors Unchained: Building a Case for Sector and Industry Selection](#), Lakos-Bujas et al., May 2013.

performance of industry returns while at the same time exhibiting low long-term correlations among themselves. Hence while no single factor may provide robust enough prediction of the cross-section of industry returns, the composite model is designed to present more consistent prediction in the short term.

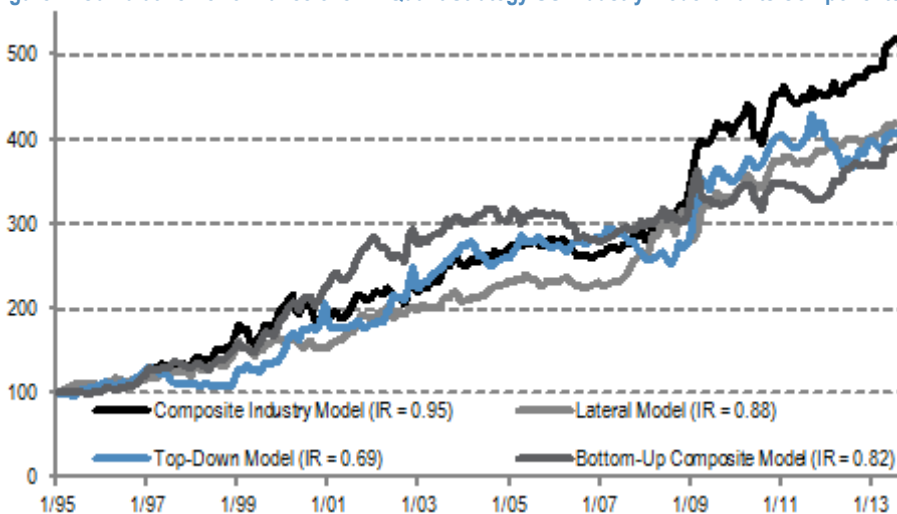
The main advantage of taking a block approach is that it allows us to combine different types of information that drive industry returns in a consistent and coherent manner.

In our opinion, the main advantage of taking a block approach is that it allows us to combine different types of information that drive industry returns in a consistent and coherent manner. The Bottom-Up Factors are applications of the traditional stock selection methodology extended to portfolios of stocks that share industry membership. The Lateral Factors, a term we coined, exploit intra-industry fundamental and technical stock distribution characteristics to predict forward industry performance. Finally, the Top-Down Factors use regression of relative returns on macroeconomic variables to predict the expected forward industry returns.

The IR of the S&P500 Composite Industry Model (GICS Level 2) 1995-2013 is 0.95.

Figure 2 presents the hypothetical performance of the long-short portfolios of the three primary blocks and the composite model as applied to GICS Level 2 S&P500 Industry Groups. The IR of the long-short portfolio of the composite model over the entire back-test period is 0.95 while the IR of the three underlying blocks ranges between 0.69 and 0.88.

Figure 2: Cumulative Performance of JPM Quant Strategy US Industry Model and Its Components



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

The hypothetical long-short portfolios are constructed in the following manner: a *given factor* ranks the 24 industry groups into three buckets, with eight industry groups in each bucket. It is assumed that every month an equal amount of capital (one-eighth of the bucket allocation) is invested in each industry within the bucket. In other words, we do not exploit any size information the factor might carry. The top bucket of the eight most favored industry groups makes up the long portfolio and the bottom bucket of the eight least liked industry groups forms the short portfolio. The choice of splitting the portfolio into three equal parts has the following rationale—we want to have enough assets in a bucket to allow for *cancelation of idiosyncratic returns* (not related to the factor) while at the same time sharpening the alpha by choosing assets corresponding to the *relatively significant* value of the factor. These are opposing goals. Given just 24 assets, one could go long top two and short bottom two to attain a sharp extraction of alpha or one could go long top 12 and short bottom

twelve to minimize 12 noise. While this choice will be difficult to resolve empirically, we have chosen to heuristically compromise by selecting top eight and bottom eight industry groups to form our long/short portfolio. A later section of the report summarizes the model performance sensitivities to portfolio size.

The Composite Industry Model is a result of three levels of aggregation: from elemental factors to sub-blocks, next to three primary blocks, and lastly to the composite model.

In the next stage, *composite sub-block* buckets (for example, Bottom-Up Quality and Bottom-Up Valuation) are built applying equal weights to the elemental factors that constitute the sub-block. Next, by applying appropriate weights to holdings of sub-blocks, new weights for industry groups are calculated for each *composite* block (Bottom-Up, Lateral, and Top-Down). Industry groups are ranked again and equal allocation is made to construct the block's long and short portfolios. Finally, the industry composite bucket is constructed applying 40% weights to Bottom-Up and Lateral buckets each and 20% weight to Top-Down bucket. A naïve approach to weighting would be to equal-weight the buckets, but we decided to assign lower weight to the Top-Down Bucket because of its narrower breadth for purposes of this analysis. We have assumed zero transaction cost.

Table 1: Composite Industry Model: Back-Test Performance Statistics (1/1995 to 10/2013)

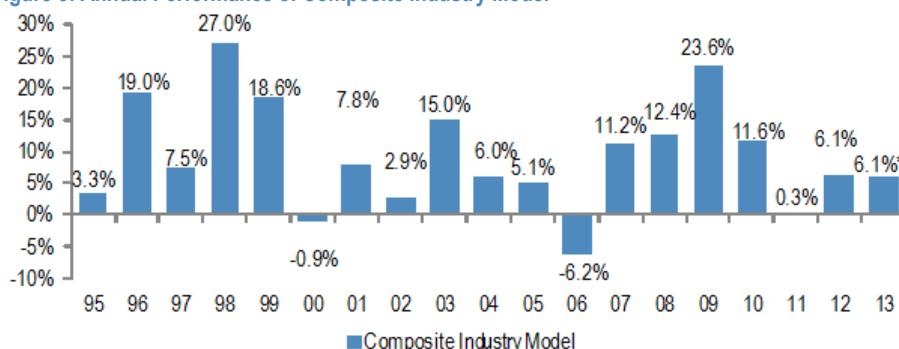
| Factor | Avg. IC | T-Stat | Hit Rate | Turnover | IR | L/S Avg. Ret | L/S Stdev. | Long Avg. Ret | Short Avg. Ret |
|---------------------------------|-------------|-------------|------------|------------|-------------|--------------|--------------|---------------|----------------|
| Composite Industry Model | 9.0% | 3.95 | 61% | 20% | 0.95 | 0.77% | 2.92% | 1.21% | 0.44% |
| Bottom-Up Model (40%) | 5.6% | 3.56 | 58% | 15% | 0.82 | 0.65% | 2.72% | 1.14% | 0.50% |
| Lateral Model (40%) | 6.3% | 3.87 | 61% | 22% | 0.88 | 0.67% | 2.58% | 1.13% | 0.47% |
| Top-Down Model (20%) | 5.0% | 3.13 | 59% | 33% | 0.69 | 0.68% | 3.24% | 1.08% | 0.41% |

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Table 1 summarizes the performance of the Composite Industry Portfolios. The payoff structure of the model (average monthly returns and annual compounded returns) is desirable with a monotonic increase in return as we move from least desirable industry groups to most favored industry groups. The average IC of 9.0% is substantially higher than that of the individual blocks. The Bottom-Up and Lateral Models have smaller volatility vs. the Top-Down Model, which has both higher volatility and turnover. The Top-Down Model is based on a regression approach, and we have not applied any constraints to reduce the turnover. The average monthly return of the Composite Model (0.77%) exceeds the weighted sum of returns (0.66%).

Figure 3: Annual Performance of Composite Industry Model



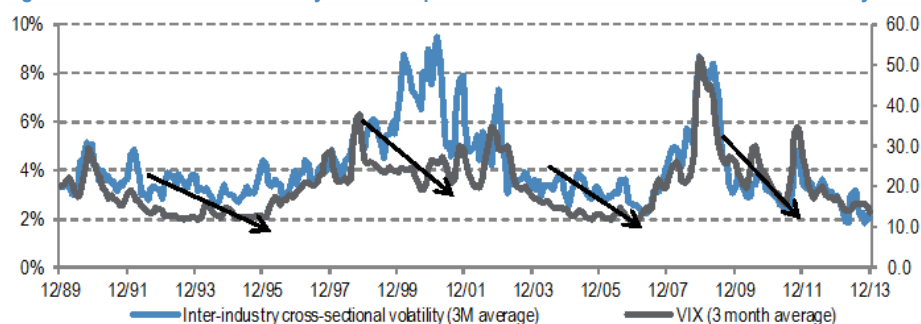
Source: Bloomberg, Factset, J.P. Morgan Quantitative and Derivatives Strategies. Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

* Covers data till Oct 31, 2013.

An interesting aspect of the Composite Industry Model is its long volatility feature—it does better, on average, when market volatility is high.

A closer look at the annual performance of the industry model highlights an interesting aspect of the model. Some of the least profitable years of the model including 1995, 2000, 2002, 2006, and 2011 share a common feature (see Figure 3). A notable characteristic of these periods is that the cross-sectional industry returns spread was narrowing and was bottoming in these years as was the CBOE's VIX Index (except 2000, see Figure 4). Conversely, some of the best years for the model would have been those when the cross-sectional returns spread was the widest, like 1998-99 and 2008-09. Ideally, the model would work best when cross-sectional spread is high but not too extreme (cross-sectional dispersion is in the top 60% to 80% range). This particular aspect of the model is also evident in the Bottom-Up and Top-Down blocks as we will see later.

Figure 4: Cross-Sectional Industry Returns Spread Narrowed in 2004-2007 and Also Recently

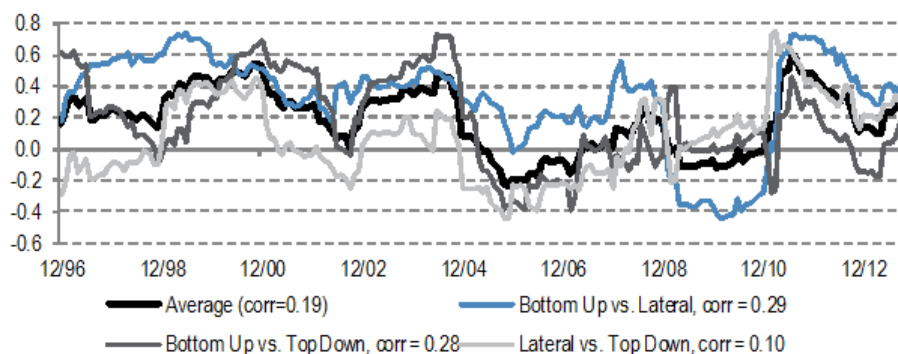


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

While primary building blocks of the sector model are positively correlated, the average correlation of 0.2 is not very high, providing good diversification benefits.

Next, turning to the correlation among blocks, the average of the three pair-wise correlations would have been about 0.2 over the whole period (Figure 5). However, at times the average inter-correlation would have been high, hovering in the 0.4 to 0.6 range. For instance, in 1999-2000 and 2003-2004, high average correlation of block performance would have coincided with a strong equity market. However, during the strong equity market recovery in 2009-2010, the correlation among blocks would have been relatively low. In other words, there is no simple way of predicting when the correlation among the blocks may rise. Nonetheless, it is comforting that periods of high correlation would not necessarily coincide with poor market performance; in fact, ideally we would especially like the model to be diversified in those periods.

Figure 5: Pair-Wise 2-Year Rolling Correlations of Industry Model Blocks

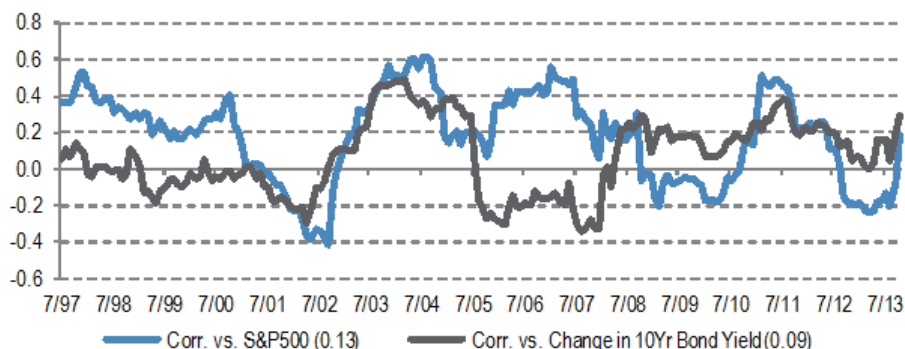


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Lastly, we examine the exposure of the Industry Model to some standard asset classes and styles. In particular, we calculate the rolling two-year correlation of

Industry Model returns on S&P 500 returns and the change in 10-year US Government Bond Yield (see Figure 6). The average correlation with both the equity and bond market movement would have been fairly low, though at times the correlation would have been as high as 0.6 and as low as -0.4. In the Appendix, we present a table with correlations of all the elemental factors and composites relative to the equity and bond markets as well as to selected style returns like Composite Value, Composite Growth, and Composite Quality, etc.

Figure 6: Correlation of Composite Industry Model to Equity and Bond Returns



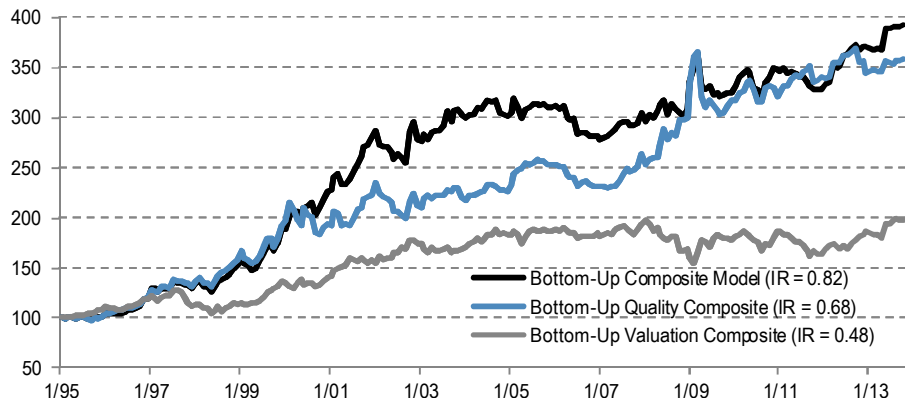
Source: Bloomberg, FactSet, S&P, J.P. Morgan Quantitative and Derivatives Strategies.

Bottom-Up: Selected Equity Factors

The Bottom-Up Model consists of two sub-blocks—Quality and Valuation. IR for the Bottom-Up Model is 0.82.

In this section we present the analysis of the Composite Bottom-Up Industry Model. There are two sub-blocks to the model—Quality and Valuation. Given the smaller number of factors in the Valuation Block we assign it 40% weight while giving the Quality Block 60% weight. To some extent these weights are arbitrary, other than reflecting the relative “size” of information driving industry selection. We have not tried to optimize the weights to maximize the model information ratio—we think that optimization is best covered in a broader context that involves all factors that go into the composite industry model and should, if possible, include turnover and transaction costs. Figure 7 shows the hypothetical performance of the composite Bottom-Up model and the two Blocks underlying the composite.

Figure 7: Bottom-Up Industry Model: Quality is the Main Driver of Performance



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

The Quality Block consists of four factors: Free Cash Flow to Invested Capital, Current Accruals, Altman-Z, and Capex to Depreciation ratio trend. Each factor carries equal weight in the aggregation. The Valuation Block is composed of two factors: Free Cash Flow Yield and Forward Sales Yield. The number of companies with Forward Sales data was too small prior to Jan 2003, so prior to that the Valuation Block is solely composed of Free Cash Flow Yield

Efficacy of many stock selection factors withers once stocks are aggregated to industry/sector portfolios. A loss of diversification due to small number of assets and the disappearance of intra-industry alpha opportunities are the two key reasons.

While examining the full suite of stock selection factors we have found some factors for which alphas appear to be durable regardless of the level of aggregation. The inescapable empirical truth is that a majority of factors lose efficacy when securities are aggregated to a less granular level. We believe that the key reasons behind this phenomenon are 1) a loss of diversification in trades as the number of assets traded is much smaller and 2) a loss of opportunity to make relative plays within groups. For instance, a decile-based portfolio of S&P 500 provides about 50 names for each long and short basket; however, the tercile portfolios of GICS Level 2 industries consists of a mere eight industry groups in each basket. Thus there is a smaller likelihood of idiosyncratic components canceling out. Furthermore, potential relative trades between, let us say, Utilities stocks, are not feasible anymore. These issues are more pronounced as we move up the aggregation from Level 2 to Level 1.

At a deeper level, the bottom-up aggregation approach to industry selection assumes that the premium earned for exposure to a factor coalesces in industry portfolios. For instance, if forward P/E works as a stock selection factor, for it to work at an industry level would require the distribution of low- and high-forward P/E stocks to be concentrated in distinct pre-determined industry portfolios. That would ensure that the spread of the average value of the characteristic (e.g., forward P/E) is large enough to earn factor premium. It is interesting that three of the seven bottom-up factors directly or indirectly relate to cash flow (FCF Yield, FCF/IC, and Current Accruals). This suggests that it is likely that cash flow, more than reported or projected earnings, matters in investors' inter-industry comparison.

Table 2 summarizes the essential back-test statistics for the Bottom-Up Model and its Blocks. Since both Quality and Valuation are slow moving, the Bottom-Up Block has relatively low turnover. For sector selection, Quality would have had slightly better performance compared to Valuation, which has a lower number of signals.

Table 2: Bottom-Up Industry Model: Back Test Performance Statistics (1995-2013)

| Factor | Avg. IC | T-Stat | Hit Rate | Turnover | IR | L/S Avg. Ret | L/S Stdev. | Long Avg. Ret | Short Avg. Ret |
|----------------------------|-------------|-------------|------------|------------|-------------|--------------|--------------|---------------|----------------|
| Bottom-Up Composite | 5.6% | 3.56 | 58% | 15% | 0.82 | 0.65% | 2.72% | 1.14% | 0.50% |
| Bottom-Up Valuation | 2.9% | 2.07 | 55% | 8% | 0.48 | 0.33% | 2.40% | 0.95% | 0.62% |
| Bottom-Up Quality | 5.1% | 3.09 | 60% | 14% | 0.68 | 0.61% | 2.98% | 1.17% | 0.56% |

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

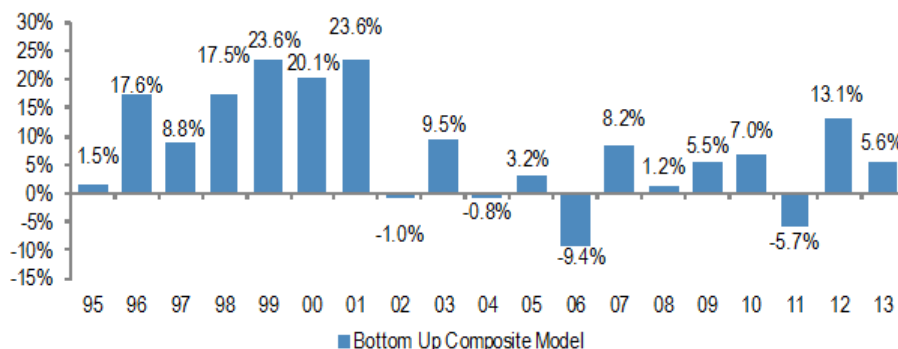
Quality and Valuation blocks complement each other due to low correlation. The 0.82 IR of the Bottom-Up Model far exceeds the IR of 0.48 for the underlying Valuation Block and IR of 0.68 for the underlying Quality Block.

The Quality and Valuation blocks complement each other nicely. A case in point is the recent financial crisis. While the composite model would have struggled in 2008 its performance would have been much worse had Quality Block not offset the effect of the Valuation Block. The Quality Block's large hypothetical gain in 2008 was due to its short position in industries that came under stress during the crisis. For instance, in May 2008 the Quality Block model would have recommended short positions in Banks, Divs. Financials, Real Estate, Utilities, Media, Telecom, Insurance, and Materials and long positions in Tech Hardware, Consumer Servs.,

HealthCare & Equip., Cons. Durables, Semis, Energy, Retailing, and Food Staples Retailing. The signal would have given up some of these gains after March 2009 as the financial sector rallied even though the Quality signal expressed misgivings about the prospects for the sector. Conversely, while Valuation Block would have struggled in 2008, it would have made a decent recovery in 2009 and 2010. The net result would have been a flat performance in 2008 and fairly strong performance of the composite Bottom-Up Model in 2009 and 2010.

