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.

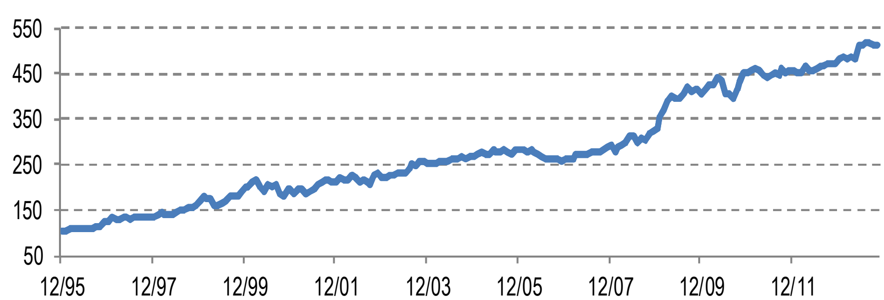
The long/short Industry Model yielded an Information Ratio (IR) of 0.95 over close to 20 years of history (1995-2013), exhibiting consistent performance (hit rate of 61%), strong Information Coefficient (IC) of 9.0%, and relatively low turnover.

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.

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

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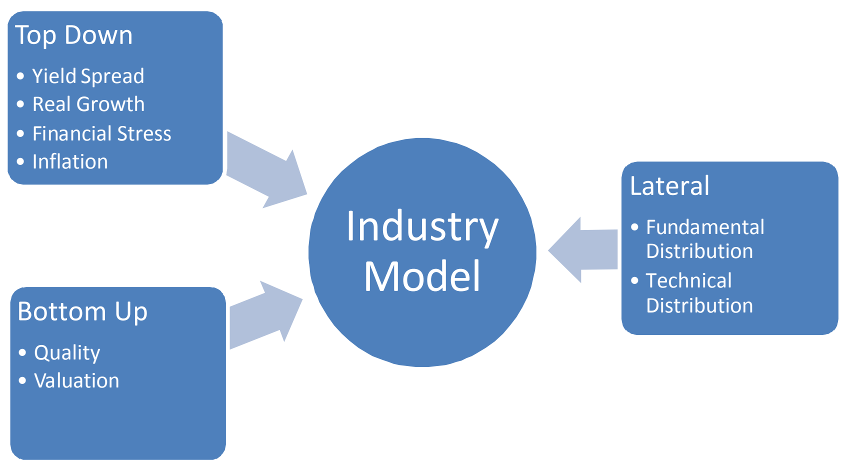
Industry Alpha Building Blocks

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 report[2] 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.

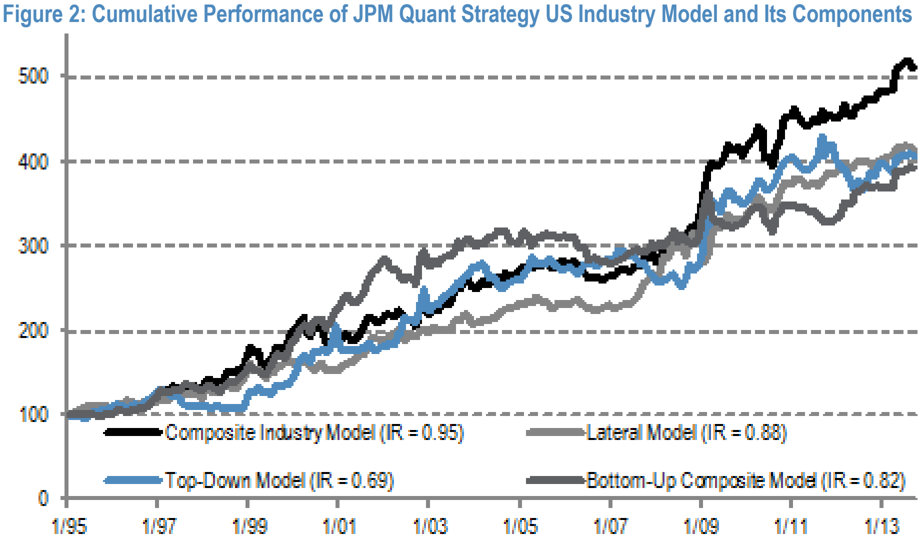
The main advantage of taking a block approach is that it allows us to combine different types of information that drive industry returns in a consistent and coherent manner.

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)

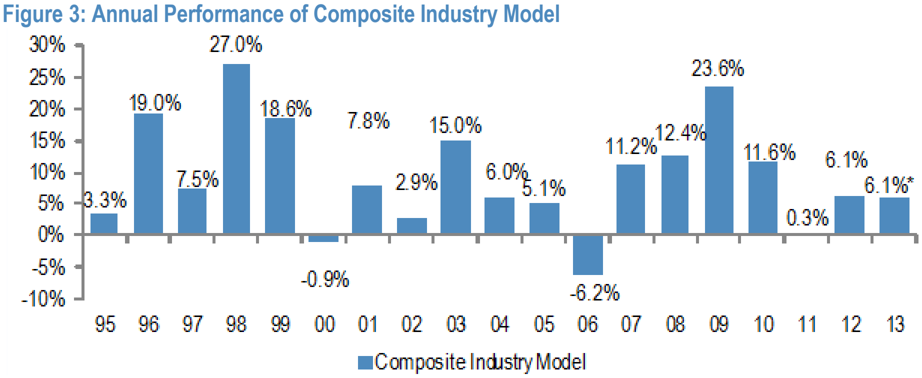
Factor	Avg. IC	T-Stat	Hit Rate	Turnover	IR	L/S Avg. Ret	L/S Stdev.	Long Avg. Ret	Short Avg. Ret
Composite Industry Model	**9.0%**	**3.95**	**61%**	**20%**	**0.95**	**0.77%**	**2.92%**	**1.21%**	**0.44%**
Bottom-Up Model (40%)	5.6%	3.56	58%	15%	0.82	0.65%	2.72%	1.14%	0.50%
Lateral Model (40%)	6.3%	3.87	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



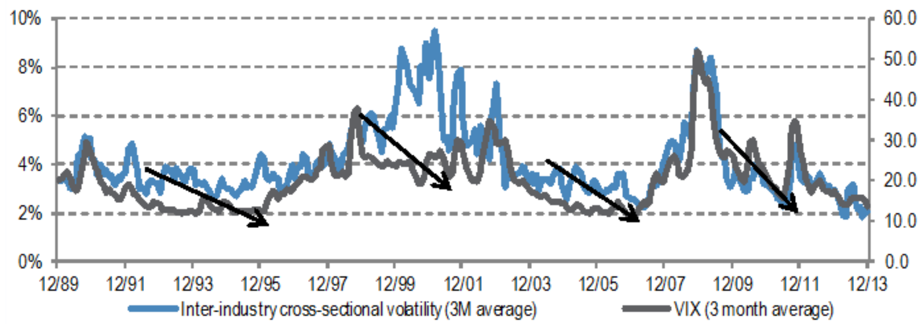
Source: Bloomberg, Factset, J.P. Morgan Quantitative and Derivatives Strategies. Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

* 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

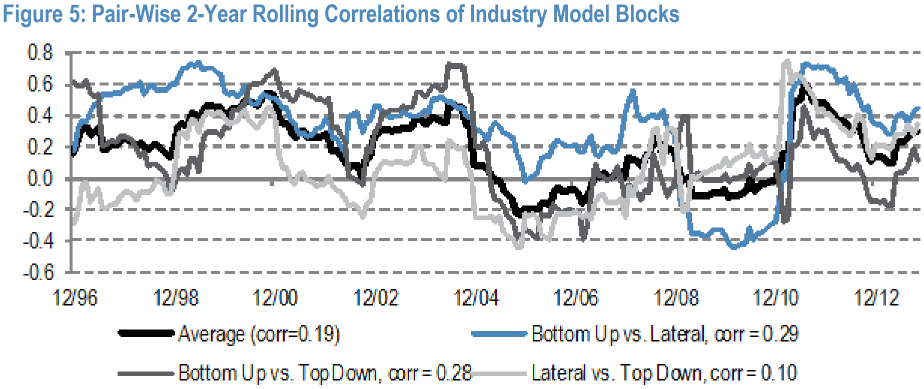


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

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

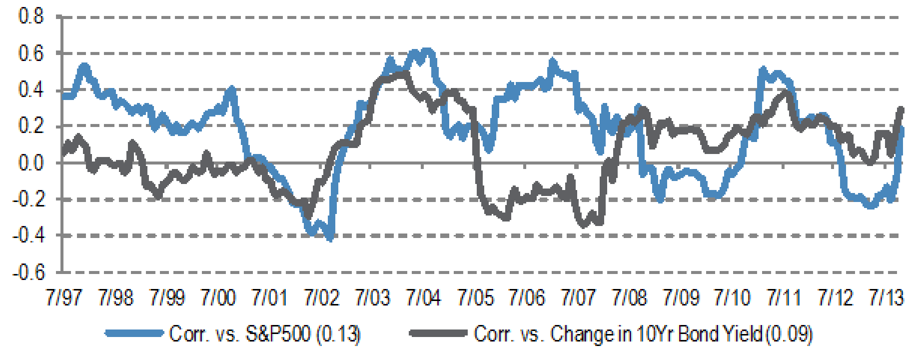


Source: Bloomberg, Factset, J.P. Morgan Quantitative and Derivatives Strategies.