Like the Composite Industry Model, we dug a bit deeper into the annual performance of the Bottom-Up Model and found similar relationship between the performance and cross-sectional dispersion of industry group returns. Figure 8 shows that the Bottom-Up model would have had muted performance in 2004 to 2006 and 2011, years when the industry returns spreads were relatively low. The correlation between the industry spread and the model performance is not perfect (see Figure 9) since the model would not have done well in years like 2002 and 2008 when Valuation in general did not work even though the industry returns spread was fairly large. Clearly, when large extraneous effects like accounting scandals (2002) and financial crises (2008) dominate, the valuation measures we have chosen are wanting.

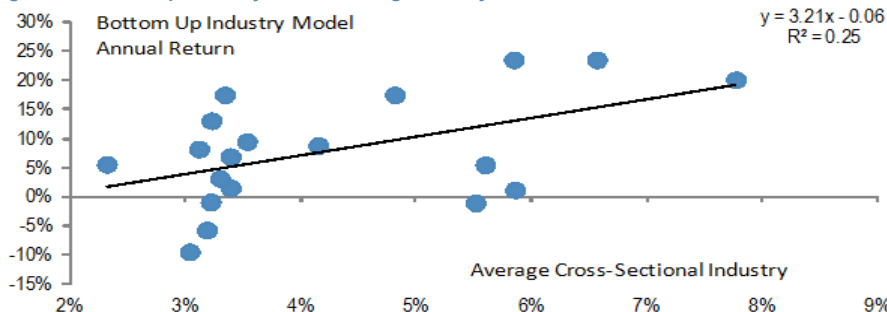
Figure 8: Annual Performance of Bottom-Up Industry Model



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
 Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

The Bottom-Up Composite Model also contributes to the Composite Industry Model in part through its overall long volatility exposure, which acts as a nice diversifier.

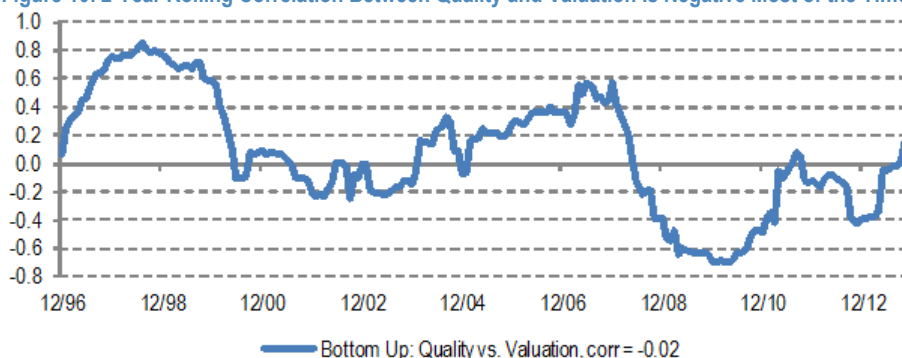
Figure 9: Bottom-Up Industry Model Is Long Volatility



Source: Bloomberg, Factset, J.P. Morgan Quantitative and Derivatives Strategies.
 Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

As mentioned above, there is a strong complementary relationship between the Quality and Valuation blocks of the model. As Figure 10 shows, the two-year rolling correlation between the two would have been negative most of the time except for a period in late 1990s when both factors would have done well.

Figure 10: 2-Year Rolling Correlation Between Quality and Valuation Is Negative Most of the Time

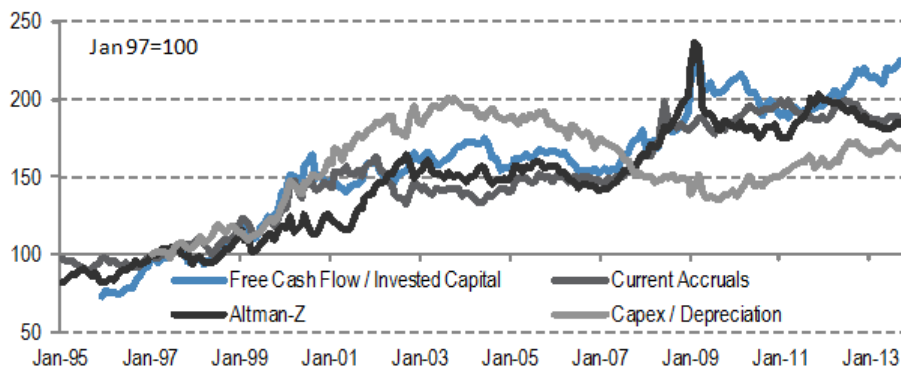


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Summary of Bottom-Up Factors

The factors used in constructing the Bottom-Up Block are well known and studied. In this section, for completeness, we graph their performance (Figures 11 and 12) and provide a summary of back-test statistics (Table 3). Readers looking for more details on individual factors can find them in the Appendix of this report.

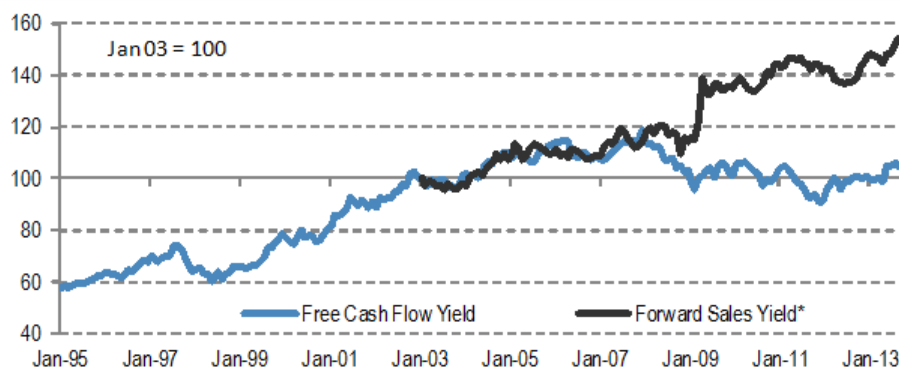
Figure 11: Bottom-Up Quality Factors' Performance: A Diversified Group of Signals



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Figure 12: Bottom-Up Valuation Factors' Performance: Free Cash Flow Yield, Forward Sales Yield



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

* We use Forward Sales Yield from 2003 onwards; prior to that, the number of companies with forward sales projections is small.

Table 3: Bottom-Up Factors: Back-Test Performance Summary (1995-2013)

| | Avg. IC | T-Stat | Hit Rate | Turnover | IR | L/S Avg. Ret | L/S Stdev. | Long Avg. Ret | Short Avg. Ret |
|--|---------|--------|----------|----------|------|--------------|------------|---------------|----------------|
| Bottom-Up Composite | 5.6% | 3.56 | 58% | 15% | 0.82 | 0.65% | 2.72% | 1.14% | 0.50% |
| Bottom-Up Quality Composite | 5.1% | 3.09 | 60% | 14% | 0.68 | 0.61% | 2.98% | 1.17% | 0.56% |
| Free Cash Flow / Invested Capital [^] | 4.9% | 2.92 | 57% | 22% | 0.66 | 0.56% | 2.82% | 0.96% | 0.39% |
| Current Accruals | 2.3% | 2.03 | 54% | 16% | 0.44 | 0.32% | 2.39% | 0.90% | 0.57% |
| Altman-Z | 3.1% | 2.10 | 53% | 2% | 0.44 | 0.41% | 2.90% | 1.06% | 0.65% |
| Capex / Depreciation ^{^^} | 0.9% | 1.67 | 53% | 9% | 0.41 | 0.29% | 2.43% | 0.75% | 0.47% |
| Bottom-Up Valuation Composite | 2.9% | 2.07 | 55% | 8% | 0.48 | 0.33% | 2.40% | 0.95% | 0.62% |
| Free Cash Flow Yield | 2.1% | 1.96 | 56% | 9% | 0.42 | 0.29% | 2.20% | 0.96% | 0.67% |
| Forward Sales Yield ^{^^^} | 1.1% | 1.85 | 53% | 4% | 0.57 | 0.37% | 2.26% | 0.90% | 0.53% |

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

[^]FCF/IC data starts in Dec 1995; ^{^^}Capex/Depreciation data is from Jan 1997; ^{^^^}Forward Sales Yield data is from Jan 2003. All the other data is from Jan 1995. The end-point for all series is Oct 2013.

Mid-Level: Lateral Drivers

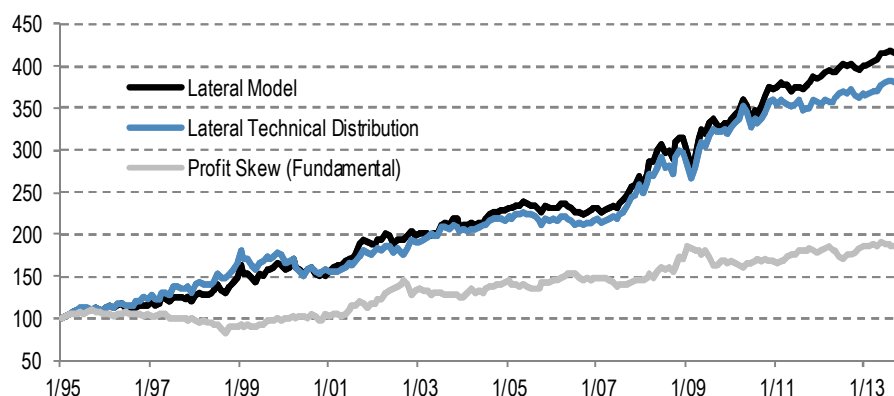
Lateral drivers use cross-sectional stock distribution characteristics (fundamental and technical) within a sector/industry group to construct scores that are predictive for relative industry trades.

So far we have investigated bottom-up drivers of performance, i.e., whether the effectiveness of factors at security level persists at sector/industry group level. In this section we suggest an alternate approach for using stock level information for sector or industry selection. Unlike a typical style approach where we construct portfolios from the bottom up, our current problem is that we are given pre-determined portfolios whose stocks share common sector or industry membership but may not necessarily share other characteristics. In this section we use cross-sectional stock distribution characteristics (fundamental and technical) within a sector/industry group and construct scores that are predictive for relative industry trades. We suggest a neologism for factors thus created—Lateral Factors.

In the remainder of this section we first cover the performance of the Lateral Composite Model followed by a discussion of the four factors: Volatility Skew, Momentum with Traded Value Spread, Risk Concentration, and Profit Skew. We go

into some details with these factors since these are fairly distinct from many bottom-up factors we have discussed in the past.

Figure 13: Performance of Lateral Industry Model: Technical Factors Are More Effective



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Figure 13 and Table 4 show the combined hypothetical performance of Lateral Technical Distribution (60% weight) and Lateral Fundamental Distribution (40% weight) composites. The Technical Distribution block is composed of three factors and is more diversified while the Fundamental Distribution has just one factor (Profit Skew).

Table 4: Lateral Industry Model: Back Test Performance Statistics

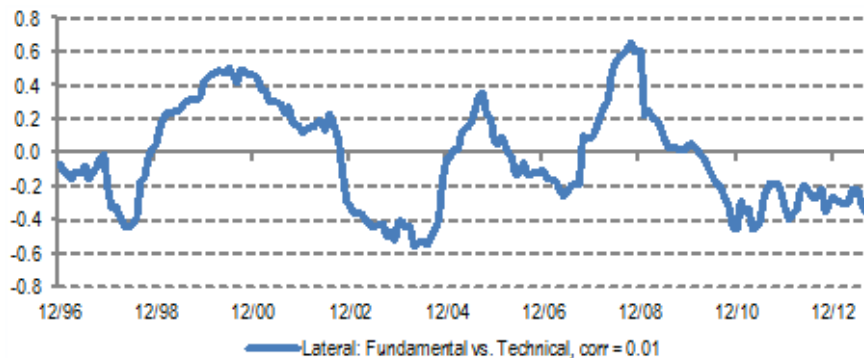
| Factor | Avg. IC | T-Stat | Hit Rate | Turnover | IR | L/S Avg. Ret | L/S Stdev. | Long Avg. Ret | Short Avg. Ret |
|---------------------------------------|-------------|-------------|------------|------------|-------------|--------------|--------------|---------------|----------------|
| Lateral Model | 6.3% | 3.87 | 61% | 23% | 0.88 | 0.67% | 2.58% | 1.13% | 0.47% |
| Lateral Technical Distribution | 6.1% | 3.58 | 59% | 22% | 0.81 | 0.63% | 2.62% | 1.17% | 0.54% |
| Volatility Skew | 3.9% | 2.05 | 57% | 16% | 0.44 | 0.34% | 2.49% | 1.01% | 0.66% |
| Momentum w/ Trade Val Spread | 5.2% | 3.51 | 62% | 27% | 0.79 | 0.66% | 2.82% | 1.13% | 0.47% |
| Risk Concentration | 2.8% | 2.03 | 55% | 17% | 0.47 | 0.42% | 2.85% | 0.78% | 0.36% |
| Lateral Fundamental (ROE Skew) | 3.0% | 1.87 | 58% | 12% | 0.39 | 0.31% | 2.52% | 0.93% | 0.62% |

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

However, there is a strong diversification benefit in inclusion of the Fundamental factor. Figure 14 shows that on average the correlation between the two blocks is close to 0.

Figure 14: Average 2-Year Rolling Correlation Between Lateral Fundamental and Technical Distribution Factors Is Close to Zero



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Volatility Skew

An increase in the cross-sectional skew of volatility of stocks within an industry is an indicator of rising “uncertainty” in the industry.

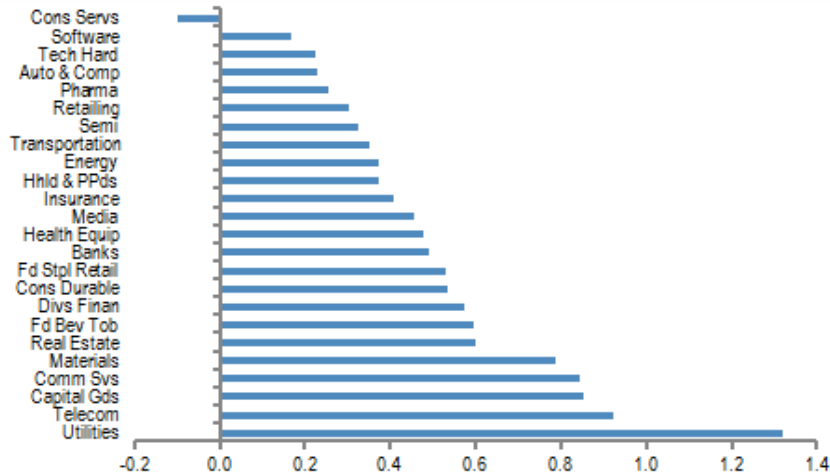
The basic thesis behind the Volatility Skew strategy is that if a sector or industry exhibits higher positive (negative) skew in risk, it might potentially have become a more (less) “uncertain” sector to invest in. For a stock, risk or volatility was defined as six-month standard deviation of daily returns. One potential cause of volatility skew is due to a small group of stocks showing extremely high volatility, causing fat tail in the right-hand side of the volatility distribution. Subsequently, either these stocks mean-revert back to more normal volatility levels or other stocks from the same sector follow suit. Our hypothesis is that investors react negatively over time to this type of uncertainty.

Interestingly, some of the low volatility industry groups like Utilities have the highest average volatility skew.

The rising uncertainty information is probably not readily apparent in the first (mean) or the second (standard deviation) moments of the volatility distribution but is captured by the third moment. Using volatility distribution as a trading signal in this manner is reminiscent of a low volatility strategy used for stock selection except that we are using the lateral behavior of stocks belonging to an industry portfolio in constructing the signal.³ Indeed, if one compares the average skew of volatilities over the entire sample, two industries with the largest skew are defensive—Utilities and Telecom—and with the exception of Pharmaceuticals and Household Products, all defensives are in the top half of ranked skew (see Figure 15).

³ For an in-depth broader discussion of using Volatility as a trading signal and in other related strategies, please see our team’s report [Systematic Strategies Across Asset Classes: Risk Factor Approach to Investing and Portfolio Management](#), Kolanovic, Wei et al, 2013 (pg. 44)

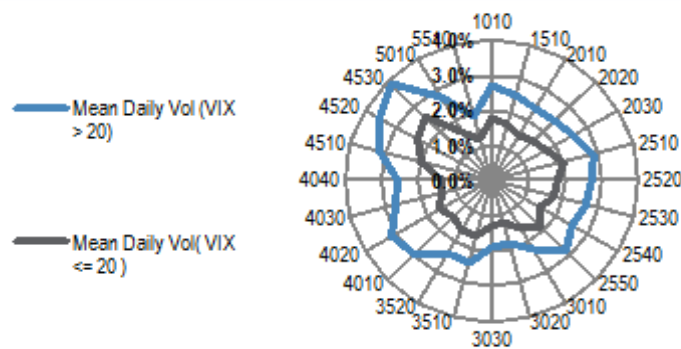
Figure 15: Average Skew of the Distribution of Volatility of Stocks, by Industry Group (1995-2013)



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Taking a deeper dive into the *distribution of stock volatility* within the industries, we next compare the behavior of the moments, namely, average (mean), volatility (standard deviation), and the skew of stock volatilities. We look at these moments in two regimes defined by VIX: VIX below 20 (low market volatility) and VIX above 20 (high market volatility).

Figure 16: GICS Level 2 Mean Daily Volatility (1995-2013)⁴



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

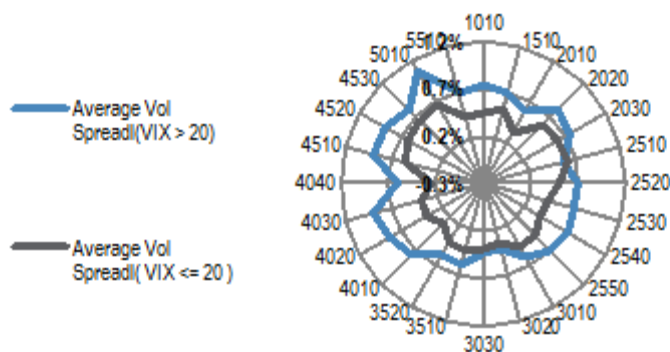
Figure 16 above uses a spider chart to illustrate daily mean volatility across the 24 industry groups. With the exception of the tech sector (4510, 4520, 4530), the overall level is similar across industries during the low volatility period, ranging from 1.2% to 2.6% (1.6% to 2.0% if we exclude the tech sector). This range increases to between 1.8% and 3.9% during the high VIX period with the utility industry group (5510) displaying the lowest average volatility in both periods.

⁴ Key to Industry Group Names: 1010 = Energy, 1510 = Materials, 2010 = Capital Gds, 2020 = Comm. Svs, 2030 = Transportation, 2510 = Auto & Comp, 2520 = Cons Durable, 2530 = Cons Servs, 2540 = Media, 2550 = Retailing, 3010 = Fd Stpl Retail, 3020 = Fd Bev Tob, 3030 = Hhld & PPds, 3510 = Health Equip, 3520 = Pharma, 4010 = Banks, 4020 = Divs Finan, 4030 = Insurance, 4040 = Real Estate, 4510 = Software, 4520 = Tech Hard, 4530 = Semi, 5010 = Telecom, 5510 = Utilities.

The cross-sectional dispersion of stock volatilities rises when overall market volatility goes up.

We next look at the question: can low mean value of volatility of stocks within an industry mask large differences in stocks' risk within an industry? For instance, stocks in a sector displaying a high level of average volatility could nonetheless have that volatility confined within a tight band, i.e., low standard deviation. On the other hand, a large variation in stock volatility is possible within less risky sector. In general, though, we find that the industry groups with high average stock volatility levels also display higher historical volatility spreads; for instance, financial industry groups (4010, 4020, 4030, 4040) and tech industry groups (4510, 4520, 4530)—see Figure 17. On the other hand, the defensive sectors such as consumer staples (3010, 3020, and 3030) have shown some of the lowest volatility spreads.

Figure 17: GICS Level 2 Volatility of Cross-Sectional Volatilities[^]



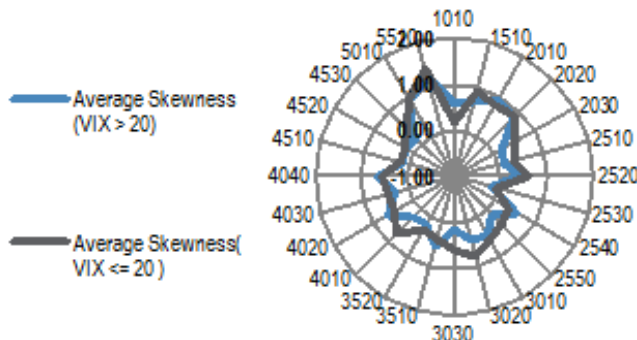
[^]Please see footnote 4 for the key to Industry Group names.
 Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Lastly, we examine skew (the basis of this trading signal) to understand its behavior under alternate VIX regimes. If a majority of stocks within the same industry group move together collectively and if their risk level rises up in parallel, skew of the volatility distribution will be somewhat constant since the whole distribution has moved upward. On the other hand, if a large enough subset of stocks within the industry group exhibit disproportionate relative increase in volatility, these outlier stocks create a positive skew. We believe, similar to the low volatility anomaly, that this type of uncertainty about the sector does not get rewarded by investors in subsequent periods. Over time this skew could dissipate either because the information diffuses into the larger population of stocks in the industry or the outliers revert to industry average. In sum, we dislike sectors/industry groups with higher levels of volatility skew due to the rationale stated above.

Surprisingly, cross-sectional skew of stock volatilities within an industry is invariant to overall market volatility.

Figure 18 shows skew distribution during both low and high market volatility periods. Unlike the previous examples, the technology sector actually shows relatively low levels of skew, whereas majority of industry groups within consumer staples (3020, 3030) and industrials (2010, 2020) along with Utilities, Banks, and Consumer Durables & Apparel, display higher skew levels. It is intriguing that there is little difference between the low VIX and high VIX regimes as far as volatility skew is concerned.

Figure 18: GICS Level 2 Skew of Cross-Sectional Volatilities^

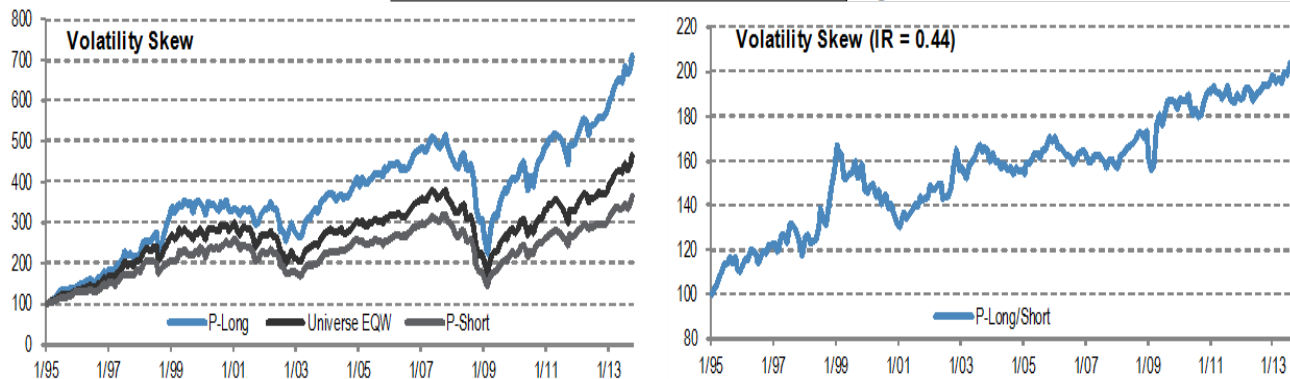


^Please see footnote 4 for the key to Industry Group names.
 Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Figure 19 presents the key statistics and performance summary of Volatility Skew industry signal.

Figure 19: Volatility Skew: Back-Test Statistics and Performance

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | |
|-------------------|----------------|---------------|--------------------|-----------------|--|----------------|---------------|--------------------|-------------|
| | | | | | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. |
| 1 | 1.0% | 11.0% | 5.1% | 57% | Long/Short L/S v Bnch | 0.3% | 3.78% | 2.5% | 57% |
| 2 | 0.7% | 7.0% | 4.9% | 43% | | | | | |
| 3 | 0.7% | 7.1% | 4.2% | 48% | | | | | |
| Total Test | | | | | Long/Short | T-Stat | IR | | |
| | Average Return | Rank IC | Avg IC | Avg # of Assets | | | | 2.05 | 0.44 |
| Universe | 0.8% | 3.2% | 3.9% | 24 | | | | | |



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
 Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Momentum with Traded Value Spread (MTV Spread)

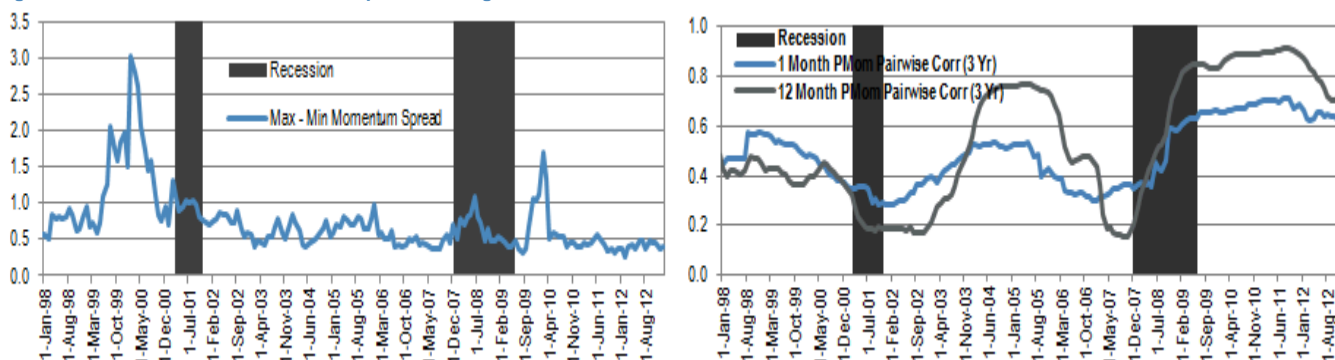
A new price momentum strategy for industries—using cross-sectional traded value to confirm price momentum trade.

In this section, we explore a technical factor based on a variation of the classic 12-month price momentum strategy. Although the price momentum factor has many attractive features, investors deploy it with caution due to well-known potential for large draw down, especially at market inflection points. As a result, many versions of momentum exist that incorporate features like short-term price reversal, a mixture of price momentum with different windows, embedded stop-loss, etc. For industry selection, we have created a strategy that relies on the interaction between 12-month price momentum and 12-month average daily traded value *except that it relies on the cross-sectional spread of traded value.*

Price momentum trading strategy for industries is challenging—the behavior of momentum was strikingly different around the past two recessions.

Before getting into the actual construction of the trading signal, we digress a little and make two observations on the challenges simple price momentum strategies face at the industry group level. One, we highlight the difference in price momentum of industries around the last two recessions. The dot-com bubble (1998-2001) definitely brought outright outperformance of the tech sector, pushing up the spread between the best and worst performing industries (see Figure 20, left chart). This inequality in performance was mitigated as the recession unfolded and the tech sector underperformed hugely. Interestingly, this type of wide spread in performance was not observed around the Great Recession (2007-2009). This striking difference is due to how broadly the market had been affected during the Great Recession, which can be seen in the 12-month price momentum based pair-wise correlation at industry group level (Figure 20, right chart). The Great Recession pushed the correlation upward 80% for a considerable duration, including the market recovery period starting March 2009. This simple illustration shows the dynamic nature of the market, having different “momentum personalities” over time.

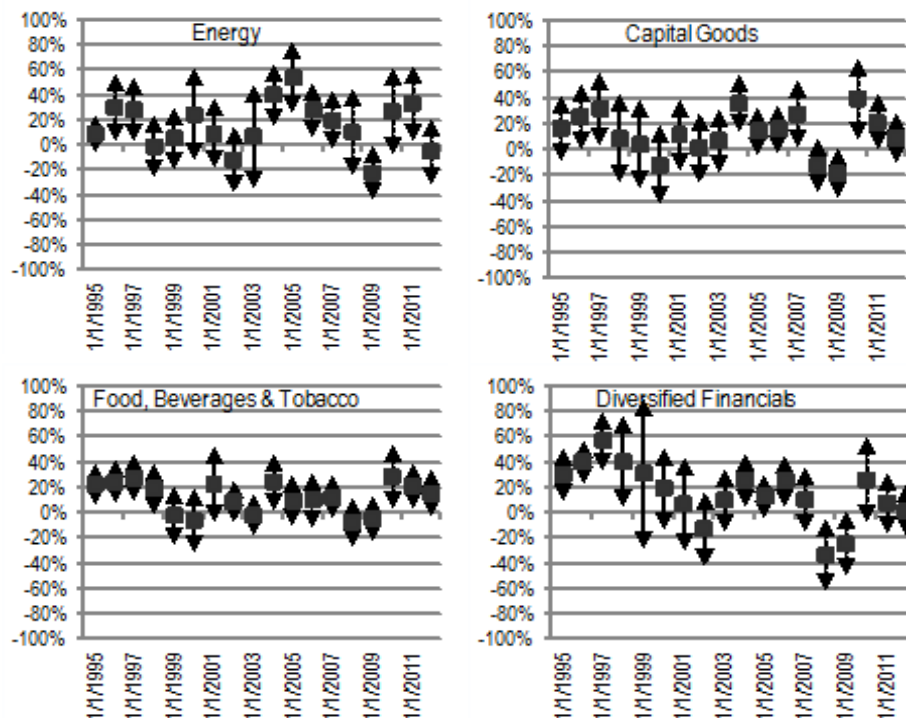
Figure 20: 12-Month Price Momentum Spread Among Industries and Their Pair-Wise Correlation



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies

The second observation is regarding the average behavior of industry group price momentum over a year. The up/down arrows in Figure 21 indicate the average standard deviation from mean (square box) for the 12-month price momentum over that year. As expected, defensive sectors like Food, Beverages & Tobacco show tighter deviation whereas a cyclical sector such as Capital Goods displays higher fluctuations. These are typical features found in defensive/cyclical sectors, and these inherent characteristics present unique challenges to price momentum trading strategies at the sector/industry group level.

Figure 21: Yearly Average of 12-Month Price Momentum: Mean and +/- 1 Standard Deviation



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies

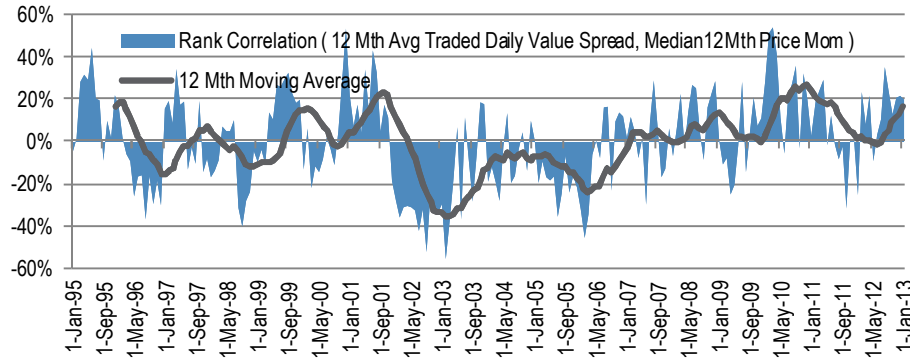
Construction of momentum trading signal for industries:

- 1) **the traded value spread of the high and low stock momentum baskets within an industry**
- 2) **long positive spread, short negative spread**

The construction of the price momentum conditioned directional trade is as follows. First, we create long and short baskets for each industry group based on the median of 12-month stock price momentum, namely high and low momentum baskets. Once the baskets are formed, we calculate the average daily traded value over a year for each basket. The traded value spread is the difference between the average traded value of the high momentum and the low momentum stock baskets within a given industry. If the traded value spread is positive, price momentum is likely to be persistent. Otherwise, a negative traded value spread is viewed as an indicator of potential reversal of the momentum trade. This method of confirming the strength of price momentum has been effective in identifying the winners in subsequent periods.

Figure 22 illustrates the rank correlation (cross-sectional) between the 12 monthly average daily traded value spread and the median level of price momentum across industries. Since The Great Recession both traded value spread and median 12-month price momentum level at the industry group level have been significantly more aligned, indicating that price momentum has been a strong factor in recent periods.

Figure 22: Rank Correlation between 12-Month Price Momentum and Traded Value Spread

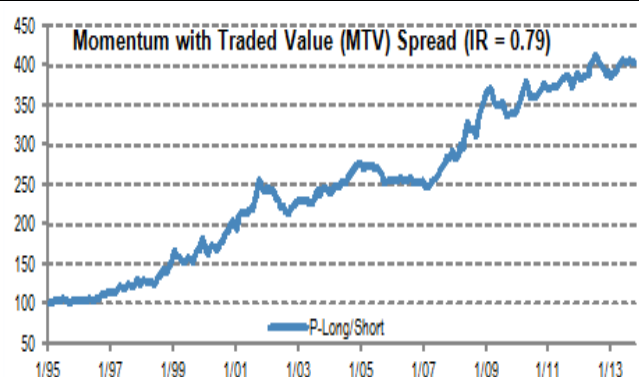
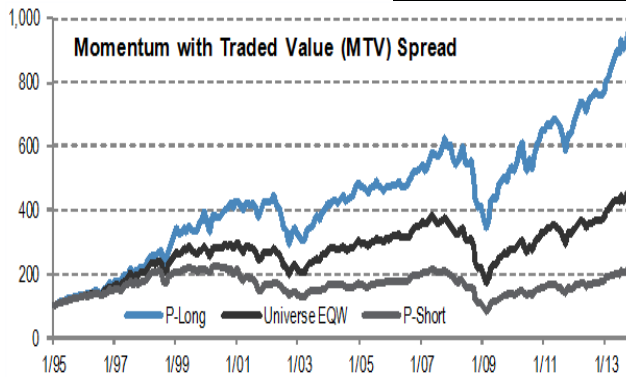


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

The summary statistics and performance of the MTV Spread signal are shown in Figure 23.

Figure 23: Momentum with Traded Value Spread : Back test Statistics and Performance

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | |
|-------------------|----------------|---------------|--------------------|-----------------|--|----------------|---------------|--------------------|-------------|
| 1 | 1.1% | 12.9% | 4.7% | 59% | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. |
| 2 | 0.8% | 8.1% | 4.7% | 48% | Long/Short | 0.7% | 7.72% | 2.8% | 62% |
| 3 | 0.5% | 4.3% | 4.8% | 39% | L/S v Bnch | 0.3% | 3.99% | 1.6% | 59% |
| Total Test | | | | | T-Stat | | IR | | |
| | Average Return | Rank IC | Avg IC | Avg # of Assets | Long/Short | 3.51 | 0.79 | | |
| Universe | 0.8% | 5.1% | 5.2% | 24 | | | | | |



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Risk Concentration

There are many ways to define market risk, and every investor has his/her favorite: realized volatility, implied volatility from the options market, VIX level, and the yield spread between high yield bond and 10-year treasury, etc. Rise in market uncertainty is signaled by rising levels of these indicators, and this would trigger a decrease in investors' risk appetites, potentially moving away from stocks deemed to be risky.

Principal Component Analysis is used to define the degree of risk concentration within an industry, which in turn is used to define the trading strategy.

In this section, we explore one of the popular risk measurements called Absorption Ratio, which is based on principal component analysis.⁵ Again, the idea is to use cross-sectional information about stocks within an industry to predict relative industry return.

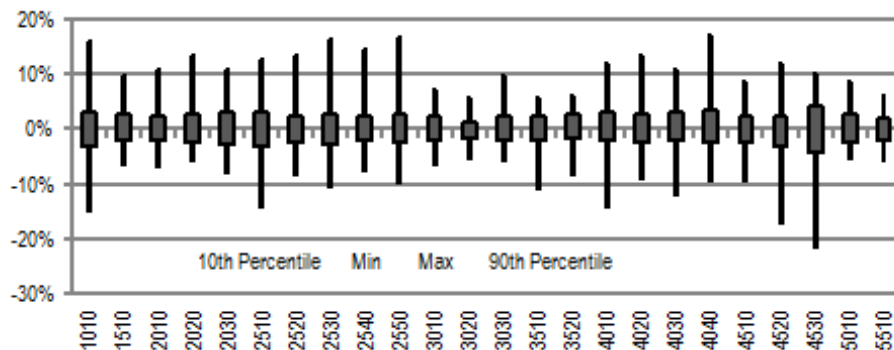
$$\text{Absorption Ratio} = \frac{1\text{st Eigenvalue} + 2\text{nd Eigenvalue}}{\text{Total Risk (Sum of All Eigenvalues)}}$$

The core idea is to decompose the total risk into a set of orthogonal risk components (each risk component in the set is independent and cannot be explained by other risk components). The absorption ratio describes how much of the total risk can be explained by, say, the top two orthogonal risks (two largest eigenvalues). If the ratio, defined above, is low, it suggests that the risk is less concentrated; otherwise, a high ratio tells us that there is a strong common driver of risk in the market, i.e. the risk is highly concentrated. There are numerous ways to define risk, for instance, realized volatility as risk. In our case, the underlying risk is pooled from market residual returns defined below,

$$\varepsilon_i(t) = r_i(t) - \alpha_i - \beta_i(t)r_m(t)$$

where $\beta_i(t)$ is estimated with 52 weeks of returns. The regression of stock return on the market return removes the systematic market effect from the stock return.

Figure 24: Residual Return Characteristics (Min, Max, 10th Pct, 90th Pct)[^]



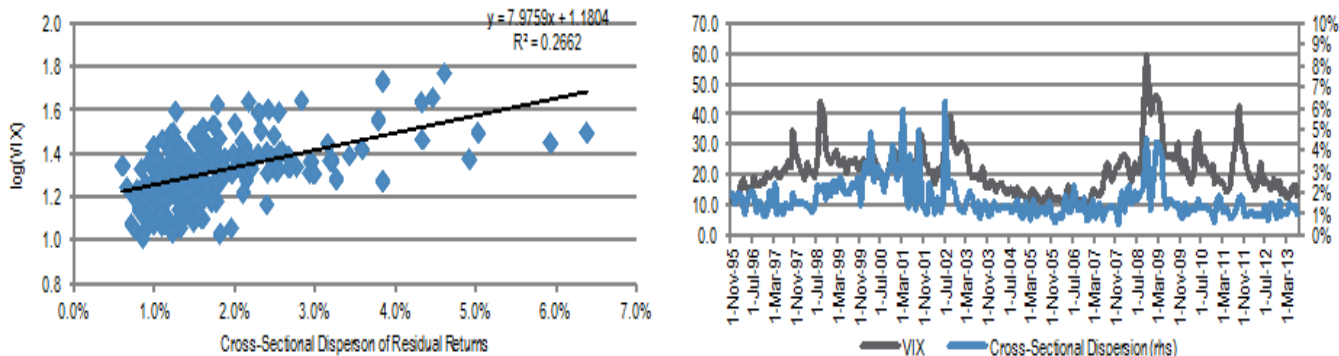
[^]Please see footnote 4 for the key to Industry Group names.

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

The comparison of stock residual returns among the industry groups is shown above (Figure 24). Unsurprisingly, semiconductor (4530), a highly cyclical industry group, displays the widest percentile spread whereas consumer staples (3010, 3020, 3030), a strong defensive sector, has the tightest spread. Generally, other cyclical and defensive sectors follow a similar pattern. We also explored their relationship against the common fear gauge, VIX (Figure 25). The long-term relationship shows that the VIX level and cross-sectional dispersion of residual returns have a linear relationship. A reason for this could be that a stock is more strongly driven by business-specific risk as the market uncertainty dominates.

⁵ Kritzman, Mark, Li, Yuanzhen, Page, Sebastien and Rigobon, Roberto, "Principal Components as a Measure of Systemic Risk," June 30, 2010.

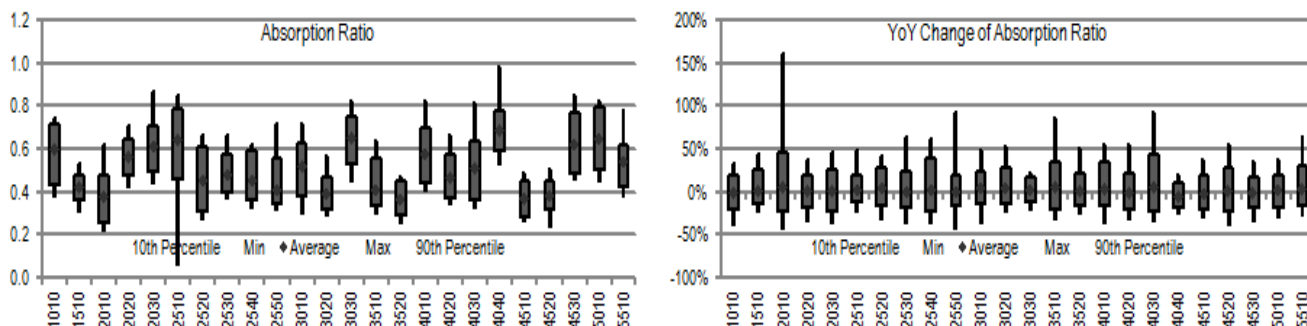
Figure 25: Cross-Sectional Dispersion of Residual Returns vs. log(VIX)



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

With these return data sets, we ran principal component analysis to extract two largest eigenvalues and constructed the ratio as aforementioned. The common statistics of this ratio along with the year on year change of the ratio are shown below (Figure 26).