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



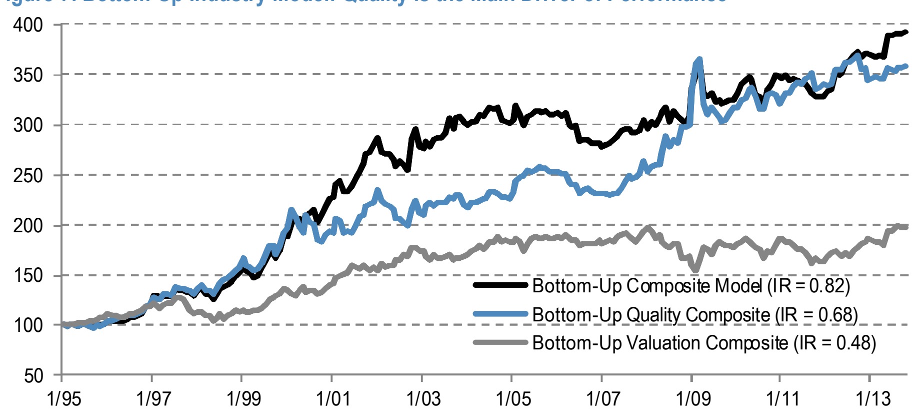
Source: Bloomberg, FactSet, S&P, J.P. Morgan Quantitative and Derivatives Strategies.

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 loose 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%

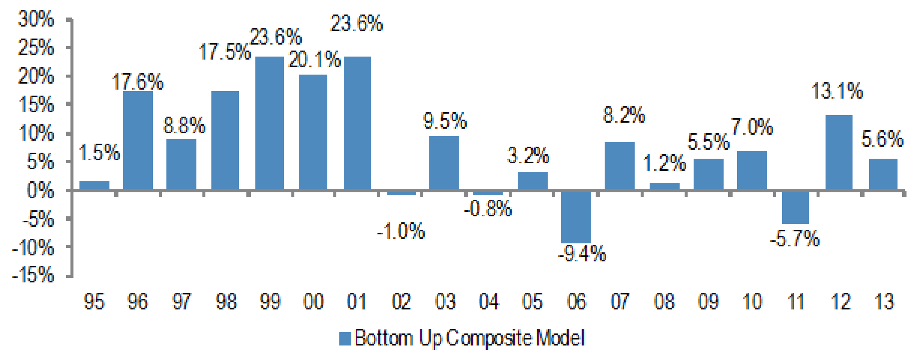
Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

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

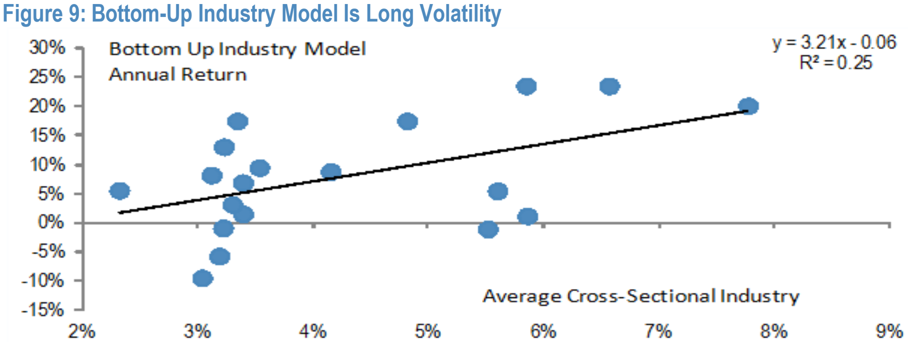


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

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.

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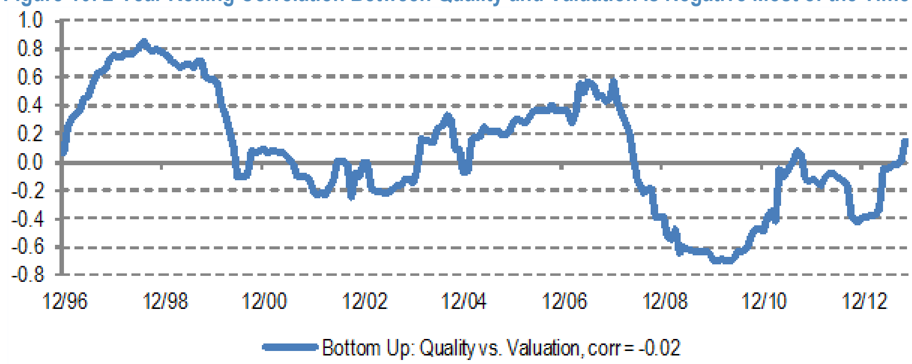
As mentioned above, there is a strong complementary relationship between the Quality and Valuation blocks of the model. As Figure 10 shows, the two-year rolling correlation between the two would have been negative most of the time except for a period in late 1990s when both factors would have done well.

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

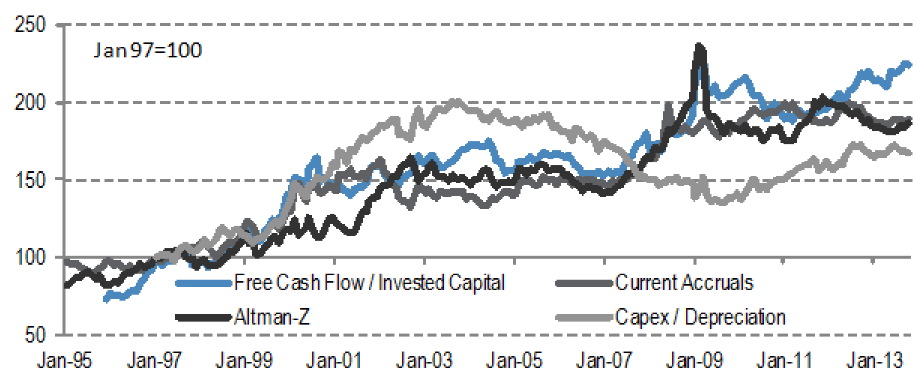


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

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.

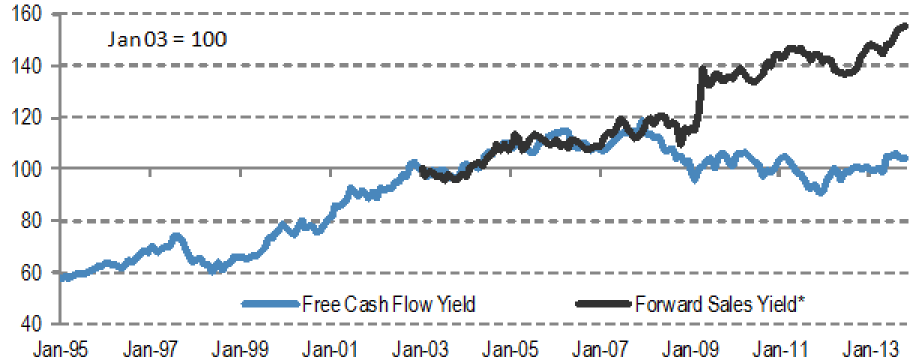
Figure 11: Bottom-Up Quality Factors' Performance: A Diversified Group of Signals



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

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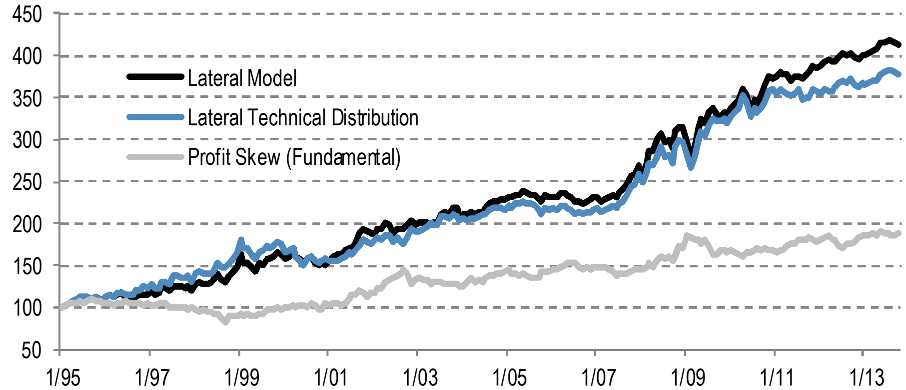
into some details with these factors since these are fairly distinct from many bottom-up factors we have discussed in the past.

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.

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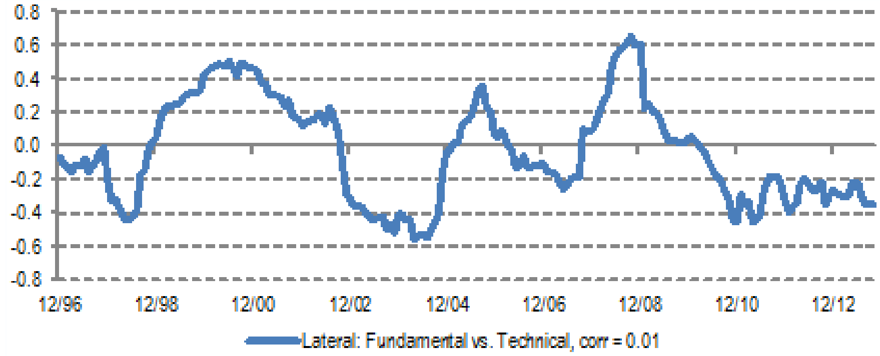
Figure 14: Average 2-Year Rolling Correlation Between Lateral Fundamental and Technical Distribution Factors Is Close to Zero



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.