Figure 26: Absorption Ratio Characteristics (Min, Average, Max, 10th Pct, 90th Pct)^A



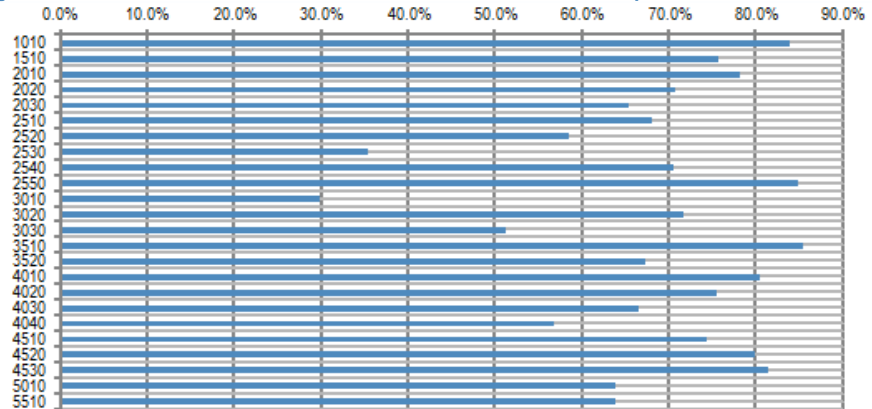
^APlease see footnote 4 for the key to Industry Group names.

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies

Could we have used average pair-wise correlation instead of Absorption Ratio? No, the two can differ for many industries—Absorption Ratio captures risk more efficiently.

The above illustration clearly shows that some of the industry groups have a tendency to possess heavier concentration risk than others, namely Semiconductor (4530), Telecommunication (5010), Real Estate (4040), Household & Personal Products (3030), etc. As mentioned above, many other methods capture this type of risk concentration profile. One tool we have used within our team is measuring an average pair-wise correlation of equity returns (stock returns within industry group): a high average correlation level indicates the market is driven by a strong common risk driver, hence, higher level of risk concentration.¹ Since we use year-on-year change in Absorption Ratio as an input to the risk concentration strategy, we performed a simple correlation of this against year-on-year change in pair-wise return correlation at industry group. The results in Figure 27 show that for some industry groups, they provide similar information, but for others this was not the case. Overall, we find that the year-on-year change in Absorption Ratio provides additional information about the current state of risk.

Figure 27: Correlation Between Pair-Wise Correlation and Y-o-Y Absorption Ratio: Not the Same^

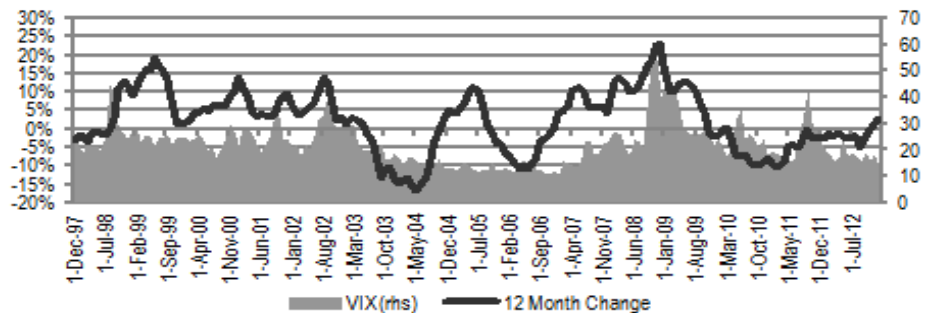


^Please see footnote 4 for the key to Industry Group names.
 Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Concentration risk signal: Derive residual risk, calculate the absorption ratio for each industry, avoid industries with rising risk, and favor those with declining risk.

To construct the signal, we first calculate the market residual returns, construct the joint correlation matrix, and then compute absorption ratio. The yearly change in this ratio is used as a signal for rising and falling risk. As a trading strategy, we avoid industry groups that are facing rising risk and favor industry groups with decline in risk.

Figure 28: Average of Industries' YoY Absorption Ratio—Sometimes It Behaves Like VIX but Not Always

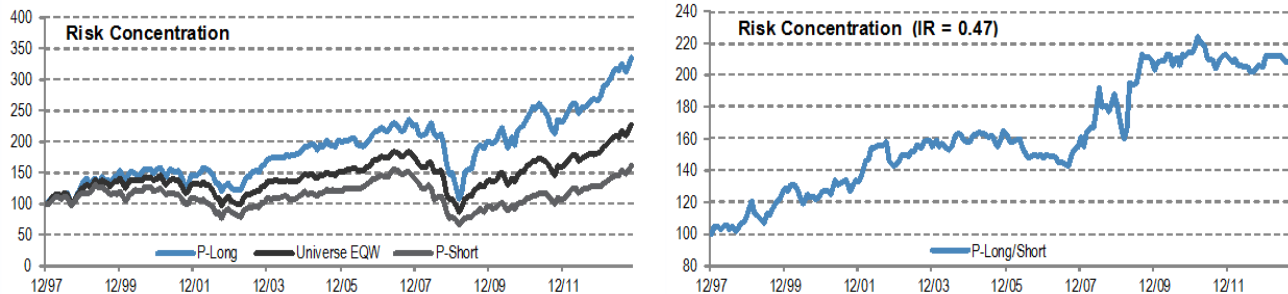


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

The summary statistics and performance of the Risk Concentration trading signal are shown in Figure 29.

Figure 29: Risk Concentration: Back test Statistics and Performance

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | |
|----------------|----------------|---------------|--------------------|-------------|--|----------------|---------------|--------------------|-------------|
| 1 | 0.8% | 8.0% | 5.3% | 52% | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. |
| 2 | 0.5% | 4.5% | 4.5% | 52% | Long/Short | 0.4% | 4.66% | 2.8% | 55% |
| 3 | 0.4% | 3.0% | 4.8% | 45% | L/S v Bnch | 0.2% | 2.79% | 1.6% | 52% |
| Total Test | | | | | T-Stat | | IR | | |
| Average Return | Rank IC | Avg IC | Avg # of Assets | | Long/Short | 2.03 | 0.47 | | |
| Universe | 0.5% | 1.7% | 2.8% | 24 | | | | | |



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Profit Skew

Rationale for the signal: High skew of cross-sectional profitability of stocks within an industry may signal overall higher future industry profitability.

For the last Lateral factor, we return to the idea of using the skew of stocks within an industry group as a trading signal. Volatility Skew (covered earlier) is essentially a technical signal since it relies on volatility of stock price returns in its construction. An alternate approach is to use a fundamental factor’s distribution, namely profit distribution, as the basis for capturing information on an industry or sector. Unlike the Volatility Skew strategy, which relies on daily individual stock returns, this strategy employs quarterly return-on-equity (ROE) figures for companies as underlying data, a much slower moving factor.

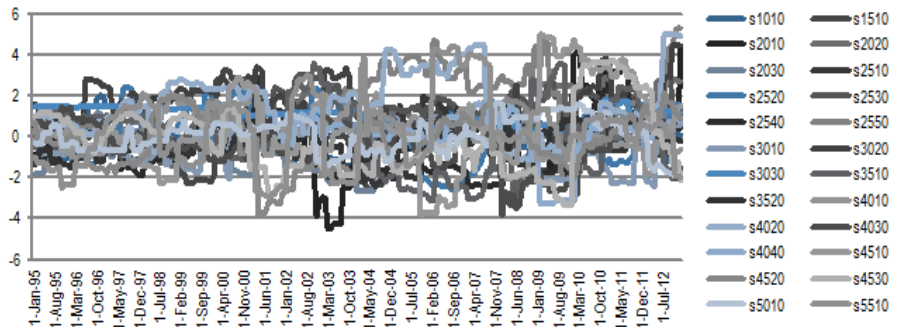
We hypothesize that if a subset of companies within a sector has become more profitable, under a competitive market environment, their success would be emulated by others, pushing up the overall profitability of the sector. The initial higher profitability by a small batch of companies can be detected earlier by a positively skewed ROE distribution within a sector. Like Volatility Skew we are again assuming that it takes time for information to get fully priced in.

We expect a Profit Skew strategy to follow a gradually mean-reverting process as competition would eventually dilute the profit edge that a select few firms initially captured. It is possible that companies at the outset sustain profitability through constant innovation, hard-to-replicate technology, high-barriers to entry, etc. However, over time, these innovations would likely be adopted by competitors. In either case, we expect Profit Skew to provide an *early* indication of improving or declining profitability, so that despite the eventual mean-reversion of industry profits, an investor could exploit the opportunity in the near term.

Profit Skew is dynamic and mean reverting.

Figure 30 shows that ROE skews are time-varying, oscillating between positive and negative territories as time progresses.

Figure 30: Industry Group Level ROE Skew Time Series: Dynamic and Mean Reverting[^]

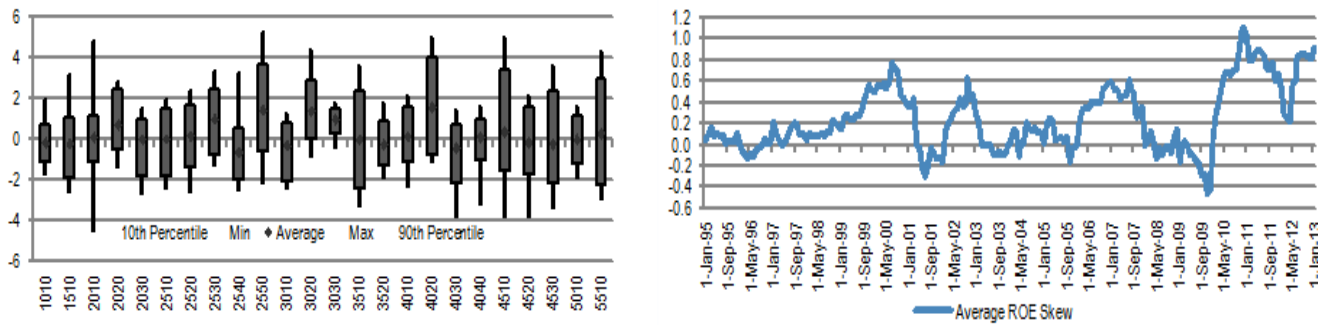


[^]Please see footnote 4 for the key to Industry Group names.

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Figure 31 shows the average ROE Skew by Industry and also shows the average trend of ROE Skew over time. Since the Great Recession the average ROE has been much higher than average.

Figure 31: Average ROE Skew By Industry Group (1995-2013)[^] - left chart; Industry Average of ROE Skew – right chart



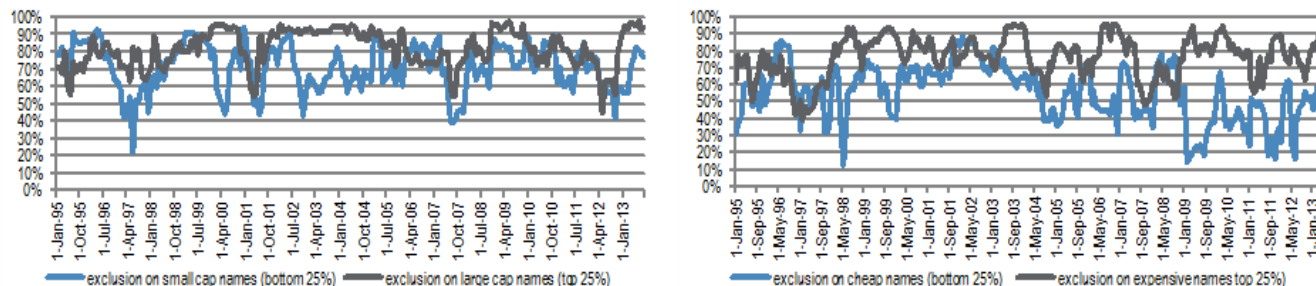
[^]Please see footnote 4 for the key to Industry Group names.

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Sensitivity analysis: Profit Skew is more sensitive to Value than Size.

In computing ROE skew, numerous factors may influence this statistical measure. Particularly, we were interested in size and value effects. As a simple exercise, we removed the top/bottom 25% of stocks from each industry group based on these two factors and recomputed skews, which were then compared against the original values using rank correlation. The charts below (Figure 32) show time series of these correlations. The comparison reveals that the value effect has been more significant than the size effect. The average difference in correlation for the size-based analysis is about 15% whereas the difference was about 24% (31% for the last 10 years) for the value-based analysis.

Figure 32: Rank Correlation Against Skew Computed with Top/Bottom 25% Removal Based on Market Caps (left chart) and Valuation (right chart)

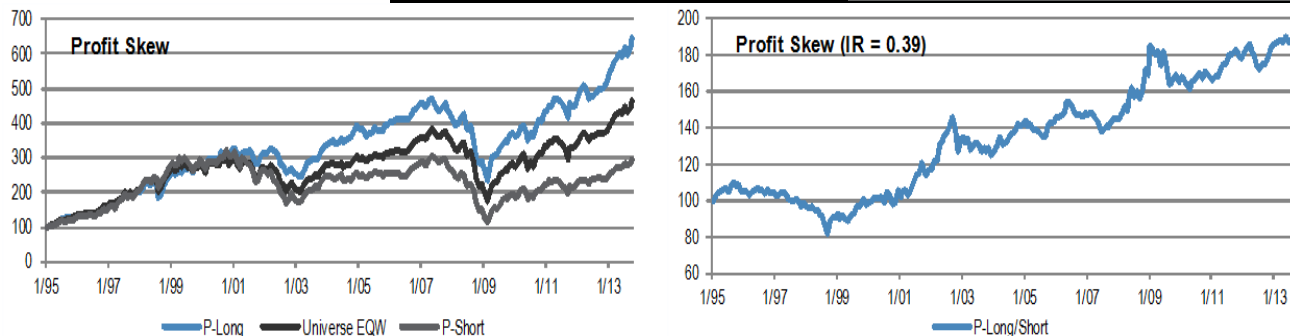


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

The summary statistics and performance of the Profit Skew trading signal are shown in Figure 33.

Figure 33: Profit Skew: Back-Test Statistics and Performance

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics | | | | |
|-------------------|----------------|---------------|--------------------|-----------------|--------------------------------|----------------|---------------|--------------------|-------------|
| 1 | 0.9% | 10.5% | 4.4% | 56% | Portfolio 1 less Portfolio 3 | Average Return | Annual Return | Standard Deviation | % Out Perf. |
| 2 | 0.8% | 8.8% | 4.5% | 51% | | | | | |
| 3 | 0.6% | 6.0% | 5.1% | 46% | Long/Short | 0.3% | 3.44% | 2.5% | 58% |
| Total Test | | | | | L/S v Bnch | 0.1% | 1.62% | 1.3% | 56% |
| Universe | 0.8% | 2.8% | 3.0% | 24 | T-Stat | | IR | | |
| | Average Return | Rank IC | Avg IC | Avg # of Assets | Long/Short | 1.87 | 0.39 | | |



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Top-Down: Macro Factors

It seems intuitively obvious that the macroeconomic environment should matter for relative performance of industries. However, as we noted in part one of our sector selection series,¹ “industry selection is seen as a macro timing problem . . . (which) in large part depends on getting fundamentals right before the majority of the market participants. As such, skepticism about existence of macroeconomic strategies that can time market consistently is understandable.” Having said that, we go on to argue that there is no avoiding industry selection, especially since “share of industry-specific idiosyncratic variation remained relatively stable over the last 20 years, accounting for 21% of total variation (of stocks).” Increasing proliferation of sector and industry ETFs makes industry selection an important part of any asset allocation process as well.

Two methods can link macro drivers to industry returns: Indirect method that links traditional factor rotation to macro environment; Direct method that forecasts cross-sectional returns using regression approach. We use the direct method in this report.

Research on macroeconomic drivers of asset returns can be grouped into two methods: indirect and direct. The indirect approach scrutinizes the performance of traditional factors like valuations, growth, quality, sentiment, and momentum under various macroeconomic conditions. For instance, momentum is likely to work in low volatility, trending phase of the business cycle, while value factors might work after a recession when cross-sectional valuation dispersion is still large but risk appetite is coming back. Our team has applied this indirect approach to link time varying factor weightings for stock selection with macro drivers in previous reports.⁶

Four groups of top-down macro variables: Yield Spread, Real Growth, Financial Stress and Inflation.

The direct method regresses the performance of industries on macroeconomic variables to predict their relative return without intermediating the effect of macro via risk factors. That is the approach we are taking in this section. Firstly, the number of bottom-up aggregate factors that can be applied for industry selection remains small compared to stock selection, leaving little room for diversification. Secondly, the approach is more practical since macroeconomic variables are likely to have greater explanatory power at the industry level as opposed to stock level where stock-specific idiosyncratic effects can dominate.

For this report, we selected 21 variables (Figure 34) that can be divided into four broad categories: Yield Spread, Real Growth, Financial Stress, and Inflation.

Figure 34: Macroeconomic Factors Tested (bold ones included in the model)

| <i>I. Yield Spread Indicators: Related to Growth and Inflation</i> | <i>II. Real Growth Related Indicators</i> | <i>III. Composite Financial Stress Indices</i> | <i>IV. Inflation Related Indicators</i> |
|---|---|--|---|
| <ol style="list-style-type: none"> 3-month Treasury Bill interest rate 10-year Bond Yield Yield Curve (10 year less 3-month) Credit Spread (Moody's BAA less Moody's BBB yield) | <ol style="list-style-type: none"> Conference Board US Leading Economic Indicator ISM Manufacturing PMI ISM Non-Manufacturing PMI Citigroup US Economic Surprise Indicator Chicago Fed National Activity Index Volatility Index (VIX) Thomson Reuters/University of Michigan's Index of Consumer Sentiment | <ol style="list-style-type: none"> St Louis Fed Financial Stress Index (based on 18 sub-series) Kansas City Fed Financial Stress Index (based on 11 sub-series) Cleveland Fed Financial Stress Index (based on 16 sub-series) | <ol style="list-style-type: none"> 5-year Inflation Expectations (TIPs Breakeven) Consumer Price Index Producer Price Index Crude Oil Price CRB BLS Commodity Spot Index ISM Prices Index Dollar Index (DXY) |

Source: J.P. Morgan Quantitative and Derivatives Strategies.

Each month the above macro variables were regressed on the one-month forward relative return of each of the industries. The regressions are suitably lagged to avoid any forward bias—for instance, regression to forecast 1-month forward relative return of industries at end-April 2004 (i.e., predicted asset return to end-May from end-April) only uses macro and return data available till end-March. Also taken into account is the lag between the release date and the reference date of macro variables to avoid forward bias.

⁶ See our reports [Measuring the Macro Impact on Factor Performance: A 'Rulebook' for Choosing Factors in Different Macro Environments](#), Smith et al, November 2010; [Making the Most of Macro: Launching our Style Timing Model for Asia](#), Smith et al, November 2010.

Besides using the significance of T-Stats in the regression approach, the prevalence and persistence of the relationship was taken into account in order to construct the long/short portfolio of industries.

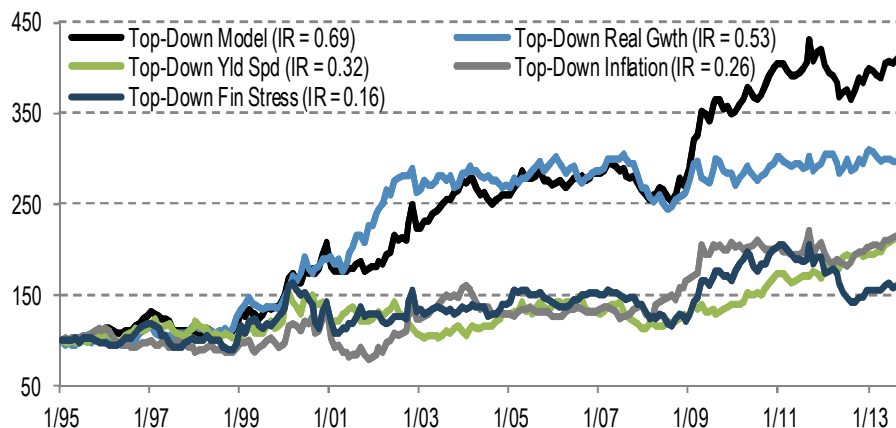
The value and the sign of the T-Stats of the regression determine whether a macro variable is included as a possible explanatory variable and the direction of the signal. Besides the T-Stats, we also take the prevalence and persistence of relationship into account by examining the T-Stats of regressions of the 3-month, 6-month, and 12-month forward returns as well as 1-month, 3-month, 6-month, and 12-month change in the macro variables. To mitigate serial correlation bias in T-Stats, we run non-overlapping regressions for forward return windows greater than 1 month—for instance, 3-month forward returns are regressed for three periods beginning January, February, and March. The T-Stats from the three regressions is then averaged. Similarly for 6-month and 12-month forward returns we run 6 and 12 regressions and then average the T-Stats. As a result each month we ran 2,640 (110 x 24) regressions for each macro concept to determine the long/short portfolio. In the Appendix, we include a recent heat map (October 2013) that shows a comprehensive overview of current regression results and the respective sensitivities of industries to macro variables.