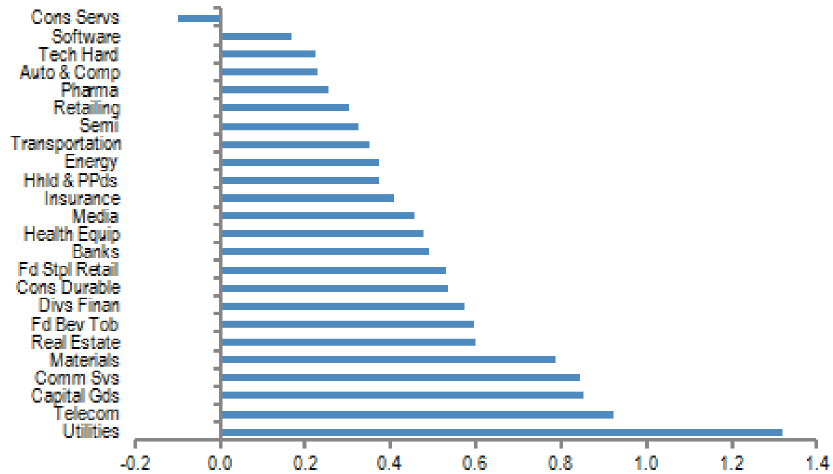
The basic thesis behind the Volatility Skew strategy is that if a sector or industry exhibits higher positive (negative) skew in risk, it might potentially have become a more (less) "uncertain" sector to invest in. For a stock, risk or volatility was defined as six-month standard deviation of daily returns. 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 all, 2013 (pg. 44)

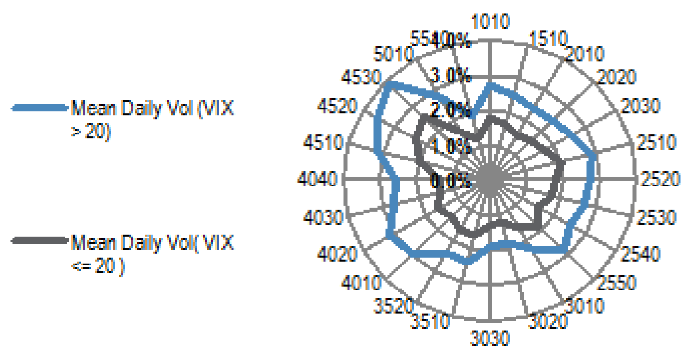
Figure 15: Average Skew of the Distribution of Volatility of Stocks, by Industry Group (1995-2013)



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.

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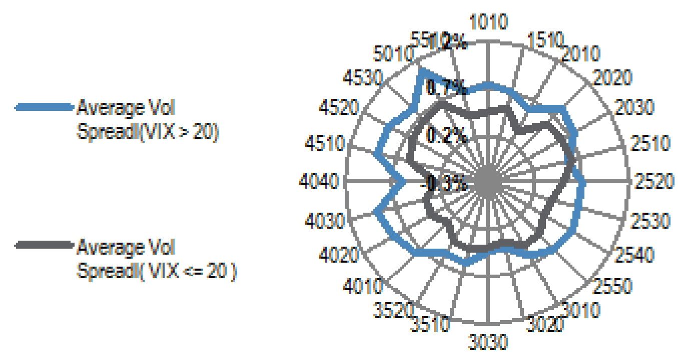
The cross-sectional dispersion of stock volatilities rises when overall market volatility goes up.

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.

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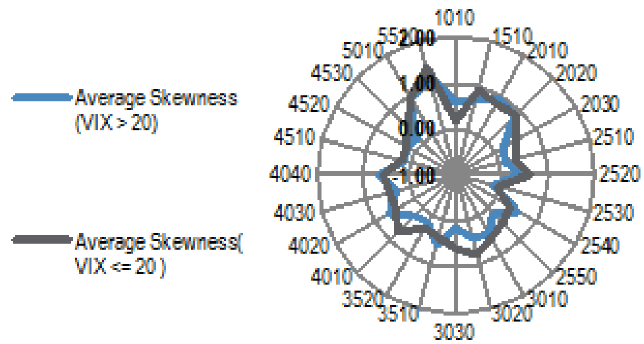
Figure 18: GICS Level 2 Skew of Cross-Sectional Volatilities^



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

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

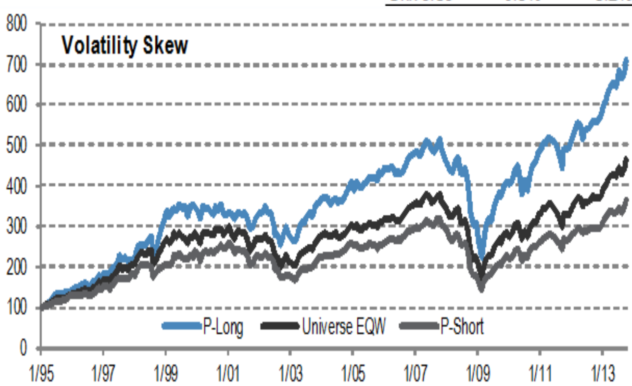
Figure 19 presents the key statistics and performance summary of Volatility Skew industry signal.

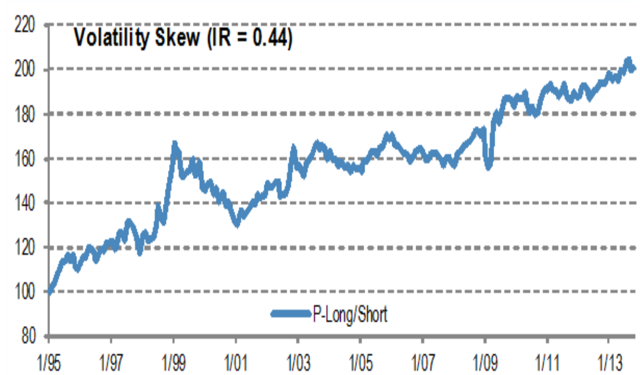
Figure 19: Volatility Skew: Back-Test Statistics and Performance

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
1	1.0%	11.0%	5.1%	57%
2	0.7%	7.0%	4.9%	43%
3	0.7%	7.1%	4.2%	48%
Total Test				
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.8%	3.2%	3.9%	24

Long Short Strategy Statistics
Portfolio 1 less Portfolio 3

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
Long/Short	0.3%	3.78%	2.5%	57%
L/S v Bnch	0.2%	2.50%	1.5%	57%
	T-Stat	**IR**		
Long/Short	2.05	0.44		





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.*

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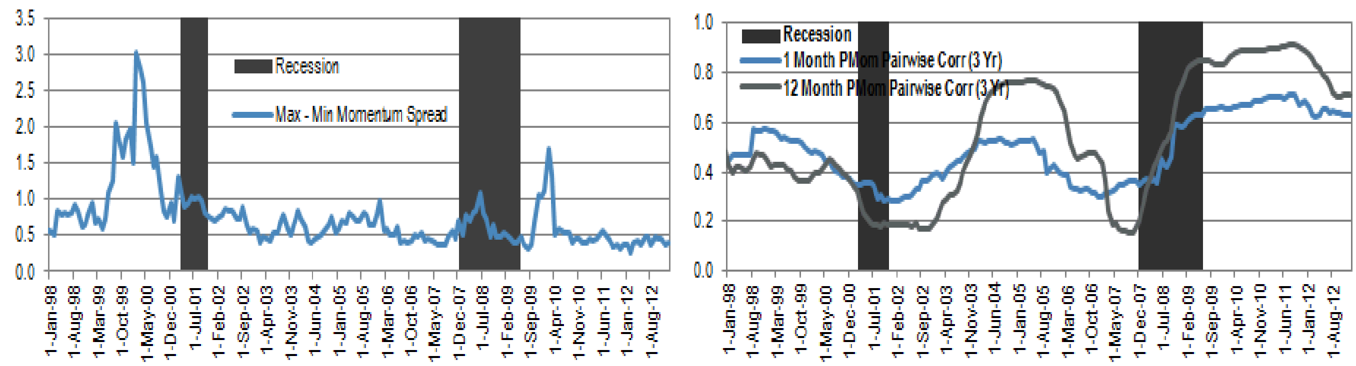
Price momentum trading strategy for industries is challenging—the behavior of momentum was strikingly different around the past two recessions.

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.