Our base “Top-Down Macro Model” includes 10 variables from four macro groups shown in figure 34. Initial regression uses five years of data (Sep 1989 – Aug 1994). The base model employs an expanding window (i.e., a new month of data is added sequentially to the regression to generate successive long-short positions for the 24 industry groups based on the parameter estimates and the value of the independent macroeconomic variables). We let the model determine the number of long-short positions dynamically. The maximum long positions over the entire sample is 17 industries, while the minimum long positions are as low as 8. Similarly maximum short positions can go as high as 16, while at least 6 positions at a minimum are short over the whole sample. On average, however, the regression-based holdings balance out with 12 long positions and 12 short positions.

Summary of Top-Down Factors

The performance of the four Top-Down macro groups is shown in Figure 35.

Figure 35: Regression-Based Top-Down Industry Model Is More Volatile Than Bottom-Up and Lateral Models



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

In order to be consistent with the framework employed in Bottom-Up and Lateral approach, we long the top one-third industries and short the bottom one-third industries. The performance statistics are shown below in Table 5.

Table 5: Top-Down Industry Model: Performance Statistics

| Factor | Avg. IC | T-Stat | Hit Rate | Turnover | IR | L/S Avg. Ret | L/S Stdev. | Long Avg. Ret | Short Avg. Ret |
|-----------------------|-------------|-------------|------------|------------|-------------|--------------|--------------|---------------|----------------|
| Top-Down Model | 5.0% | 3.13 | 59% | 30% | 0.69 | 0.68% | 3.24% | 1.08% | 0.41% |
| Top-Down Yield Spread | 7.0% | 1.63 | 58% | 15% | 0.32 | 0.41% | 3.79% | 1.23% | 0.81% |
| Top-Down Real Growth | 5.5% | 2.48 | 57% | 33% | 0.53 | 0.52% | 3.15% | 1.03% | 0.51% |
| Top-Down Fin Stress | 1.7% | 1.02 | 52% | 40% | 0.16 | 0.32% | 4.73% | 0.90% | 0.58% |
| Top-Down Inflation | 3.4% | 1.46 | 56% | 27% | 0.26 | 0.45% | 4.65% | 1.08% | 0.62% |

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

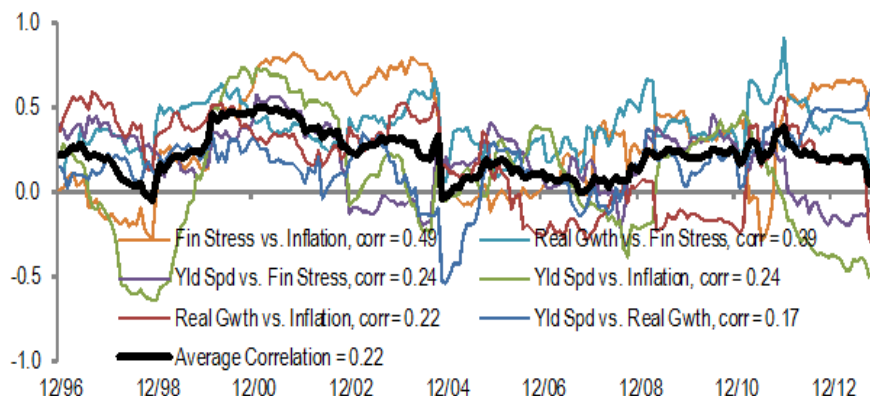
Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

The best performing Top-Down model would have been the Real Growth model, which captures the business cycle and uses factors like ISM Manufacturing and Consumer Sentiment. We were disappointed by the hypothetical performance of Financial Stress model, which uses indices created by two different Federal Reserve Banks to capture the level of financial stress in the economy. While these indices would have had predictive power for the Financial sector, they seem to give us little else in terms of anticipating relative performance of industries. Granted that these indices are primarily designed to capture financial stress, it is still surprising that they do not appear to anticipate future changes in business activity—we believe if they did we would probably see higher predictive power for industry performance.

The other surprise was that what are typically thought of as leading indicators of inflation, like the breakeven point of 10-year and 5-year TIPS, ISM Prices Paid, and the Dollar Index (DXY) would not have had as good a predictive power as plain vanilla core CPI and PPI inflation. Interesting—what is the point of research if there are no surprises?

Figure 36 presents the rolling correlation among the four Top-Down macro groups. On average the correlation is positive, suggesting that the underlying drivers of the four groups have some common market factor exposures. Nonetheless, for the purpose of forecast we believe there is enough diversification for a robust model.

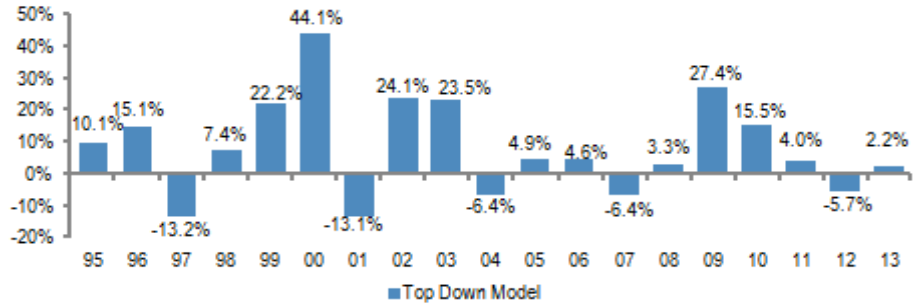
Figure 36: Pair-Wise 2-Year Rolling Correlation of Top-Down Components: On Average Positive, Financial Stress Has Highest Pair-Wise Correlation with Other Macro Groups



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Lastly, Figures 37 and 38 show that our Top-Down Model, like the Bottom-Up Model, would have performed well in periods of higher industry return dispersion.

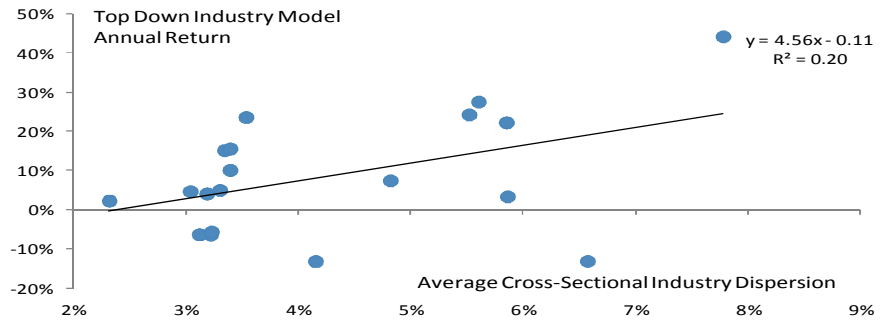
Figure 37: Annual Performance of Top-Down Model Is More Volatile Than Other Blocks



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Figure 38: Top-Down Model is Also Long Volatility



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Sensitivity to Portfolio Size and Rebalance Frequency

In this section we report the results of alternate constructions of the Industry Model. One could experiment with the construction of the model in two ways: one, change the number of portfolios to as few as 2 (12 Industry Groups in each portfolio) to an extreme of 12 portfolios (2 Industry Groups in each portfolio). Alternately, one could try different rebalance frequencies besides a monthly rebalance—rebalance every three months (in which case one is effectively running three parallel portfolios starting Jan, Feb, and Mar) or rebalance every six months (running six parallel portfolios starting Jan, Feb, Mar, Apr, May, and Jun).

Table 6: Sensitivity Analysis: Composite Industry Model (24 Industry Groups, GICS Level 2)

| | Avg. IC | T-Stat | Hit Rate | Turn Over | IR* | Avg. Ret LS | StdDev. Ret LS | Annual Long Ret | Annual Short Ret | Annual Active Ret |
|--------------------------------------|--------------|-------------|------------|------------|-------------|--------------|----------------|-----------------|------------------|-------------------|
| Monthly Rebalance | | | | | | | | | | |
| 2-Portfolios (12 industries top/bot) | 9.0% | 3.77 | 59% | 15% | 0.90 | 0.57% | 2.29% | 12.09% | 4.76% | 6.79% |
| 3-Portfolios (8 industries top/bot) | 9.0% | 3.95 | 61% | 20% | 0.95 | 0.77% | 2.92% | 13.91% | 4.04% | 9.10% |
| 6-Portfolios (4 industries top/bot) | 9.0% | 4.54 | 65% | 26% | 1.13 | 1.32% | 4.37% | 19.27% | 2.57% | 15.77% |
| 8-Portfolios (3 industries top/bot) | 9.0% | 4.70 | 63% | 29% | 1.19 | 1.67% | 5.33% | 22.55% | 1.46% | 20.03% |
| 12-Portfolios (2 industries top/bot) | 9.0% | 4.74 | 63% | 32% | 1.22 | 1.98% | 6.25% | 25.31% | -0.18% | 23.71% |
| Average | 9.0% | 4.34 | 62% | 24% | 1.08 | 1.26% | 4.23% | 18.63% | 2.53% | 15.08% |
| Rebalance Every 3 Months | | | | | | | | | | |
| 2-Portfolios | 13.7% | 3.71 | 69% | 25% | 0.88 | 1.54% | 3.61% | 11.24% | 4.82% | 6.04% |
| 3-Portfolios | 13.7% | 3.60 | 72% | 31% | 0.86 | 2.02% | 4.83% | 12.77% | 4.26% | 7.85% |
| 6-Portfolios | 13.7% | 3.68 | 68% | 41% | 0.90 | 3.36% | 7.91% | 15.84% | 1.82% | 12.82% |
| 8-Portfolios | 13.7% | 4.02 | 70% | 45% | 0.99 | 4.23% | 9.12% | 18.88% | 1.38% | 16.29% |
| 12-Portfolios | 13.7% | 4.10 | 71% | 50% | 1.02 | 4.90% | 10.34% | 20.33% | 0.16% | 18.83% |
| Average | 13.7% | 3.82 | 70% | 39% | 0.93 | 3.21% | 7.16% | 15.81% | 2.49% | 12.37% |
| Rebalance Every 6 Months | | | | | | | | | | |
| 2-Portfolios | 16.9% | 2.88 | 69% | 31% | 0.68 | 2.55% | 5.46% | 10.42% | 5.18% | 4.88% |
| 3-Portfolios | 16.9% | 3.14 | 72% | 40% | 0.75 | 3.71% | 7.17% | 12.37% | 4.65% | 7.05% |
| 6-Portfolios | 16.9% | 3.10 | 71% | 51% | 0.75 | 6.06% | 11.83% | 14.85% | 2.50% | 11.14% |
| 8-Portfolios | 16.9% | 3.38 | 73% | 55% | 0.82 | 7.55% | 13.61% | 17.12% | 1.69% | 13.90% |
| 12-Portfolios | 16.9% | 3.64 | 73% | 62% | 0.89 | 8.77% | 14.76% | 17.64% | -0.19% | 16.26% |
| Average | 16.9% | 3.23 | 72% | 48% | 0.78 | 5.73% | 10.57% | 14.48% | 2.77% | 10.65% |

Source: J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Sensitivity Analysis suggests that the Composite Industry Model has a linear pay-off structure as the number of industries in the long/short portfolios declines from 12 to 2. Additionally, the pay-off structure holds equally well for 1- 3- and 6-month investment horizons.

Table 6 summarizes the result of the sensitivity analysis. For 3- and 6-month rebalance periods the statistics reported are averages of 3 and 6 back tests, respectively, starting in different months. A few results stand out:

- More frequent rebalance frequency would have resulted in higher IR, lower volatility, and higher active return. This should be expected since the drivers of alpha decay over time.
- *Annualized* turnover would naturally be higher for monthly rebalance.
- It is satisfying that as we sharpen our portfolio from 12 assets in each basket (2 portfolios) to 4 assets in each basket (6 portfolios) and to 2 assets in each basket

the IR would have improved whether one rebalances monthly, quarterly, or bi-annually, and so do volatility and turnover; however, the increase in active return would have compensated for the higher volatility and transaction cost to some extent.

Table 7 below reports very similar results for GICS Level 1 Sectors using the same set of factors to run the strategies.

Table 7: Sensitivity Analysis: Composite Industry Model (10 Sectors, GICS Level 1)

| | Avg. IC | T-Stat | Hit Rate | Turn Over | IR* | Avg. Ret LS | StdDev Ret LS | Annual Long Ret | Annual Short Ret | Annual Active Ret |
|-------------------------------------|--------------|-------------|------------|------------|-------------|--------------|---------------|-----------------|------------------|-------------------|
| Monthly Rebalance | | | | | | | | | | |
| 2-Portfolios (5 industries top/bot) | 10.7% | 4.16 | 62% | 13% | 1.00 | 0.78% | 2.81% | 12.87% | 3.13% | 9.25% |
| 3-Portfolios (3 industries top/bot) | 10.7% | 3.65 | 62% | 17% | 0.88 | 0.83% | 3.41% | 12.86% | 2.69% | 9.66% |
| 5-Portfolios (2 industries top/bot) | 10.7% | 3.51 | 58% | 21% | 0.86 | 1.01% | 4.30% | 15.00% | 2.88% | 11.54% |
| 10-Portfolios (1 industry top/bot) | 10.7% | 4.03 | 59% | 24% | 1.03 | 1.74% | 6.46% | 20.23% | -0.92% | 20.09% |
| Average | 10.7% | 3.84 | 60% | 19% | 0.94 | 1.09% | 4.24% | 15.24% | 1.94% | 12.63% |
| Rebalance Every 3 Months | | | | | | | | | | |
| 2-Portfolios | 16.7% | 3.08 | 67% | 22% | 0.73 | 1.66% | 4.68% | 10.95% | 4.20% | 6.35% |
| 3-Portfolios | 16.7% | 2.93 | 62% | 28% | 0.70 | 1.91% | 5.64% | 11.12% | 3.49% | 7.21% |
| 5-Portfolios | 16.7% | 3.38 | 69% | 32% | 0.82 | 2.92% | 7.52% | 13.53% | 1.91% | 11.07% |
| 10-Portfolios | 16.7% | 4.19 | 69% | 38% | 1.05 | 5.30% | 11.00% | 19.40% | -2.00% | 20.37% |
| Average | 16.7% | 3.39 | 67% | 30% | 0.83 | 2.95% | 7.21% | 13.75% | 1.90% | 11.25% |
| Rebalance Every 6 Months | | | | | | | | | | |
| 2-Portfolios | 23.1% | 2.36 | 63% | 29% | 0.56 | 2.48% | 6.40% | 9.78% | 4.90% | 4.61% |
| 3-Portfolios | 23.1% | 2.61 | 69% | 35% | 0.62 | 3.53% | 8.19% | 10.15% | 3.17% | 6.53% |
| 5-Portfolios | 23.1% | 3.34 | 74% | 43% | 0.80 | 6.08% | 11.06% | 13.35% | 1.18% | 11.35% |
| 10-Portfolios | 23.1% | 4.29 | 78% | 49% | 1.06 | 10.63% | 15.13% | 18.49% | -3.04% | 20.22% |
| Average | 23.1% | 3.15 | 71% | 39% | 0.76 | 5.68% | 10.20% | 12.94% | 1.55% | 10.68% |

Source: J.P. Morgan Quantitative and Derivatives Strategies. Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Future Research

Agenda for future research: Portfolio Construction, Risk Management, and devising more efficient ways to combine stocks into “industry-like” buckets to build more robust portfolios.

Our primary goal in this report is to present complementary approaches to generating alpha for Industry Selection. We have not covered risk management and portfolio construction—these are topics for future research. Some of the topics we touched on in our first report on exploiting correlation among industries using clustering are part of this future agenda.

We conclude the report by applying a risk management technique often used in Global Macro models to Industry Selection. In absence of any other constraint, the portfolio aggregation from Bottom-Up, Lateral, and Top-Down models results in portfolios whose risk is not controlled and could be fairly random. One approach that is practical when we have a manageable number of assets (as is the case here) is to use a predicted correlation matrix of asset returns to target a fixed risk for each industry model block. For instance, in the simplest case, we can take fixed equal risk (for example, 1% target risk) for each block. This would result in sizing the holdings of industries in our portfolio based on the predicted variances and covariances. The prediction of variance and covariance is based on historical data. Table 8 illustrates the application of this methodology for the Industry Model and its underlying blocks.

Notice that Target Risk and realized Annual Risk can deviate somewhat based on how close the predicted correlation matrix comes to the realized correlation among industries. As expected, the drawdown of the strategy is a function of the target risk taken, though not exactly proportionally.

Table 8: Application of Target (Controlled) Risk to Industry Model

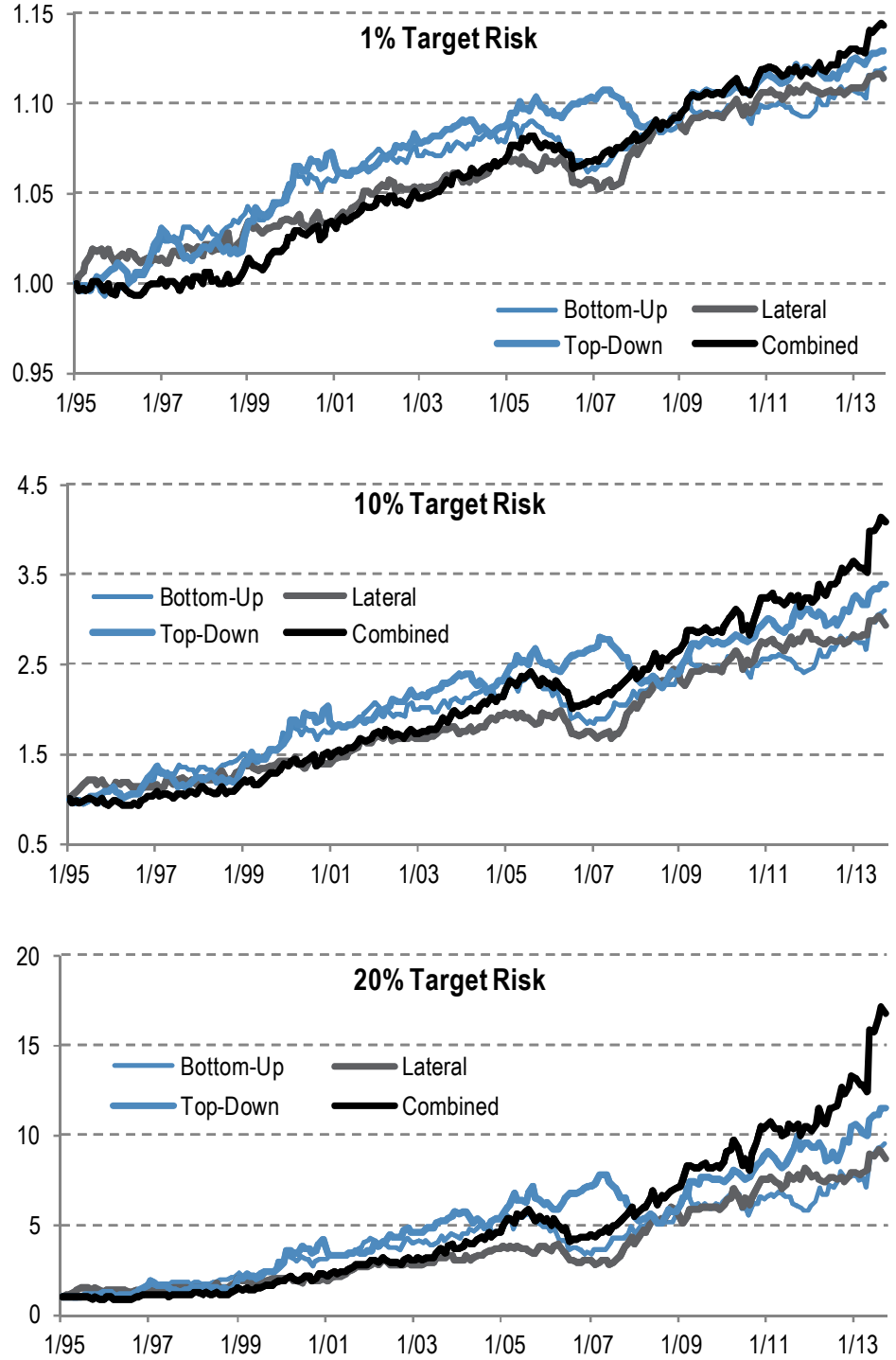
| Target Risk | Portfolio | IR | Annual Ret | Annual Risk | Hit Rate | Max Drawdown |
|-------------|------------------|-------------|--------------|--------------|------------|---------------|
| 1% | Bottom-Up | 0.62 | 0.6% | 1.0% | 56% | -2.5% |
| | Lateral | 0.63 | 0.6% | 0.9% | 58% | -1.7% |
| | Top-Down | 0.69 | 0.7% | 0.9% | 57% | -2.1% |
| | Composite | 0.76 | 0.7% | 0.9% | 61% | -1.7% |
| 10% | Bottom-Up | 0.62 | 6.0% | 9.6% | 56% | -22.5% |
| | Lateral | 0.63 | 5.8% | 9.1% | 58% | -15.6% |
| | Top-Down | 0.69 | 6.5% | 9.4% | 57% | -19.4% |
| | Composite | 0.78 | 7.5% | 9.6% | 61% | -17.0% |
| 20% | Bottom-Up | 0.62 | 12.0% | 19.3% | 56% | -39.9% |
| | Lateral | 0.63 | 11.5% | 18.2% | 58% | -28.8% |
| | Top-Down | 0.69 | 13.0% | 18.8% | 57% | -35.0% |
| | Composite | 0.78 | 15.0% | 19.3% | 61% | -31.1% |

Source: J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns. Recall from section 1 that the IR for the original models is as follows – Bottom-Up = 0.82; Lateral = 0.88; Top-Down = 0.69 and Composite = 0.95.