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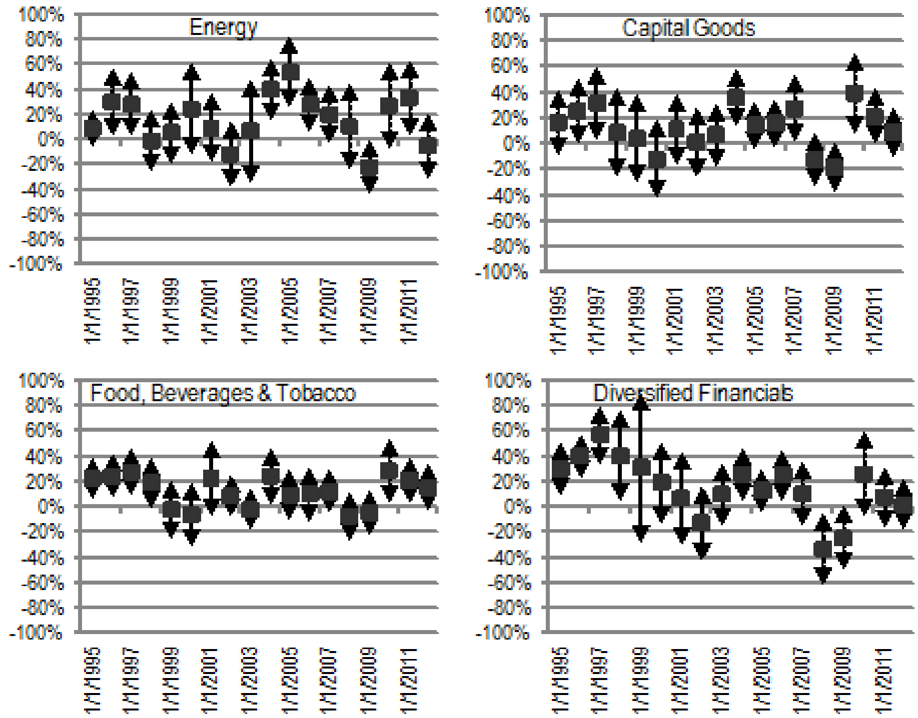
Figure 21: Yearly Average of 12-Month Price Momentum: Mean and +/- 1 Standard Deviation



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

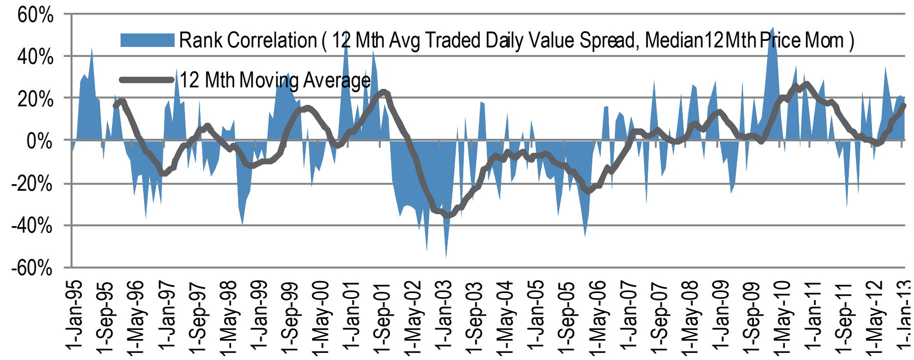
Construction of momentum trading signal for industries:

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.

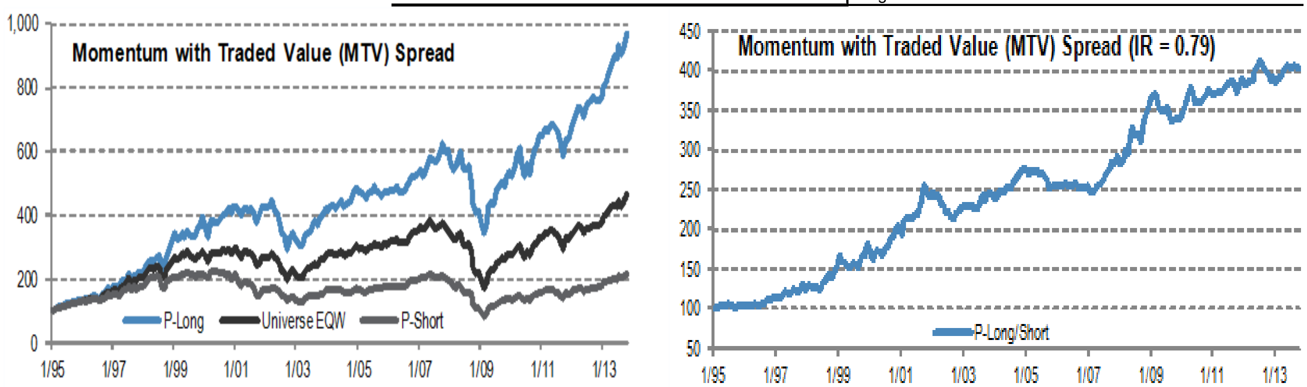
The summary statistics and performance of the MTV Spread signal are shown in Figure 23.

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

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
1	1.1%	12.9%	4.7%	59%
2	0.8%	8.1%	4.7%	48%
3	0.5%	4.3%	4.8%	39%
Total Test				
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.8%	5.1%	5.2%	24

Long Short Strategy Statistics
Portfolio 1 less Portfolio 3

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
Long/Short	0.7%	7.72%	2.8%	62%
L/S v Bnch	0.3%	3.99%	1.6%	59%
	T-Stat	**IR**		
Long/Short	3.51	0.79		



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.

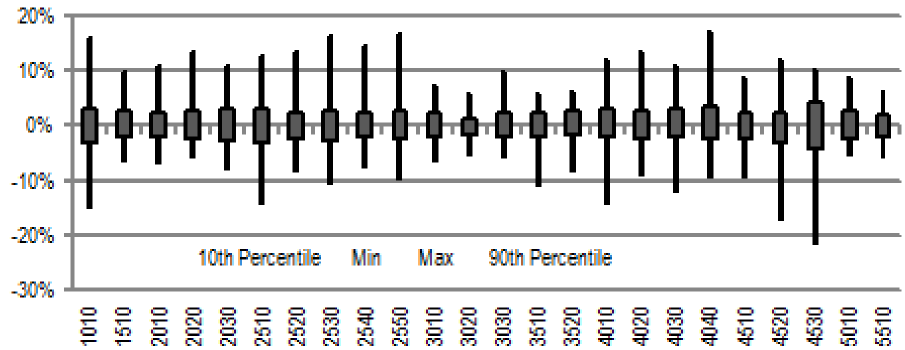
$$Absorption\ Ratio = \frac{1st\ Eigenvalue + 2nd\ Eigenvalue}{Total\ Risk\ (Sum\ of\ All\ Eigenvalues)}$$

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.

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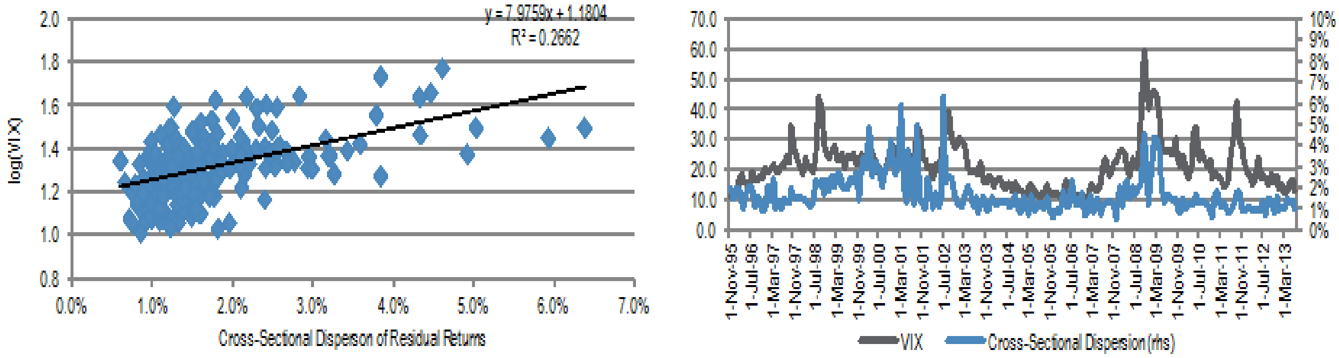
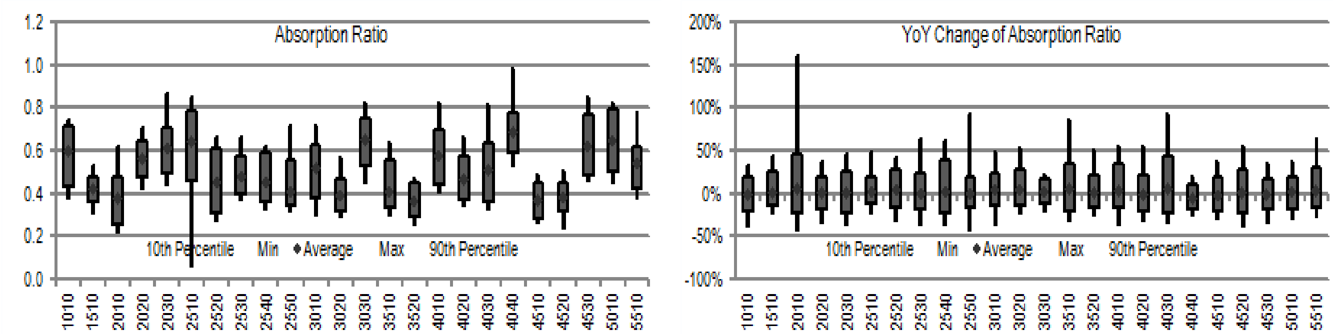
Figure 25: Cross-Sectional Dispersion of Residual Returns vs. log(VIX)



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)^



^Please 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.

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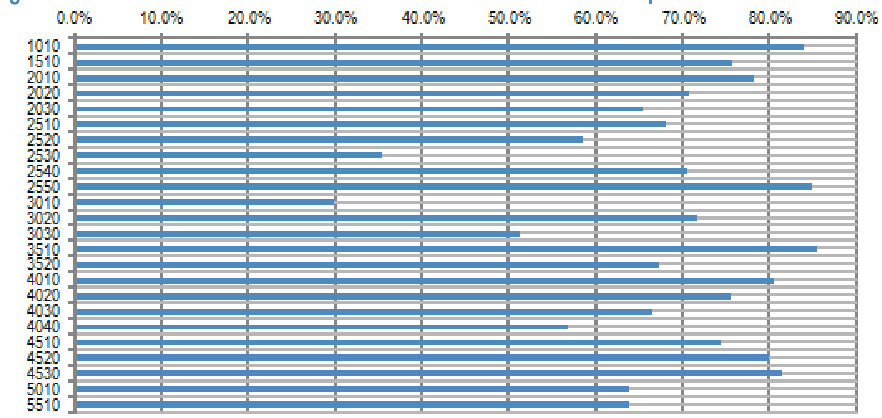
Figure 27: Correlation Between Pair-Wise Correlation and Y-o-Y Absorption Ratio: Not the Same^



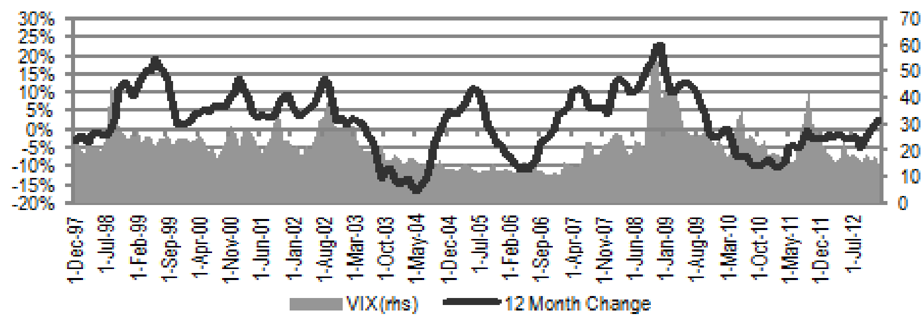
^Please see footnote 4 for the key to Industry Group names.

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

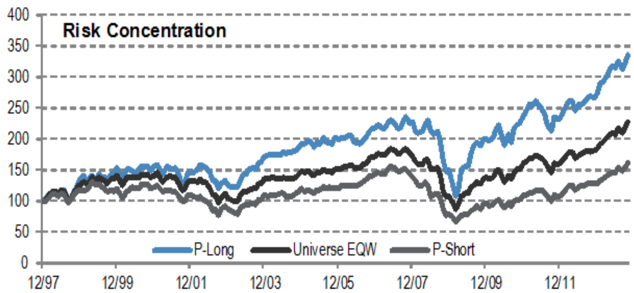
Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
1	0.8%	8.0%	5.3%	52%
2	0.5%	4.5%	4.5%	52%
3	0.4%	3.0%	4.8%	45%

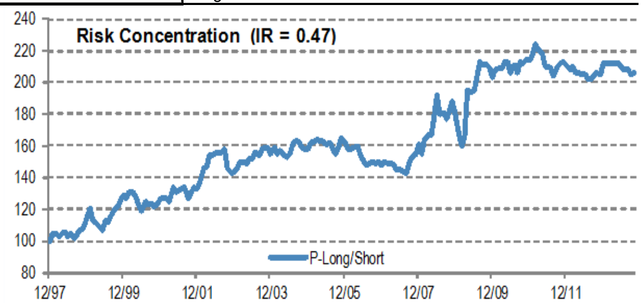
Total Test	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.5%	1.7%	2.8%	24

Long Short Strategy Statistics
Portfolio 1 less Portfolio 3

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
Long/Short	0.4%	4.66%	2.8%	55%
L/S v Bnch	0.2%	2.79%	1.6%	52%

	T-Stat	IR
Long/Short	2.03	0.47





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.

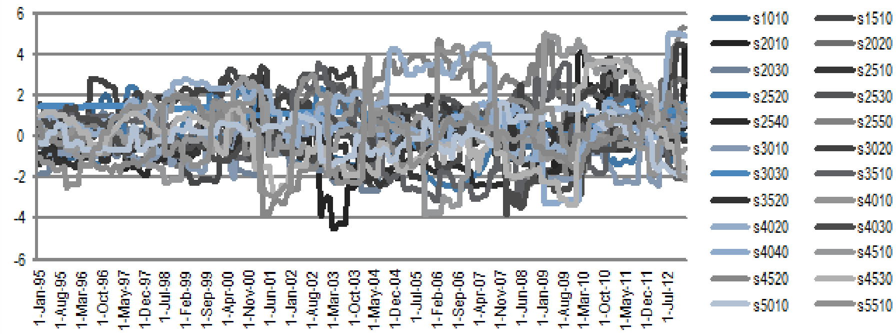
We hypothesize that if a subset of companies within a sector has become more profitable, under a competitive market environment, their success would be emulated by others, pushing up the overall profitability of the sector. The initial higher profitability by a small batch of companies can be detected 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^

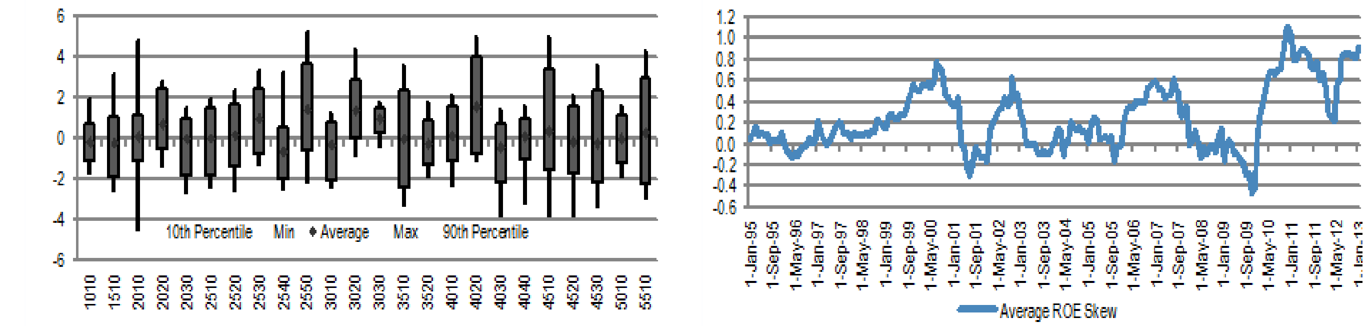


^Please see footnote 4 for the key to Industry Group names.

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.

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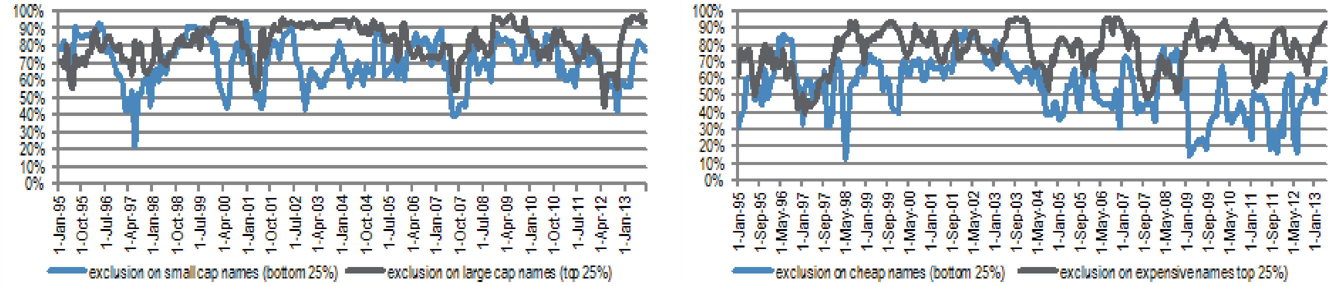
Figure 32: Rank Correlation Against Skew Computed with Top/Bottom 25% Removal Based on Market Caps (left chart) and Valuation (right chart)



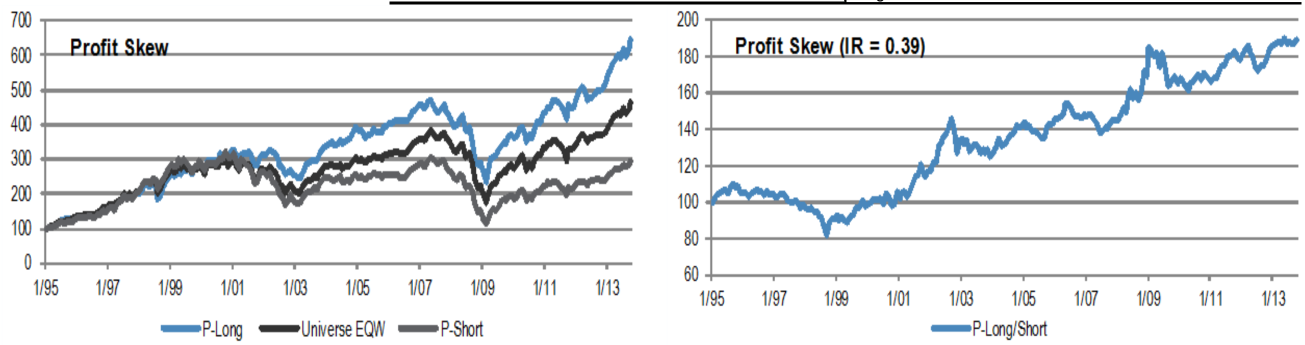
Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

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.
1	0.9%	10.5%	4.4%	56%
2	0.8%	8.8%	4.5%	51%
3	0.6%	6.0%	5.1%	46%
Total Test				
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.8%	2.8%	3.0%	24

Long Short Strategy Statistics Portfolio 1 less Portfolio 3				
Portfolio	**Average Return**	**Annual Return**	**Standard Deviation**	**% Out Perf.**
Long/Short	0.3%	3.44%	2.5%	58%
L/S v Bnch	0.1%	1.62%	1.3%	56%
	T-Stat	**IR**		
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]

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.