Figure 39 shows the cumulative performance of the three underlying industry blocks. The Composite is based on weighted average risk-adjusted blocks, applying 40%, 40%, and 20% weights to Bottom-Up, Lateral, and Top-Down models, respectively. As expected at higher levels of risk the deviation in the performance of the composite model and the block models diverges more than at lower level of target risk.

Figure 39: Performance of Models for Various Levels of Target Risk (1%, 10%, 20%)



Source: J.P. Morgan Quantitative and Derivatives Strategies.
 Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Appendix

A: Exposure of Industry Factors to Market Returns and Styles

The following table reports the pair-wise correlations of the various industry factors covered in the main report and selected market variables (change in S&P 500, 10-year Bond Yield, and VIX) and composite stock selection styles (Value, Growth, Momentum, Quality and Size).

Table 9: Pair-Wise Return Correlations (1995-2013)

| | S&P 500 | Bond Yield | Size | Value | Growth | Quality | Momentum |
|--|--------------|-------------|-------------|--------------|--------------|--------------|--------------|
| FCF/Invested Capital | 0.08 | 0.07 | 0.19 | -0.04 | 0.22 | 0.11 | 0.25 |
| Current Accruals | 0.11 | 0.04 | 0.07 | -0.16 | 0.11 | -0.15 | 0.13 |
| Capex/Depreciation | 0.04 | -0.02 | 0.03 | -0.11 | 0.01 | -0.09 | 0.15 |
| Bottom-Up Quality Composite | -0.09 | 0.03 | 0.10 | -0.18 | 0.19 | 0.11 | 0.30 |
| Free Cash Flow Yield | 0.30 | 0.12 | 0.10 | 0.19 | -0.04 | -0.13 | -0.15 |
| Forward Sales Yield | 0.21 | 0.04 | -0.25 | 0.34 | -0.24 | -0.35 | -0.37 |
| Bottom-Up Valuation Composite | 0.35 | 0.12 | 0.01 | 0.23 | -0.16 | -0.23 | -0.24 |
| Bottom-Up Composite Model | 0.14 | 0.08 | 0.13 | -0.03 | 0.06 | 0.02 | 0.14 |
| Momentum with Traded Value Spread | -0.05 | -0.04 | 0.11 | -0.13 | 0.25 | 0.13 | 0.28 |
| Risk Concentration | 0.16 | 0.04 | -0.06 | 0.11 | 0.11 | -0.17 | -0.02 |
| Volatility Skew | 0.30 | 0.06 | 0.16 | 0.10 | -0.11 | -0.26 | -0.19 |
| Lateral Technical Distribution | 0.27 | 0.04 | 0.12 | 0.02 | 0.12 | -0.16 | 0.02 |
| Profit Skew (Fundamental Distribution) | -0.26 | -0.05 | 0.10 | 0.10 | 0.14 | 0.39 | 0.28 |
| Lateral Model | 0.22 | 0.02 | 0.12 | 0.09 | 0.08 | -0.11 | 0.03 |
| Top-Down Yield Spread | -0.02 | 0.09 | 0.23 | -0.20 | 0.24 | 0.08 | 0.22 |
| Top-Down Real Growth | -0.05 | -0.04 | 0.16 | 0.01 | 0.04 | 0.01 | 0.10 |
| Top-Down Fin Stress | 0.05 | 0.07 | 0.08 | -0.14 | 0.04 | -0.15 | -0.01 |
| Top-Down Inflation | -0.03 | -0.08 | 0.19 | -0.06 | 0.16 | -0.03 | 0.12 |
| Top-Down Model | -0.01 | 0.00 | 0.19 | -0.13 | 0.09 | -0.08 | 0.06 |
| Composite Industry Model | 0.13 | 0.09 | 0.23 | -0.05 | 0.14 | -0.07 | 0.15 |

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

B: Correlation Matrix of Industry Factors

Table 10: Pair-Wise Return Correlations (1995-2013)

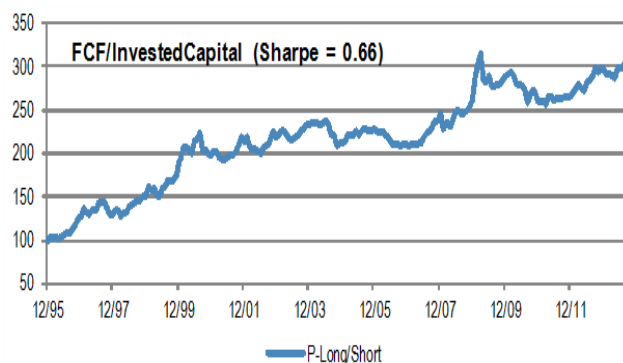
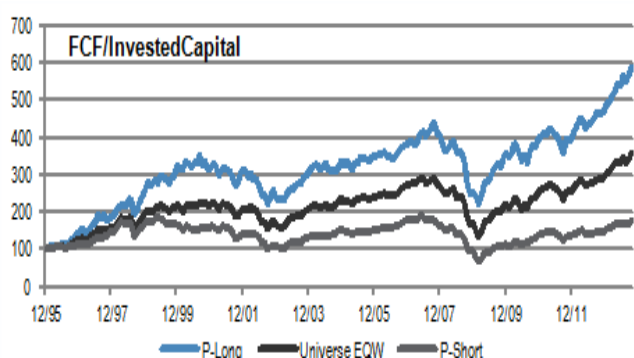
| | FCF/IC | Accruals | Capex/Depr | BUQual | FCFYld | FwdSalesYld | BUVal | BUComp | MomValSprd | RiskConc | VolSkew | LatTech | LatFund | LatComp | TDYldSpd | TDRealGwth | TDFinStr | TDInf | TDComp | IGModel |
|----------------|--------|----------|------------|--------|--------|-------------|-------|--------|------------|----------|---------|---------|---------|---------|----------|------------|----------|-------|--------|---------|
| FCF/IC | 1.00 | 0.44 | 0.28 | 0.71 | 0.27 | -0.18 | -0.23 | 0.58 | 0.22 | -0.01 | 0.13 | 0.26 | 0.02 | 0.21 | 0.14 | 0.20 | 0.14 | 0.13 | 0.21 | 0.54 |
| Accruals | 0.44 | 1.00 | 0.39 | 0.65 | 0.10 | -0.03 | 0.03 | 0.59 | 0.32 | 0.17 | 0.22 | 0.36 | -0.11 | 0.31 | 0.22 | 0.18 | 0.27 | 0.23 | 0.31 | 0.57 |
| Capex/Depr | 0.28 | 0.39 | 1.00 | 0.58 | 0.09 | -0.16 | 0.08 | 0.55 | 0.17 | -0.08 | 0.15 | 0.18 | -0.04 | 0.16 | 0.15 | 0.14 | 0.10 | 0.21 | 0.16 | 0.42 |
| BUQual | 0.71 | 0.65 | 0.58 | 1.00 | 0.07 | -0.25 | -0.02 | 0.82 | 0.35 | -0.10 | 0.12 | 0.27 | 0.05 | 0.23 | 0.21 | 0.24 | 0.23 | 0.19 | 0.26 | 0.68 |
| FCFYld | 0.27 | 0.10 | 0.09 | 0.07 | 1.00 | 0.04 | 0.74 | 0.33 | 0.11 | 0.15 | 0.28 | 0.30 | -0.04 | 0.29 | 0.00 | -0.03 | 0.06 | 0.05 | 0.06 | 0.28 |
| FwdSalesYld | -0.18 | -0.03 | -0.16 | -0.25 | 0.04 | 1.00 | 0.65 | 0.07 | -0.21 | 0.33 | 0.23 | 0.09 | 0.05 | 0.10 | 0.12 | -0.02 | 0.17 | 0.14 | 0.12 | 0.14 |
| BUVal | 0.13 | 0.03 | 0.08 | -0.02 | 0.74 | 0.65 | 1.00 | 0.34 | 0.03 | 0.21 | 0.33 | 0.26 | -0.06 | 0.27 | 0.01 | -0.04 | 0.07 | 0.06 | 0.05 | 0.26 |
| BUComp | 0.69 | 0.59 | 0.55 | 0.82 | 0.33 | 0.07 | 0.34 | 1.00 | 0.37 | -0.08 | 0.22 | 0.33 | -0.05 | 0.29 | 0.14 | 0.24 | 0.22 | 0.19 | 0.28 | 0.75 |
| MomValSprd | 0.22 | 0.32 | 0.17 | 0.35 | 0.11 | -0.21 | 0.03 | 0.37 | 1.00 | 0.12 | 0.14 | 0.54 | -0.04 | 0.49 | -0.07 | 0.01 | 0.11 | 0.03 | 0.09 | 0.46 |
| RiskConc | -0.01 | 0.17 | -0.08 | -0.10 | 0.15 | 0.33 | 0.21 | -0.08 | 0.12 | 1.00 | 0.32 | 0.60 | 0.13 | 0.59 | 0.04 | -0.09 | 0.14 | 0.13 | 0.12 | 0.25 |
| VolSkew | 0.13 | 0.22 | 0.15 | 0.12 | 0.28 | 0.23 | 0.33 | 0.22 | 0.14 | 0.32 | 1.00 | 0.68 | -0.01 | 0.68 | -0.07 | 0.03 | 0.18 | 0.20 | 0.14 | 0.47 |
| LatTech | 0.26 | 0.36 | 0.18 | 0.27 | 0.30 | 0.09 | 0.26 | 0.33 | 0.54 | 0.60 | 0.68 | 1.00 | 0.01 | 0.91 | -0.08 | -0.04 | 0.20 | 0.23 | 0.14 | 0.65 |
| LatFund | 0.02 | -0.11 | -0.04 | 0.05 | -0.04 | 0.05 | -0.06 | -0.05 | -0.04 | 0.13 | -0.01 | 0.01 | 1.00 | 0.19 | 0.01 | -0.05 | 0.01 | 0.16 | -0.03 | 0.08 |
| LatComp | 0.21 | 0.31 | 0.16 | 0.23 | 0.29 | 0.10 | 0.27 | 0.29 | 0.49 | 0.59 | 0.68 | 0.91 | 0.19 | 1.00 | -0.10 | -0.04 | 0.17 | 0.22 | 0.10 | 0.61 |
| TDYldSpd | 0.14 | 0.22 | 0.15 | 0.21 | 0.00 | 0.12 | 0.01 | 0.14 | -0.07 | 0.04 | -0.07 | -0.08 | 0.01 | -0.10 | 1.00 | 0.17 | 0.24 | 0.24 | 0.45 | 0.24 |
| TDRealGwth | 0.20 | 0.18 | 0.14 | 0.24 | -0.03 | -0.02 | -0.04 | 0.24 | 0.01 | -0.09 | 0.03 | -0.04 | -0.05 | -0.04 | 0.17 | 1.00 | 0.39 | 0.22 | 0.54 | 0.31 |
| TDFinStr | 0.14 | 0.27 | 0.10 | 0.23 | 0.06 | 0.17 | 0.07 | 0.22 | 0.11 | 0.14 | 0.18 | 0.20 | 0.01 | 0.17 | 0.24 | 0.39 | 1.00 | 0.49 | 0.77 | 0.45 |
| TDInf | 0.13 | 0.23 | 0.21 | 0.19 | 0.05 | 0.14 | 0.06 | 0.19 | 0.03 | 0.13 | 0.20 | 0.23 | 0.16 | 0.22 | 0.24 | 0.22 | 0.49 | 1.00 | 0.66 | 0.43 |
| TDComp | 0.21 | 0.31 | 0.16 | 0.26 | 0.06 | 0.12 | 0.05 | 0.28 | 0.09 | 0.12 | 0.14 | 0.14 | -0.03 | 0.10 | 0.45 | 0.54 | 0.77 | 0.66 | 1.00 | 0.50 |
| IGModel | 0.54 | 0.57 | 0.42 | 0.68 | 0.28 | 0.14 | 0.26 | 0.75 | 0.46 | 0.25 | 0.47 | 0.65 | 0.08 | 0.61 | 0.24 | 0.31 | 0.45 | 0.43 | 0.50 | 1.00 |

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

C: Bottom-Up Factors—Performance Summary

Bottom-Up Quality Factor 1. Free Cash Flow / Invested Capital

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | | |
|-------------------|----------------|---------------|--------------------|-------------|--|----------------|---------------|--------------------|-------------|--|
| | | | | | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | |
| 1 | 1.0% | 10.5% | 4.9% | 54% | | | | | | |
| 2 | 0.8% | 8.1% | 4.7% | 51% | | | | | | |
| 3 | 0.4% | 3.3% | 5.0% | 41% | | | | | | |
| Total Test | | | | | Long/Short | 0.6% | 6.47% | 2.8% | 57% | |
| | | | | | L/S v Bnch | 0.2% | 2.84% | 1.6% | 54% | |
| | | | | | | T-Stat | Sharpe | | | |
| Average Return | | | | | Long/Short | 2.92 | 0.66 | | | |
| Rank IC | | | | | | | | | | |
| Avg IC | | | | | | | | | | |
| Avg # of Assets | | | | | | | | | | |
| Universe | 0.7% | 3.9% | 4.9% | 23 | | | | | | |

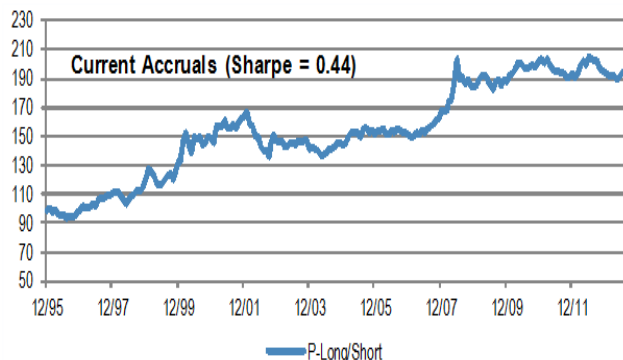
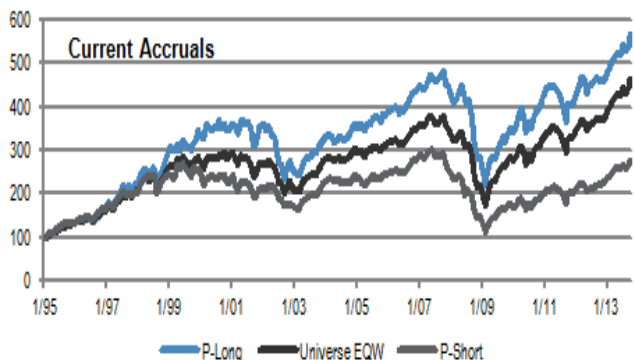


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Bottom-Up Quality Factor 2. Current Accruals

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | | |
|-------------------|----------------|---------------|--------------------|-------------|--|----------------|---------------|--------------------|-------------|--|
| | | | | | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | |
| 1 | 0.9% | 9.7% | 4.9% | 52% | | | | | | |
| 2 | 0.9% | 10.0% | 4.4% | 55% | | | | | | |
| 3 | 0.6% | 5.6% | 4.8% | 44% | | | | | | |
| Total Test | | | | | Long/Short | 0.3% | 3.60% | 2.4% | 54% | |
| | | | | | L/S v Bnch | 0.1% | 1.20% | 1.3% | 52% | |
| | | | | | | T-Stat | Sharpe | | | |
| Average Return | | | | | Long/Short | 2.03 | 0.44 | | | |
| Rank IC | | | | | | | | | | |
| Avg IC | | | | | | | | | | |
| Avg # of Assets | | | | | | | | | | |
| Universe | 0.8% | 1.4% | 2.3% | 24 | | | | | | |

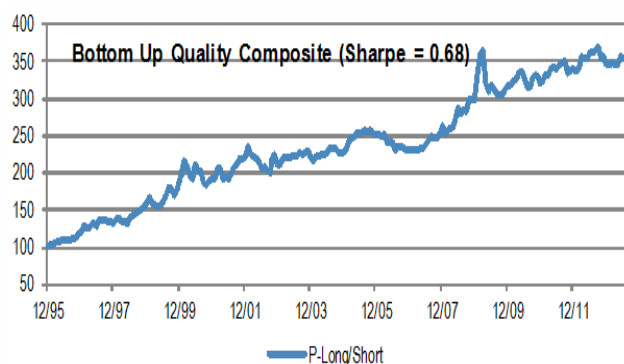
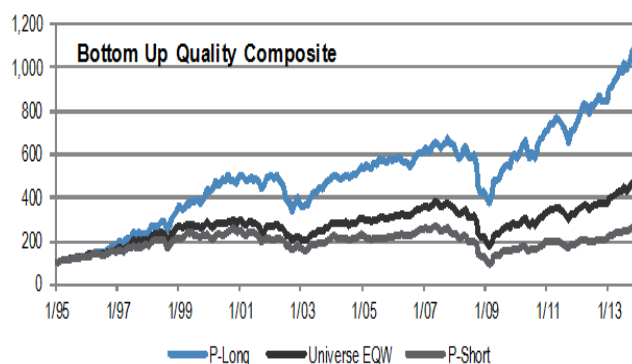


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Bottom-Up Quality Composite Factor

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | |
|------------|----------------|---------------|--------------------|-----------------|--|----------------|---------------|--------------------|-------------|
| 1 | 1.2% | 13.5% | 4.7% | 59% | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. |
| 2 | 0.6% | 6.1% | 4.5% | 50% | Long/Short | 0.6% | 7.06% | 3.0% | 60% |
| 3 | 0.6% | 5.3% | 5.1% | 39% | L/S v Bnch | 0.4% | 4.55% | 1.8% | 59% |
| Total Test | | | | | T-Stat | | Sharpe | | |
| | Average Return | Rank IC | Avg IC | Avg # of Assets | Long/Short | 3.09 | 0.68 | | |
| Universe | 0.8% | 4.7% | 5.1% | 24 | | | | | |

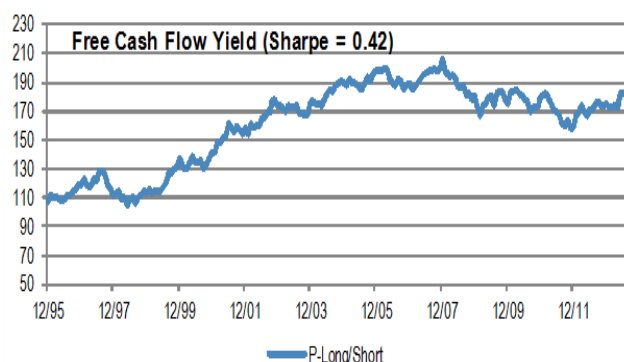
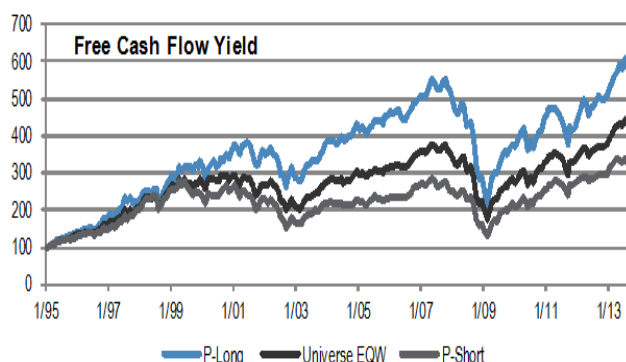


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Bottom-Up Valuation Factor 1. Free Cash Flow Yield