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

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: Yield Spread Indicators: Related to Growth and Inflation	*II. Real Growth Related Indicators*	*III. Composite Financial Stress Indices*	*IV. Inflation Related Indicators*
1. 3-month Treasury Bill interest rate	1. Conference Board US Leading Economic Indicator	**1. St Louis Fed Financial Stress Index (based on 18 sub-series)**	1. 5-year Inflation Expectations (TIPs Breakeven)
2. 10-year Bond Yield	**2. ISM Manufacturing PMI**	2. Kansas City Fed Financial Stress Index (based on 11 sub-series)	**2. Consumer Price Index**
3. Yield Curve (10 year less 3-month)	3. ISM Non-Manufacturing PMI	**3. Cleveland Fed Financial Stress Index (based on 16 sub-series)**	**3. Producer Price Index**
4. Credit Spread (Moody's BAA less Moody's BBB yield)	**4. Citigroup US Economic Surprise Indicator**		4. Crude Oil Price
	5. Chicago Fed National Activity Index		5. CRB BLS Commodity Spot Index
	6. Volatility Index (VIX)		6. ISM Prices Index
	7. Thomson Reuters/University of Michigan's Index of Consumer Sentiment		7. 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 all, November 2010; *Making the Most of Macro: Launching our Style Timing Model for Asia*, Smith et all, 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.

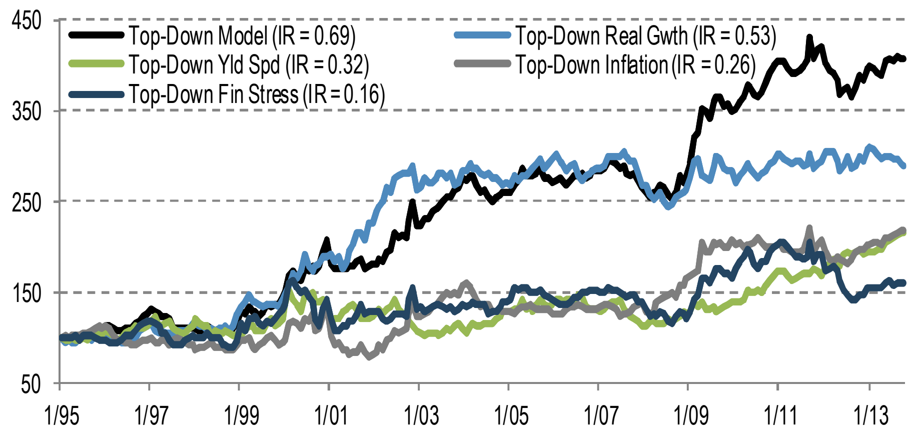
The value and the sign of the T-Stats of the regression determine whether a macro variable is included as a possible explanatory variable and the direction of the signal. Besides the T-Stats, we also take the prevalence and persistence of relationship into account by examining the T-Stats of regressions 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.

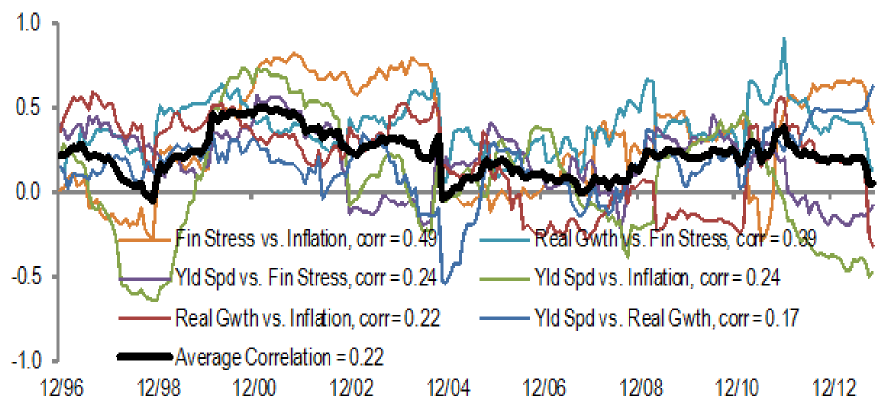
Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

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.

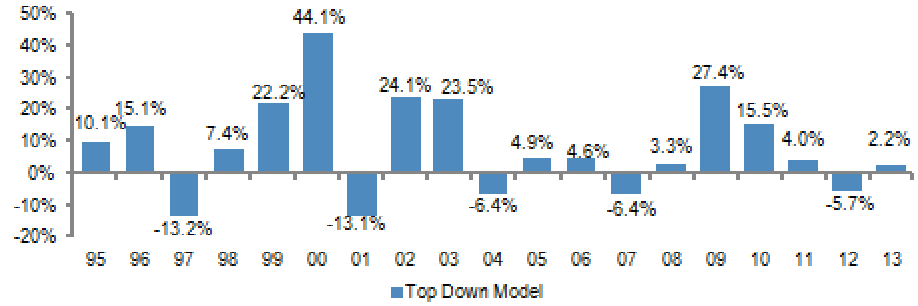
Figure 36: Pair-Wise 2-Year Rolling Correlation of Top-Down Components: On Average Positive, Financial Stress Has Highest Pair-Wise Correlation with Other Macro Groups



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.

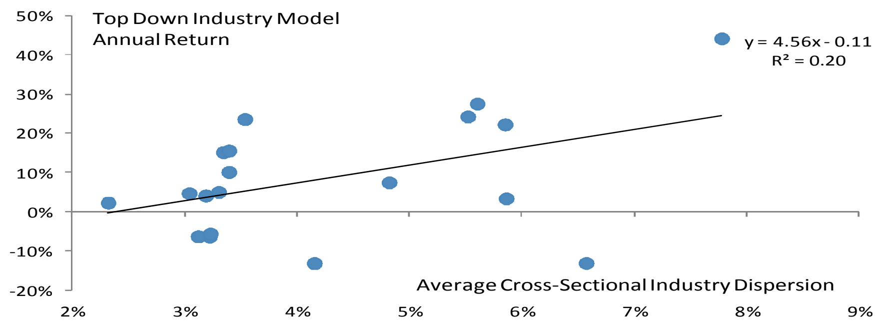
Figure 37: Annual Performance of Top-Down Model Is More Volatile Than Other Blocks



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.

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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.

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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.

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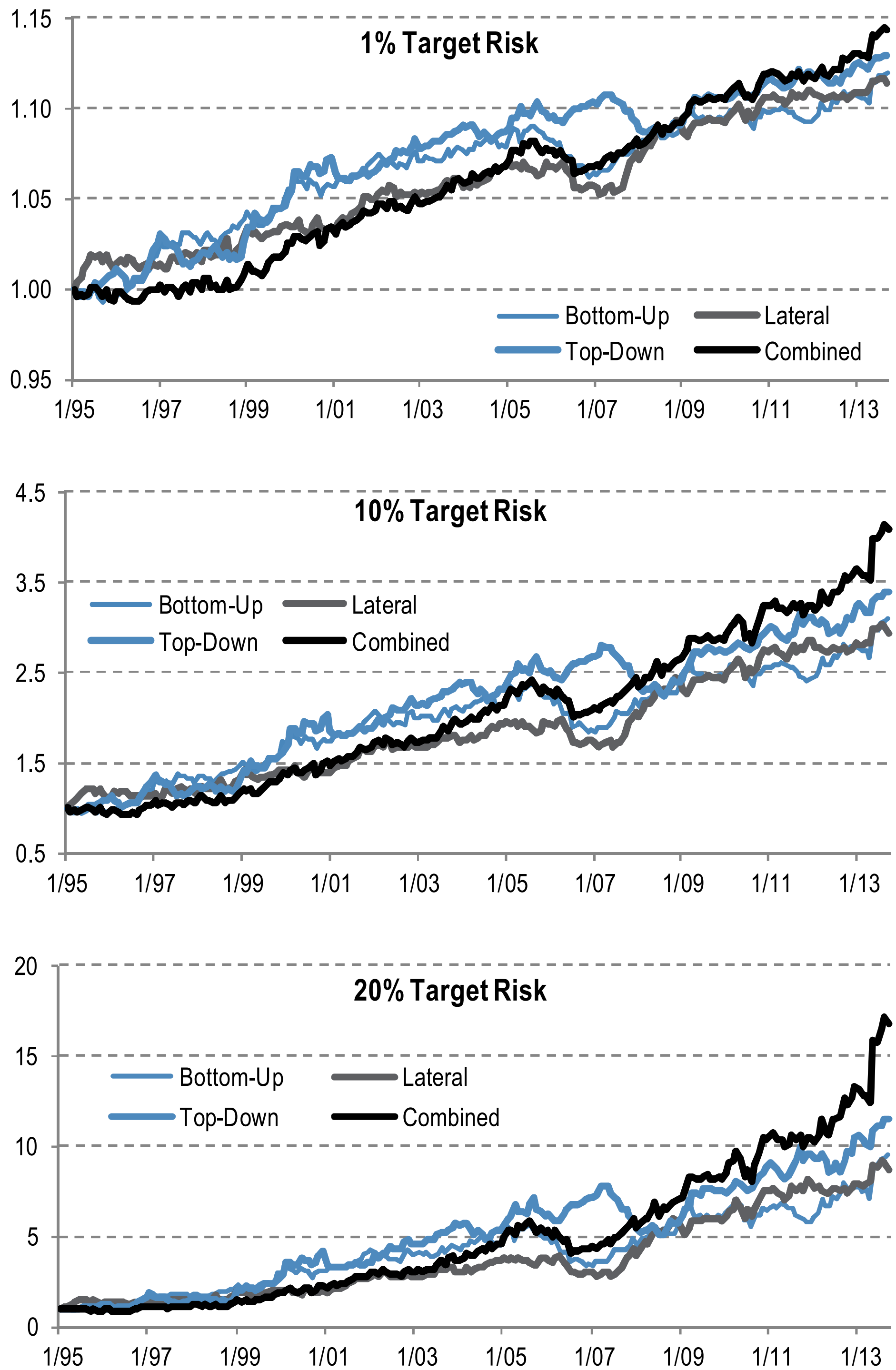
Figure 39: Performance of Models for Various Levels of Target Risk (1%, 10%, 20%)



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

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

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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

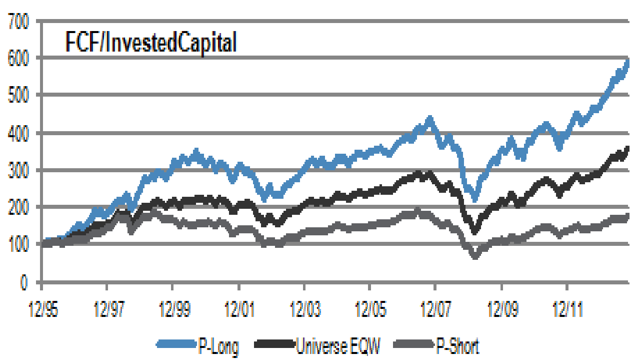
Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

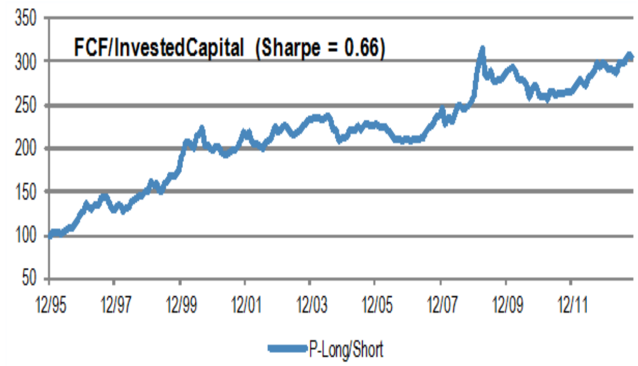
C: Bottom-Up Factors—Performance Summary

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

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
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				
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.7%	3.9%	4.9%	23

Long Short Strategy Statistics Portfolio 1 less Portfolio 3				
Portfolio	**Average Return**	**Annual Return**	**Standard Deviation**	**% Out Perf.**
Long/Short	0.6%	6.47%	2.8%	57%
L/S v Bnch	0.2%	2.84%	1.6%	54%
	T-Stat	**Sharpe**		
Long/Short	2.92	0.66		



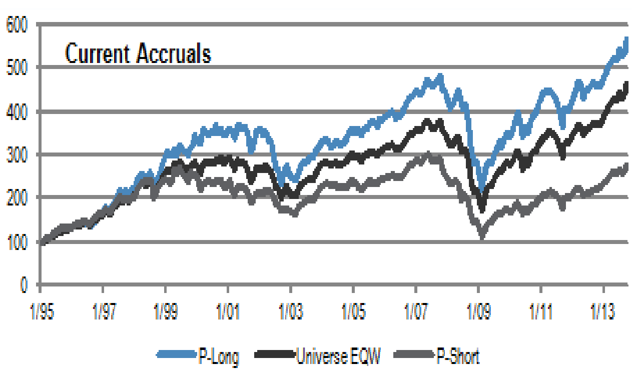


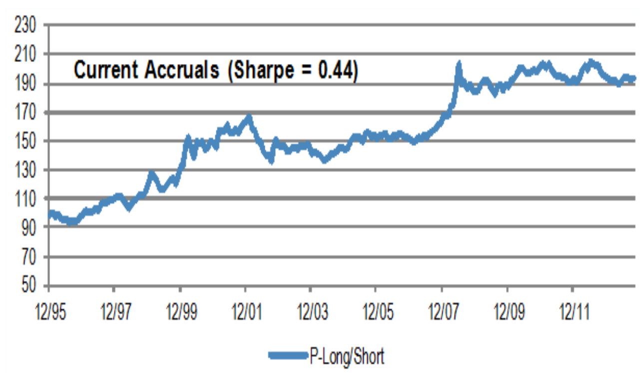
Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Bottom-Up Quality Factor 2. Current Accruals

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
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				
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.8%	1.4%	2.3%	24

Long Short Strategy Statistics Portfolio 1 less Portfolio 3				
Portfolio	**Average Return**	**Annual Return**	**Standard Deviation**	**% Out Perf.**
Long/Short	0.3%	3.60%	2.4%	54%
L/S v Bnch	0.1%	1.20%	1.3%	52%
	T-Stat	**Sharpe**		
Long/Short	2.03	0.44		

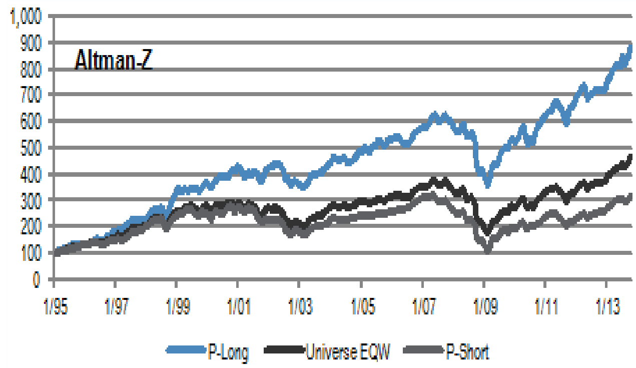


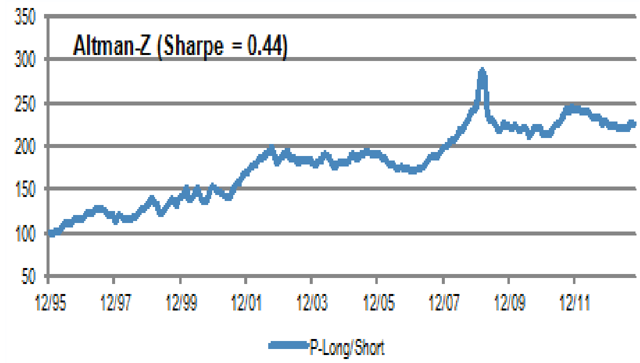


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Bottom-Up Quality Factor 3. Altman-Z

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	1.1%	12.3%	4.1%	58%	Long/Short	0.4%	4.46%	2.9%	53%
2	0.6%	6.2%	5.0%	47%	L/S v Bnch	0.3%	3.11%	1.6%	58%
3	0.6%	6.4%	5.2%	41%					
Total Test									
	Average Return	Rank IC	Avg IC	Avg # of Assets		T-Stat	Sharpe		
Universe	0.8%	4.1%	3.1%	24	Long/Short	2.10	0.44		

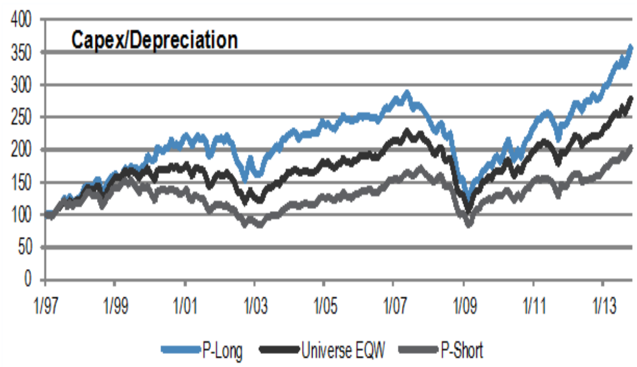


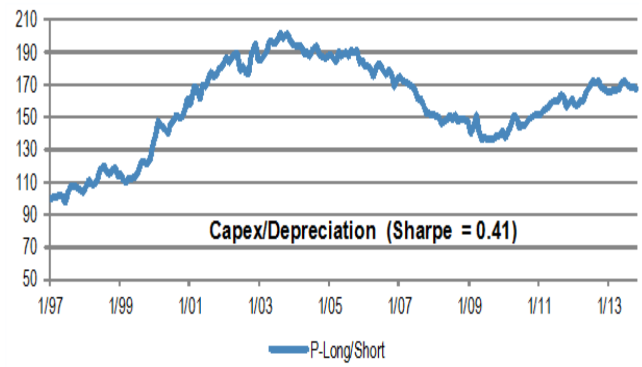


Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Bottom-Up Quality Factor 4. Capex/Depreciation

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	0.8%	7.9%	4.9%	56%	Long/Short	0.3%	3.13%	2.4%	53%
2	0.6%	6.2%	5.1%	48%					
3	0.5%	4.3%	4.7%	47%					
Total Test									
	Average Return	Rank IC	Avg IC	Avg # of Assets		T-Stat	Sharpe		
Universe	0.6%	2.3%	0.9%	24	Long/Short	1.67	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.