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | |
|------------|----------------|---------------|--------------------|-----------------|--|----------------|---------------|--------------------|-------------|
| 1 | 1.0% | 10.3% | 5.3% | 53% | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. |
| 2 | 0.7% | 7.8% | 4.2% | 48% | Long/Short | 0.3% | 3.21% | 2.2% | 56% |
| 3 | 0.7% | 7.0% | 4.6% | 45% | L/S v Bnch | 0.2% | 1.99% | 1.4% | 53% |
| Total Test | | | | | T-Stat | | Sharpe | | |
| | Average Return | Rank IC | Avg IC | Avg # of Assets | Long/Short | 1.96 | 0.42 | | |
| Universe | 0.8% | 2.4% | 2.1% | 24 | | | | | |

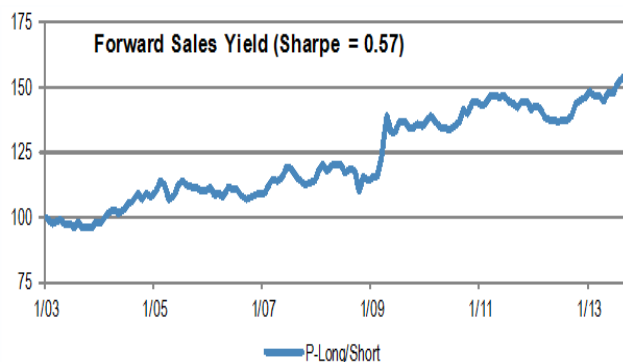
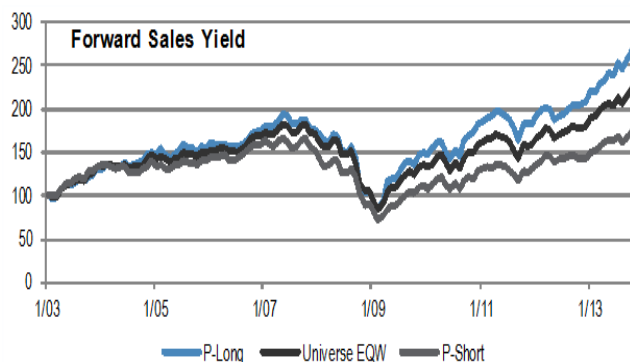


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Bottom-Up Valuation Factor 2. Forward Sales Yield

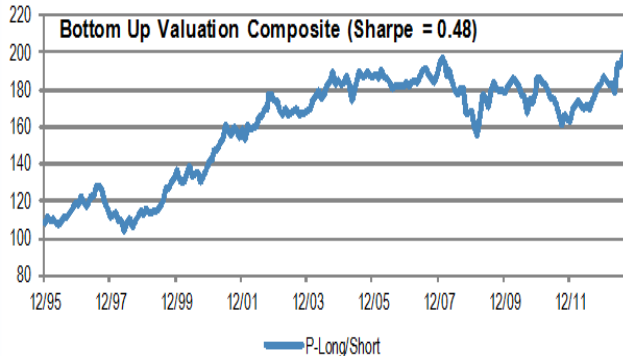
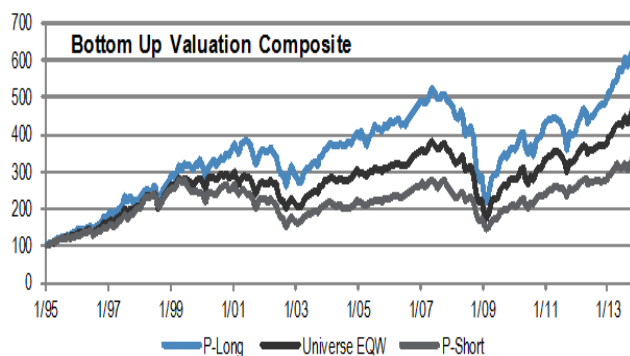
| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | |
|------------|----------------|---------------|--------------------|-----------------|--|----------------|---------------|--------------------|-------------|
| 1 | 0.9% | 9.6% | 5.1% | 58% | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. |
| 2 | 0.7% | 8.2% | 4.2% | 49% | Long/Short | 0.4% | 4.20% | 2.3% | 53% |
| 3 | 0.5% | 5.3% | 4.4% | 47% | | | | | |
| Total Test | | | | | | | | | |
| | Average Return | Rank IC | Avg IC | Avg # of Assets | | T-Stat | Sharpe | | |
| Universe | 0.7% | 2.7% | 1.1% | 24 | Long/Short | 1.85 | 0.57 | | |



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
 Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Bottom-Up Valuation Composite

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | |
|------------|----------------|---------------|--------------------|-----------------|--|----------------|---------------|--------------------|-------------|
| 1 | 1.0% | 10.3% | 5.2% | 54% | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. |
| 2 | 0.8% | 8.3% | 4.8% | 49% | Long/Short | 0.3% | 3.69% | 2.4% | 55% |
| 3 | 0.6% | 6.6% | 4.2% | 45% | | | | | |
| Total Test | | | | | | | | | |
| | Average Return | Rank IC | Avg IC | Avg # of Assets | | T-Stat | Sharpe | | |
| Universe | 0.8% | 2.6% | 2.9% | 24 | Long/Short | 2.07 | 0.48 | | |

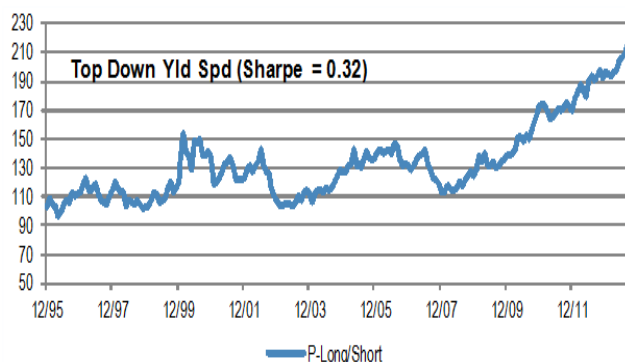
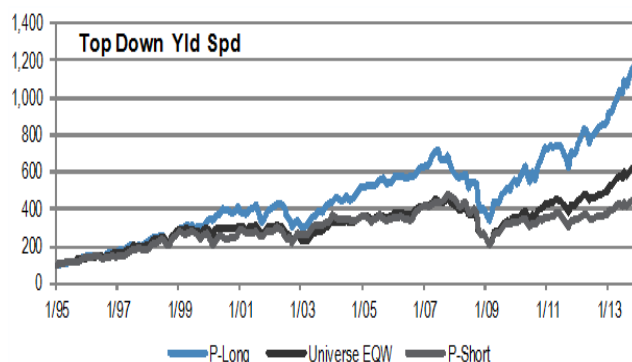


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
 Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

D: Top-Down Factors — Performance Summary

Top-Down Factor 1. Yield Spread

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | | |
|-------------------|----------------|---------------|--------------------|-------------|--|----------------|---------------|--------------------|-------------|--|
| | | | | | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | |
| 1 | 1.2% | 14.0% | 5.1% | 56% | Long/Short | 0.4% | 4.17% | 3.8% | 58% | |
| 2 | 0.7% | 7.0% | 5.7% | 47% | | | | | | |
| 3 | 0.8% | 8.4% | 5.3% | 44% | | | | | | |
| Total Test | | | | | L/S v Bnch | 0.3% | 3.28% | 2.1% | 56% | |
| | | | | | T-Stat | | Sharpe | | | |
| Average Return | | | | | T-Stat | | Sharpe | | | |
| Rank IC | | | | | Long/Short | | 1.63 | | 0.32 | |
| Avg IC | | | | | | | | | | |
| Avg # of Assets | | | | | | | | | | |
| Universe | 0.9% | 7.1% | 7.0% | 10 | | | | | | |

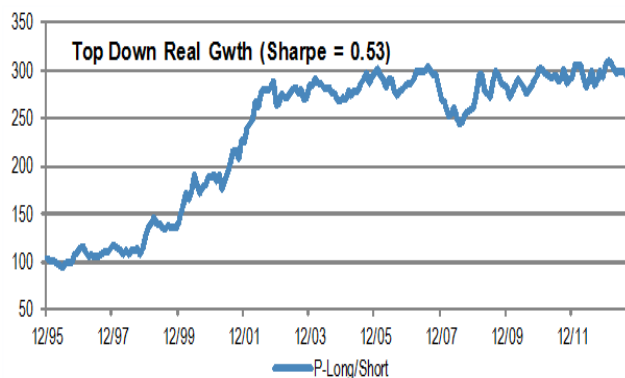
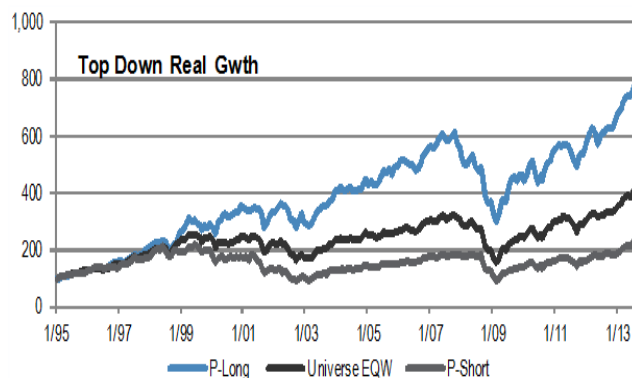


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Top-Down Factor 2. Real Economic Growth

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | | |
|-------------------|----------------|---------------|--------------------|-------------|--|----------------|---------------|--------------------|-------------|--|
| | | | | | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | |
| 1 | 1.0% | 11.7% | 4.7% | 55% | Long/Short | 0.5% | 5.80% | 3.1% | 57% | |
| 2 | 0.7% | 6.8% | 4.9% | 45% | | | | | | |
| 3 | 0.5% | 4.7% | 5.0% | 48% | | | | | | |
| Total Test | | | | | L/S v Bnch | 0.3% | 3.33% | 1.7% | 55% | |
| | | | | | T-Stat | | Sharpe | | | |
| Average Return | | | | | T-Stat | | Sharpe | | | |
| Rank IC | | | | | Long/Short | | 2.48 | | 0.53 | |
| Avg IC | | | | | | | | | | |
| Avg # of Assets | | | | | | | | | | |
| Universe | 0.7% | 6.0% | 5.5% | 15 | | | | | | |

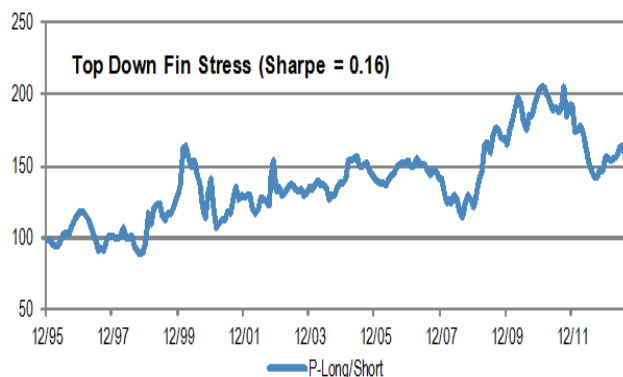
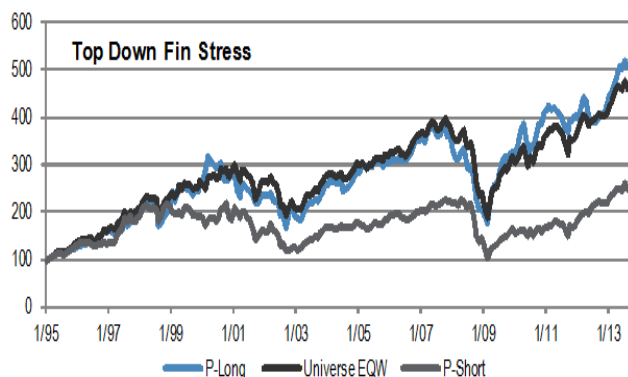


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Top-Down Factor 3. Financial Stress Factor

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | |
|------------|----------------|---------------|--------------------|-----------------|--|----------------|---------------|--------------------|-------------|
| 1 | 0.9% | 9.4% | 5.5% | 52% | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. |
| 2 | 1.0% | 11.1% | 5.0% | 54% | Long/Short | 0.3% | 2.58% | 4.7% | 52% |
| 3 | 0.6% | 5.4% | 5.3% | 49% | L/S v Bnch | 0.1% | 0.54% | 2.6% | 52% |
| Total Test | | | | | T-Stat | | Sharpe | | |
| | Average Return | Rank IC | Avg IC | Avg # of Assets | Long/Short | 1.02 | 0.16 | | |
| Universe | 0.8% | 1.9% | 1.7% | 12 | | | | | |

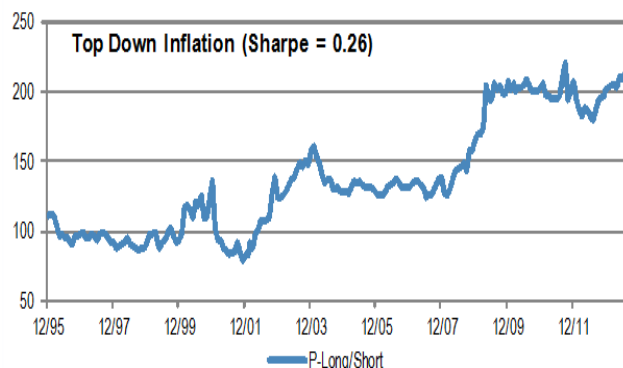
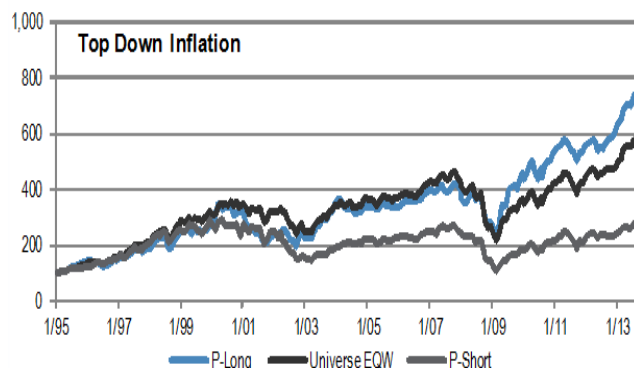


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Top-Down Factor 4. Inflation Factor

| Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. | Long Short Strategy Statistics Portfolio 1 less Portfolio 3 | | | | |
|------------|----------------|---------------|--------------------|-----------------|--|----------------|---------------|--------------------|-------------|
| 1 | 1.1% | 11.7% | 5.6% | 53% | Portfolio | Average Return | Annual Return | Standard Deviation | % Out Perf. |
| 2 | 1.0% | 11.7% | 4.8% | 51% | Long/Short | 0.5% | 4.22% | 4.6% | 56% |
| 3 | 0.6% | 5.8% | 5.4% | 42% | L/S v Bnch | 0.2% | 1.52% | 2.6% | 53% |
| Total Test | | | | | T-Stat | | Sharpe | | |
| | Average Return | Rank IC | Avg IC | Avg # of Assets | Long/Short | 1.46 | 0.26 | | |
| Universe | 0.9% | 3.0% | 3.4% | 11 | | | | | |



Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

E: Top-Down Macro Heat Map (7/1993-10/2013)

Expected *Relative* Performance of Industries for Selected Macro Variables

We used two yield spreads in the model capturing monetary policy and fixed income market pricing of economic outlook.

Rising Short Term Rates: Positive for Capital Goods, Pharmaceuticals, Diversified Financials, Insurance, Utilities; **Negative** for Retailing, Consumer Durables, and Consumer Services.

Steepening Yield Curve: Positive for Consumer Durables, Consumer Services, Commercial Services, Retailing; **Negative** for Capital Goods, Pharmaceuticals, Diversified Financials, and Energy.

Four forward-looking variables for growth outlook help predict cross-section of industry returns.

Rising Citigroup Economic Surprise Index: Positive for Capital Goods, Banks, Diversified Financials, Insurance; **Negative** for Software, Tech Hardware, Utilities, Retailing, and Consumer Services.

Rising Volatility (VIX): Positive for Pharmaceuticals, Software, Tech Hardware, Telecom; **Negative** for Banks, Diversified Financials, Real Estate, Capital Goods, Transportation.

Rising ISM Manufacturing Index: Positive for Capital Goods, Household & Personal Products, Banks, Real Estate, Energy; **Negative** for Retailing, Food & Staples Retailing, Pharmaceuticals, Commercial Services.

Rising Michigan Consumer Confidence Index: Positive for Energy, Capital Goods, Banks, Diversified Financials; **Negative** for Consumer Durables, Consumer Services, and Retailing.

The financial stress indices incorporate many financial and macro variables—we were surprised to find that our Financial Stress block was the least efficacious in predicting forward industry returns.

Rising St Louis Fed Financial Stress Index: Positive for Pharmaceuticals, Food Bev Tobacco, Software, Telecom; **Negative** for Banks, Diversified Financials, Real Estate, Insurance, Capital Goods, Consumer Durables.

Rising Cleveland Fed Financial Stress Index: Positive for Tech Hardware, Software, and Semiconductors; **Negative** for Banks, Insurance, Real Estate, Food Bev Tobacco, and Consumer Durables.

Also surprising is that none of the forward-looking inflation indicators, like breakeven rates and ISM Price Index, did a better job at predicting than plain vanilla consumer and producer inflation rates.

Rising Core Consumer Inflation: Positive for Food Staple Retailing, Food Bev Tobacco, Healthcare Equipment, Pharmaceuticals, Utilities; **Negative** for Auto, Semiconductors, Software, Tech Hardware, and Diversified Financials.

Rising Finished Goods Producer Inflation: Positive for Utilities, Food Bev Tobacco, Transportation, Energy; **Negative** for Auto, Retailing.

Table 11e: Industries 9 to 16 of 24 versus Macro Variables 14 to 26 of 26

T-Stat Heat Map – Relative Industry Group Returns 1, 3, 6, 12 Months Forward, Regressed on Macro Variables (contd.)

| Sector Name Returns, Mths Fwd | Media | | | | Retailing | | | | Fd Stpl Retail | | | | Fd Bev Tob | | | | Hhld & PPds | | | | Health Equip | | | | Pharma | | | | Banks | | | |
|--|-------|---|---|----|-----------|---|---|----|----------------|---|---|----|------------|---|---|----|-------------|---|---|----|--------------|---|---|----|--------|---|---|----|-------|---|---|----|
| | 1 | 3 | 6 | 12 | 1 | 3 | 6 | 12 | 1 | 3 | 6 | 12 | 1 | 3 | 6 | 12 | 1 | 3 | 6 | 12 | 1 | 3 | 6 | 12 | 1 | 3 | 6 | 12 | 1 | 3 | 6 | 12 |
| Log(Oil/Gold Price), avg average of daily (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Log(CRB Commodity Price Index) average of daily (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leading Economic Indicator, YoY% (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Log(ISM Manufact) (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Log(ISM Non- Manufacturing) (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chicago Fed National Activity Index (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Michigan Consumer Confidence Index, Log (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CPI, YoY% (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CPI, Core YoY% (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PPI, Finished YoY% (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PPI, Intermediate YoY% (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ISM Business Prices (log) (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| log(Dollar Index) average of daily (change, # of lags) | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

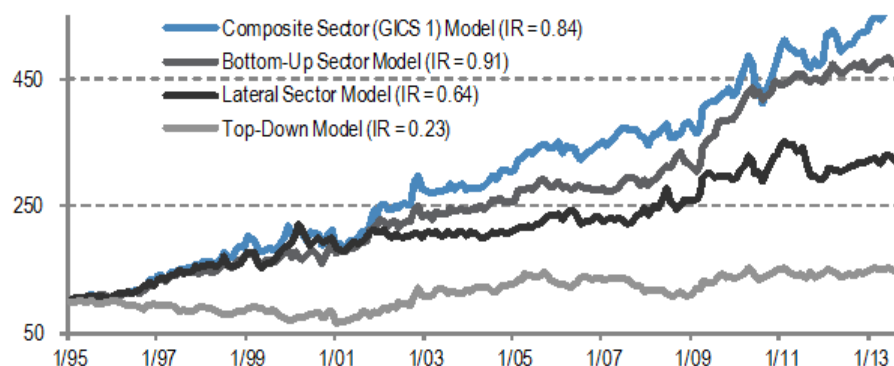
KEY

| | | |
|-------------|----------------|--|
| t-stat >= 2 | -1 < t <= 0 | Note: The changes 1, 3, 6, 12 (vertical axis) represent 1, 3, 6, 12 months difference in the macro variables. The 0 change is the difference between current value of a macro variable and its trailing five year average. |
| 1 < t <= 2 | -2 < t <= -1 | |
| 0 < t <= 1 | -2 t-stat < -2 | |

Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

F: Sector GICS Level I Model—Using Same Factors as the Industry Model

Figure 40: Performance: Sector Models and Its Sub-Blocks



Source: J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Table 12: Sector Model: Performance Statistics

| Factor | Avg. IC | T-Stat | Hit Rate | Turnover | IR | L/S Avg. Ret | L/S Stdev. | Long Avg. Ret | Short Avg. Ret |
|---------------------------------|---------|--------|----------|----------|------|--------------|------------|---------------|----------------|
| Composite Sector (GICS 1) Model | 10.7% | 3.65 | 62% | 17% | 0.84 | 0.83% | 3.41% | 1.13% | 0.30% |
| Bottom-Up Sector Model | 9.6% | 3.94 | 62% | 12% | 0.91 | 0.74% | 2.81% | 1.03% | 0.29% |
| Lateral Sector Model | 8.7% | 2.78 | 60% | 19% | 0.64 | 0.56% | 3.04% | 1.04% | 0.48% |
| Top-Down Model | 1.4% | 0.97 | 51% | 35% | 0.23 | 0.26% | 4.04% | 0.97% | 0.71% |

Source: J.P. Morgan Quantitative and Derivatives Strategies.

Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

金融商品取引法に基づく表示事項

(Below statement explains possibilities of risk of financial instruments in Japanese language. This is to follow “the Financial Instruments and Exchange Law” regulated by Government of Japan.)

株式をお取引する場合には、約定代金に事前にお客様と個別に合意した手数料率を乗じて算出した委託手数料及び消費税を頂くこととなります。株式を募集等により取得する場合には、購入対価のみお支払いいただくこととなります。株式取引は株価の変動等により損失が生じる恐れがあります。また、外国株式取引の場合、為替相場の変動によっても損失が生じるおそれがあります。

転換社債を当社が相手方となりお買付いただく場合及び募集・売出しによりお買付いただく場合は、購入対価のみお支払いいただくこととなります。また、債券の売却にあたり手数料は発生しません。債券の価格は、市場での株式の価格、株式への転換条件、金利水準等の変化に対応して変動しますので、償還前に換金する場合には、損失が生じるおそれがあります。債券の発行者の業務や財産の状況の変化に伴い、債券の価格が変動することによって損失が生じるおそれがあります。株式への転換を選択された場合、転換後の財産の価格や評価額が債券の当初購入金額を下回るおそれがあります。新株予約権を行使できる期間に制限があります。

キャップ・フロアー、スワップション、通貨オプション取引、金利スワップ、通貨スワップ、クレジットデリバティブ、個別株オプション等の「店頭デリバティブ取引」にあたっては、手数料その他の費用は頂戴しません。店頭デリバティブ取引は、金利指標、通貨の価格、金融指標の名称、参照先の信用状況、対象とする個別株式の株価、等の変動を直接の原因として損失が生ずることとなるおそれがある取引です。また、ISDA マスター契約におけるクレジット・サポート・アネックス(Credit Support Annex)等の担保契約の適用がある場合、金利指標、通貨の価格等の参照指標が大きく変動することで、あるいはクレジットイベントが発生して、プロテクションの売り手側が支払うべき金額が差入れ済みの担保の額を上回る場合に、発生する損失の額が差し入れていただく担保の額を上回る恐れがあります。店頭デリバティブ取引の想定元本は、当該デリバティブ取引等についてお客様に差し入れていただく担保の額を上回る可能性があります。店頭デリバティブ取引にあたり差し入れていただく担保の額は担保契約の内容により異なるため、想定元本の担保額に対する比率上限を算出することはできません。店頭デリバティブ取引では反対取引を行おうとする場合は価格に差があり、原則として同じ価格での反対売買を行うことは出来ません。

市場先物取引、市場オプション取引、市場先物オプション取引をお取引する場合には、約定代金または約定枚数に対し、事前にお客様と個別に合意した手数料率を乗じて算出した委託手数料および消費税のみを頂くこととなります。証拠金の額は、SPAN®等各取引所の定める方法により、先物取引、オプション取引、先物オプション取引全体の建玉から生じるリスクに応じて計算されますので、市場先物取引、市場オプション取引、市場先物オプション取引の額の証拠金の額に対する比率は、常に一定ではなく、取引の額が証拠金の額を上回る場合があります。市場先物取引、市場オプション取引、市場先物オプションの価格は、対象とする株価指数、有価証券の価格、金利、通貨の変動等により上下しますので、これにより損失が発生するおそれがあり、また当該株価指数、有価証券の価格、金利、通貨が大きく変動することで発生する損失の額が差し入れていただく保証金の額を上回る恐れがあります。また、当該市場先物取引、市場オプション取引、市場先物オプション取引が外貨建て取引の場合、為替相場の変動によって損失が生じるおそれがあります。

商品毎に手数料等およびリスクは異なりますので、実際上記取引を行っていただく前には当該商品等の契約締結前交付書面や目論見書またはお客様向け資料をよくお読みください。

金融商品取引業者 JP モルガン証券株式会社関東財務局長(金商)第 82 号 加入協会/日本証券業協会、一般社団法人金融先物取引業協会、一般社団法人第二種金融商品取引業協会、一般社団法人日本投資顧問業協会

Disclosures

Analyst Certification: The research analyst(s) denoted by an “AC” on the cover of this report certifies (or, where multiple research analysts are primarily responsible for this report, the research analyst denoted by an “AC” on the cover or within the document individually certifies, with respect to each security or issuer that the research analyst covers in this research) that: (1) all of the views expressed in this report accurately reflect his or her personal views about any and all of the subject securities or issuers; and (2) no part of any of the research analyst's compensation was, is, or will be directly or indirectly related to the specific recommendations or views expressed by the research analyst(s) in this report. For all Korea-based research analysts listed on the front cover, they also certify, as per KOFIA requirements, that their analysis was made in good faith and that the views reflect their own opinion, without undue influence or intervention.

Important Disclosures

Company-Specific Disclosures: Important disclosures, including price charts, are available for compendium reports and all J.P. Morgan-covered companies by visiting <https://jpm.com/research/disclosures>, calling 1-800-477-0406, or e-mailing research.disclosure.inquiries@jpmorgan.com with your request. J.P. Morgan’s Strategy, Technical, and Quantitative Research teams may screen companies not covered by J.P. Morgan. For important disclosures for these companies, please call 1-800-477-0406 or e-mail research.disclosure.inquiries@jpmorgan.com.

Explanation of Equity Research Ratings, Designations and Analyst(s) Coverage Universe:

J.P. Morgan uses the following rating system: Overweight [Over the next six to twelve months, we expect this stock will outperform the average total return of the stocks in the analyst's (or the analyst's team's) coverage universe.] Neutral [Over the next six to twelve months, we expect this stock will perform in line with the average total return of the stocks in the analyst's (or the analyst's team's) coverage universe.] Underweight [Over the next six to twelve months, we expect this stock will underperform the average total return of the stocks in the analyst's (or the analyst's team's) coverage universe.] Not Rated (NR): J.P. Morgan has removed the rating and, if applicable, the price target, for this stock because of either a lack of a sufficient fundamental basis or for legal, regulatory or policy reasons. The previous rating and, if applicable, the price target, no longer should be relied upon. An NR designation is not a recommendation or a rating. In our Asia (ex-Australia) and U.K. small- and mid-cap equity research, each stock's expected total return is compared to the expected total return of a benchmark country market index, not to those analysts' coverage universe. If it does not appear in the Important Disclosures section of this report, the certifying analyst's coverage universe can be found on J.P. Morgan's research website, www.jpmorganmarkets.com.

J.P. Morgan Equity Research Ratings Distribution, as of January 1, 2014

| | Overweight (buy) | Neutral (hold) | Underweight (sell) |
|---|---------------------|-------------------|-----------------------|
| J.P. Morgan Global Equity Research Coverage | 43% | 45% | 12% |
| IB clients* | 57% | 49% | 36% |
| JPMS Equity Research Coverage | 43% | 50% | 7% |
| IB clients* | 75% | 66% | 59% |

*Percentage of investment banking clients in each rating category.

For purposes only of FINRA/NYSE ratings distribution rules, our Overweight rating falls into a buy rating category; our Neutral rating falls into a hold rating category; and our Underweight rating falls into a sell rating category. Please note that stocks with an NR designation are not included in the table above.

Equity Valuation and Risks: For valuation methodology and risks associated with covered companies or price targets for covered companies, please see the most recent company-specific research report at <http://www.jpmorganmarkets.com>, contact the primary analyst or your J.P. Morgan representative, or email research.disclosure.inquiries@jpmorgan.com.

Equity Analysts' Compensation: The equity research analysts responsible for the preparation of this report receive compensation based upon various factors, including the quality and accuracy of research, client feedback, competitive factors, and overall firm revenues.

Registration of non-US Analysts: Unless otherwise noted, the non-US analysts listed on the front of this report are employees of non-US affiliates of JPMS, are not registered/qualified as research analysts under NASD/NYSE rules, may not be associated persons of JPMS, and may not be subject to FINRA Rule 2711 and NYSE Rule 472 restrictions on communications with covered companies, public appearances, and trading securities held by a research analyst account.

Conflict of Interest

This research contains the views, opinions and recommendations of J.P. Morgan research analysts. J.P. Morgan has adopted research conflict of interest policies, including prohibitions on non-research personnel influencing the content of research. Research analysts still may speak to J.P. Morgan trading desk personnel in formulating views, opinions and recommendations. Trading desks may trade, or have traded, as principal on the basis of the research analysts' views and research. Therefore, this research may not be independent from the proprietary interests of J.P. Morgan trading desks which may conflict with your interests. As a general matter, J.P. Morgan and/or its affiliates trade as principal in connection with making markets in fixed income securities, commodities and other investment instruments discussed in research reports.

Other Disclosures

J.P. Morgan ("JPM") is the global brand name for J.P. Morgan Securities LLC ("JPMS") and its affiliates worldwide. J.P. Morgan Cazenove is a marketing name for the U.K. investment banking businesses and EMEA cash equities and equity research businesses of JPMorgan Chase & Co. and its subsidiaries.

All research reports made available to clients are simultaneously available on our client website, J.P. Morgan Markets. Not all research content is redistributed, e-mailed or made available to third-party aggregators. For all research reports available on a particular stock, please contact your sales representative.

Options related research: If the information contained herein regards options related research, such information is available only to persons who have received the proper option risk disclosure documents. For a copy of the Option Clearing Corporation's Characteristics and Risks of Standardized Options, please contact your J.P. Morgan Representative or visit the OCC's website at <http://www.optionsclearing.com/publications/risks/riskstoc.pdf>

Legal Entities Disclosures

U.S.: JPMS is a member of NYSE, FINRA, SIPC and the NFA. JPMorgan Chase Bank, N.A. is a member of FDIC. U.K.: JPMorgan Chase N.A., London Branch, is authorised by the Prudential Regulation Authority and is subject to regulation by the Financial Conduct Authority and to limited regulation by the Prudential Regulation Authority. Details about the extent of our regulation by the Prudential Regulation Authority are available from J.P. Morgan on

request. J.P. Morgan Securities plc (JPMS plc) is a member of the London Stock Exchange and is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority. Registered in England & Wales No. 2711006. Registered Office 25 Bank Street, London, E14 5JP. **South Africa:** J.P. Morgan Equities South Africa Proprietary Limited is a member of the Johannesburg Securities Exchange and is regulated by the Financial Services Board. **Hong Kong:** J.P. Morgan Securities (Asia Pacific) Limited (CE number AAJ321) is regulated by the Hong Kong Monetary Authority and the Securities and Futures Commission in Hong Kong. **Korea:** J.P. Morgan Securities (Far East) Ltd, Seoul Branch, is regulated by the Korea Financial Supervisory Service. **Australia:** J.P. Morgan Australia Limited (JPMAL) (ABN 52 002 888 011/AFS Licence No: 238188) is regulated by ASIC and J.P. Morgan Securities Australia Limited (JPMSAL) (ABN 61 003 245 234/AFS Licence No: 238066) is regulated by ASIC and is a Market, Clearing and Settlement Participant of ASX Limited and CHI-X. **Taiwan:** J.P.Morgan Securities (Taiwan) Limited is a participant of the Taiwan Stock Exchange (company-type) and regulated by the Taiwan Securities and Futures Bureau. **India:** J.P. Morgan India Private Limited, having its registered office at J.P. Morgan Tower, Off. C.S.T. Road, Kalina, Santacruz East, Mumbai - 400098, is a member of the National Stock Exchange of India Limited (SEBI Registration Number - INB 230675231/INF 230675231/INE 230675231) and Bombay Stock Exchange Limited (SEBI Registration Number - INB 010675237/INF 010675237) and is regulated by Securities and Exchange Board of India. **Thailand:** JPMorgan Securities (Thailand) Limited is a member of the Stock Exchange of Thailand and is regulated by the Ministry of Finance and the Securities and Exchange Commission. **Indonesia:** PT J.P. Morgan Securities Indonesia is a member of the Indonesia Stock Exchange and is regulated by the BAPEPAM LK. **Philippines:** J.P. Morgan Securities Philippines Inc. is a Trading Participant of the Philippine Stock Exchange and a member of the Securities Clearing Corporation of the Philippines and the Securities Investor Protection Fund. It is regulated by the Securities and Exchange Commission. **Brazil:** Banco J.P. Morgan S.A. is regulated by the Comissao de Valores Mobiliarios (CVM) and by the Central Bank of Brazil. **Mexico:** J.P. Morgan Casa de Bolsa, S.A. de C.V., J.P. Morgan Grupo Financiero is a member of the Mexican Stock Exchange and authorized to act as a broker dealer by the National Banking and Securities Exchange Commission. **Singapore:** This material is issued and distributed in Singapore by J.P. Morgan Securities Singapore Private Limited (JPMS) [MIC (P) 049/04/2013 and Co. Reg. No.: 199405335R] which is a member of the Singapore Exchange Securities Trading Limited and is regulated by the Monetary Authority of Singapore (MAS) and/or JPMorgan Chase Bank, N.A., Singapore branch (JPMCB Singapore) which is regulated by the MAS. **Japan:** JPMorgan Securities Japan Co., Ltd. is regulated by the Financial Services Agency in Japan. **Malaysia:** This material is issued and distributed in Malaysia by JPMorgan Securities (Malaysia) Sdn Bhd (18146-X) which is a Participating Organization of Bursa Malaysia Berhad and a holder of Capital Markets Services License issued by the Securities Commission in Malaysia. **Pakistan:** J. P. Morgan Pakistan Broking (Pvt.) Ltd is a member of the Karachi Stock Exchange and regulated by the Securities and Exchange Commission of Pakistan. **Saudi Arabia:** J.P. Morgan Saudi Arabia Ltd. is authorized by the Capital Market Authority of the Kingdom of Saudi Arabia (CMA) to carry out dealing as an agent, arranging, advising and custody, with respect to securities business under licence number 35-07079 and its registered address is at 8th Floor, Al-Faisaliyah Tower, King Fahad Road, P.O. Box 51907, Riyadh 11553, Kingdom of Saudi Arabia. **Dubai:** JPMorgan Chase Bank, N.A., Dubai Branch is regulated by the Dubai Financial Services Authority (DFSA) and its registered address is Dubai International Financial Centre - Building 3, Level 7, PO Box 506551, Dubai, UAE.

Country and Region Specific Disclosures

U.K. and European Economic Area (EEA): Unless specified to the contrary, issued and approved for distribution in the U.K. and the EEA by JPMS plc. Investment research issued by JPMS plc has been prepared in accordance with JPMS plc's policies for managing conflicts of interest arising as a result of publication and distribution of investment research. Many European regulators require a firm to establish, implement and maintain such a policy. This report has been issued in the U.K. only to persons of a kind described in Article 19 (5), 38, 47 and 49 of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (all such persons being referred to as "relevant persons"). This document must not be acted on or relied on by persons who are not relevant persons. Any investment or investment activity to which this document relates is only available to relevant persons and will be engaged in only with relevant persons. In other EEA countries, the report has been issued to persons regarded as professional investors (or equivalent) in their home jurisdiction. **Australia:** This material is issued and distributed by JPMSAL in Australia to "wholesale clients" only. This material does not take into account the specific investment objectives, financial situation or particular needs of the recipient. The recipient of this material must not distribute it to any third party or outside Australia without the prior written consent of JPMSAL. For the purposes of this paragraph the term "wholesale client" has the meaning given in section 761G of the Corporations Act 2001. **Germany:** This material is distributed in Germany by J.P. Morgan Securities plc, Frankfurt Branch and J.P.Morgan Chase Bank, N.A., Frankfurt Branch which are regulated by the Bundesanstalt für Finanzdienstleistungsaufsicht. **Hong Kong:** The 1% ownership disclosure as of the previous month end satisfies the requirements under Paragraph 16.5(a) of the Hong Kong Code of Conduct for Persons Licensed by or Registered with the Securities and Futures Commission. (For research published within the first ten days of the month, the disclosure may be based on the month end data from two months prior.) J.P. Morgan Broking (Hong Kong) Limited is the liquidity provider/market maker for derivative warrants, callable bull bear contracts and stock options listed on the Stock Exchange of Hong Kong Limited. An updated list can be found on HKEX website: <http://www.hkex.com.hk>. **Japan:** There is a risk that a loss may occur due to a change in the price of the shares in the case of share trading, and that a loss may occur due to the exchange rate in the case of foreign share trading. In the case of share trading, JPMorgan Securities Japan Co., Ltd., will be receiving a brokerage fee and consumption tax (shouhizei) calculated by multiplying the executed price by the commission rate which was individually agreed between JPMorgan Securities Japan Co., Ltd., and the customer in advance. Financial Instruments Firms: JPMorgan Securities Japan Co., Ltd., Kanto Local Finance Bureau (kinsho) No. 82 Participating Association / Japan Securities Dealers Association, The Financial Futures Association of Japan, Type II Financial Instruments Firms Association and Japan Investment Advisers Association. **Korea:** This report may have been edited or contributed to from time to time by affiliates of J.P. Morgan Securities (Far East) Ltd, Seoul Branch. **Singapore:** JPMS and/or its affiliates may have a holding in any of the securities discussed in this report; for securities where the holding is 1% or greater, the specific holding is disclosed in the Important Disclosures section above. **India:** For private circulation only, not for sale. **Pakistan:** For private circulation only, not for sale. **New Zealand:** This material is issued and distributed by JPMSAL in New Zealand only to persons whose principal business is the investment of money or who, in the course of and for the purposes of their business, habitually invest money. JPMSAL does not issue or distribute this material to members of "the public" as determined in accordance with section 3 of the Securities Act 1978. The recipient of this material must not distribute it to any third party or outside New Zealand without the prior written consent of JPMSAL. **Canada:** The information contained herein is not, and under no circumstances is to be construed as, a prospectus, an advertisement, a public offering, an offer to sell securities described herein, or solicitation of an offer to buy securities described herein, in Canada or any province or territory thereof. Any offer or sale of the securities described herein in Canada will be made only under an exemption from the requirements to file a prospectus with the relevant Canadian securities regulators and only by a dealer properly registered under applicable securities laws or, alternatively, pursuant to an exemption from the dealer registration requirement in the relevant province or territory of Canada in which such offer or sale is made. The information contained herein is under no circumstances to be construed as investment advice in any province or territory of Canada and is not tailored to the needs of the recipient. To the extent that the information contained herein references securities of an issuer incorporated, formed or created under the laws of Canada or a province or territory of Canada, any trades in such securities must be conducted through a dealer registered in Canada. No securities commission or similar regulatory authority in Canada has reviewed or in any way passed judgment upon these materials, the information contained herein

or the merits of the securities described herein, and any representation to the contrary is an offence. **Dubai:** This report has been issued to persons regarded as professional clients as defined under the DFSA rules. **Brazil:** Ombudsman J.P. Morgan: 0800-7700847 / ouvidoria.jp.morgan@jpmorgan.com.

General: Additional information is available upon request. Information has been obtained from sources believed to be reliable but JPMorgan Chase & Co. or its affiliates and/or subsidiaries (collectively J.P. Morgan) do not warrant its completeness or accuracy except with respect to any disclosures relative to JPMS and/or its affiliates and the analyst's involvement with the issuer that is the subject of the research. All pricing is as of the close of market for the securities discussed, unless otherwise stated. Opinions and estimates constitute our judgment as of the date of this material and are subject to change without notice. Past performance is not indicative of future results. This material is not intended as an offer or solicitation for the purchase or sale of any financial instrument. The opinions and recommendations herein do not take into account individual client circumstances, objectives, or needs and are not intended as recommendations of particular securities, financial instruments or strategies to particular clients. The recipient of this report must make its own independent decisions regarding any securities or financial instruments mentioned herein. JPMS distributes in the U.S. research published by non-U.S. affiliates and accepts responsibility for its contents. Periodic updates may be provided on companies/industries based on company specific developments or announcements, market conditions or any other publicly available information. Clients should contact analysts and execute transactions through a J.P. Morgan subsidiary or affiliate in their home jurisdiction unless governing law permits otherwise.

"Other Disclosures" last revised December 7, 2013.

Copyright 2014 JPMorgan Chase & Co. All rights reserved. This report or any portion hereof may not be reprinted, sold or redistributed without the written consent of J.P. Morgan.