Bottom-Up Quality Composite Factor

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
1	1.2%	13.5%	4.7%	59%
2	0.6%	6.1%	4.5%	50%
3	0.6%	5.3%	5.1%	39%

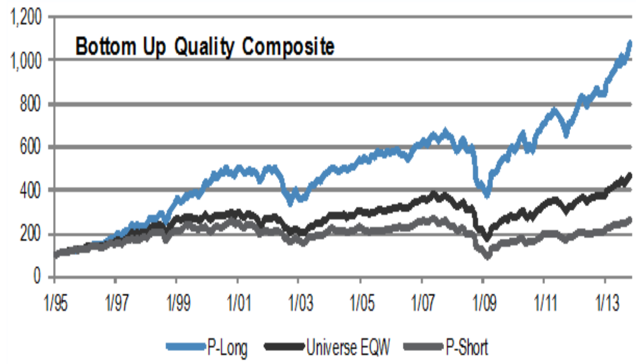
Total Test

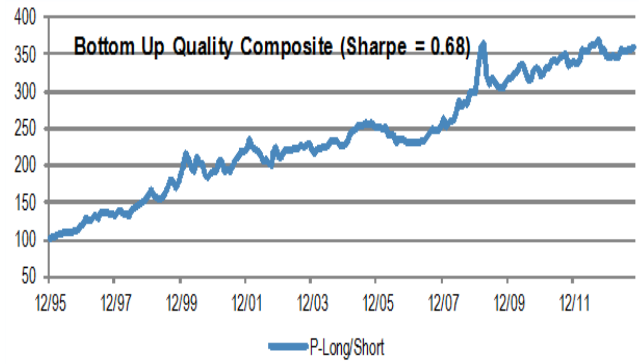
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.8%	4.7%	5.1%	24

Long Short Strategy Statistics
Portfolio 1 less Portfolio 3

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
Long/Short	0.6%	7.06%	3.0%	60%
L/S v Bnch	0.4%	4.55%	1.8%	59%

	T-Stat	Sharpe
Long/Short	3.09	0.68





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.
1	1.0%	10.3%	5.3%	53%
2	0.7%	7.8%	4.2%	48%
3	0.7%	7.0%	4.6%	45%

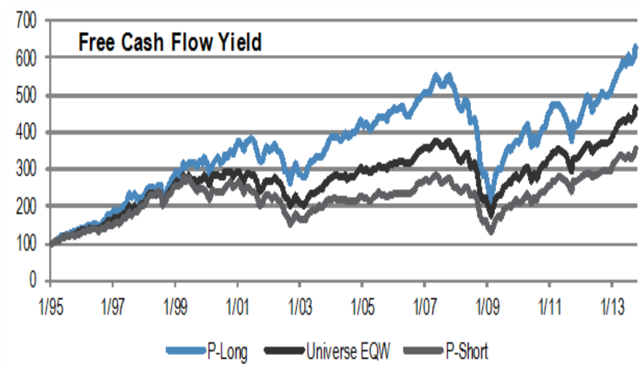
Total Test

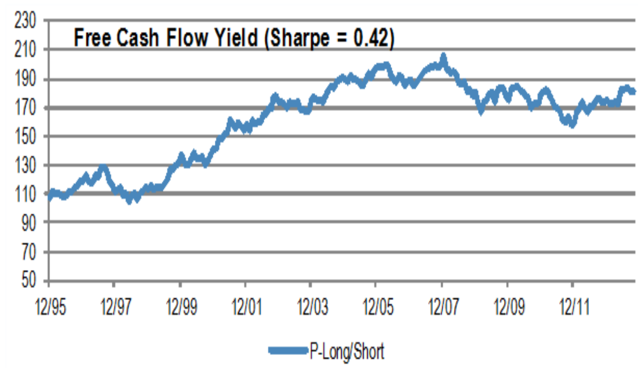
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.8%	2.4%	2.1%	24

Long Short Strategy Statistics
Portfolio 1 less Portfolio 3

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
Long/Short	0.3%	3.21%	2.2%	56%
L/S v Bnch	0.2%	1.99%	1.4%	53%

	T-Stat	Sharpe
Long/Short	1.96	0.42





Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
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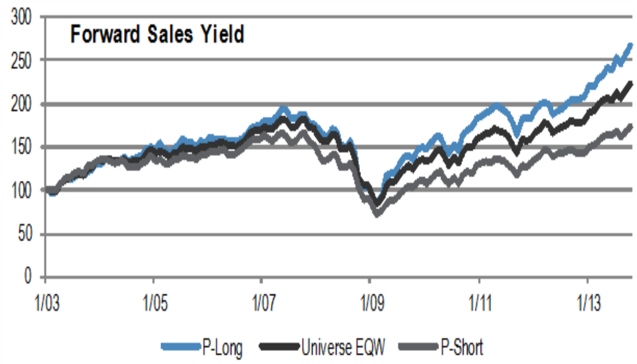
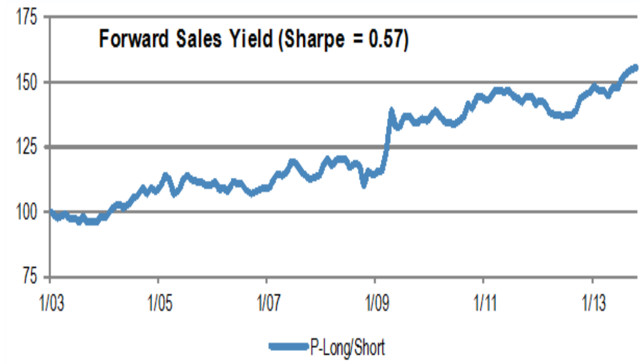
Bottom-Up Valuation Factor 2. Forward Sales Yield

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
1	0.9%	9.6%	5.1%	58%
2	0.7%	8.2%	4.2%	49%
3	0.5%	5.3%	4.4%	47%
Total Test				
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.7%	2.7%	1.1%	24

Long Short Strategy Statistics
Portfolio 1 less Portfolio 3

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
Long/Short	0.4%	4.20%	2.3%	53%
	T-Stat	Sharpe		
Long/Short	1.85	0.57		





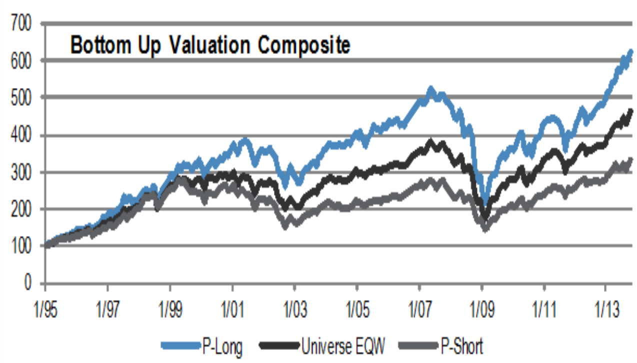
Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

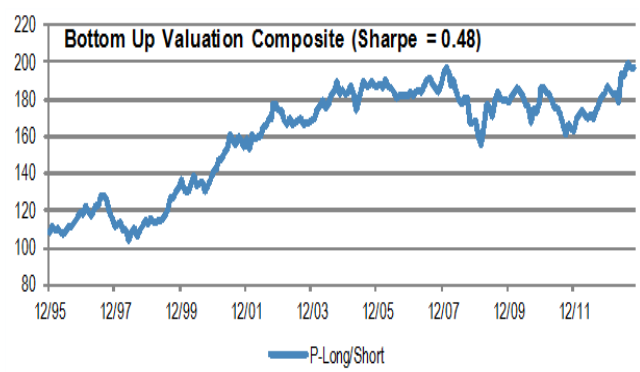
Bottom-Up Valuation Composite

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
1	1.0%	10.3%	5.2%	54%
2	0.8%	8.3%	4.8%	49%
3	0.6%	6.6%	4.2%	45%
Total Test				
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.8%	2.6%	2.9%	24

Long Short Strategy Statistics
Portfolio 1 less Portfolio 3

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
Long/Short	0.3%	3.69%	2.4%	55%
	T-Stat	Sharpe		
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.

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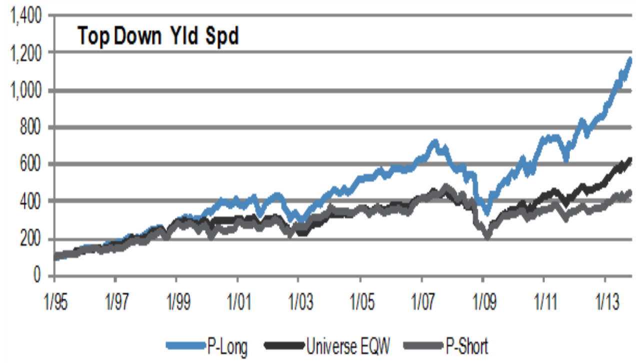
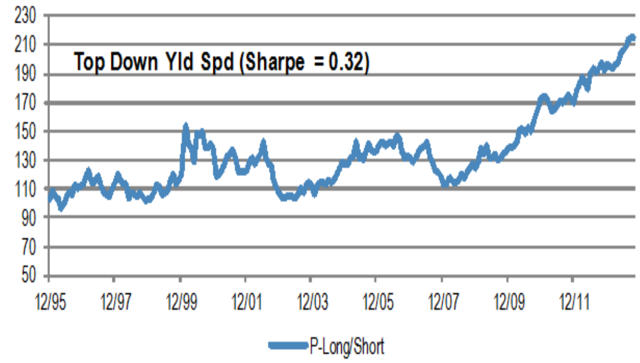
D: Top-Down Factors — Performance Summary

Top-Down Factor 1. Yield Spread

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
1	1.2%	14.0%	5.1%	56%
2	0.7%	7.0%	5.7%	47%
3	0.8%	8.4%	5.3%	44%
Total Test				
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.9%	7.1%	7.0%	10

Long Short Strategy Statistics Portfolio 1 less Portfolio 3				
Portfolio	**Average Return**	**Annual Return**	**Standard Deviation**	**% Out Perf.**
Long/Short	0.4%	4.17%	3.8%	58%
L/S v Bnch	0.3%	3.28%	2.1%	56%
	T-Stat	**Sharpe**		
Long/Short	1.63	0.32		



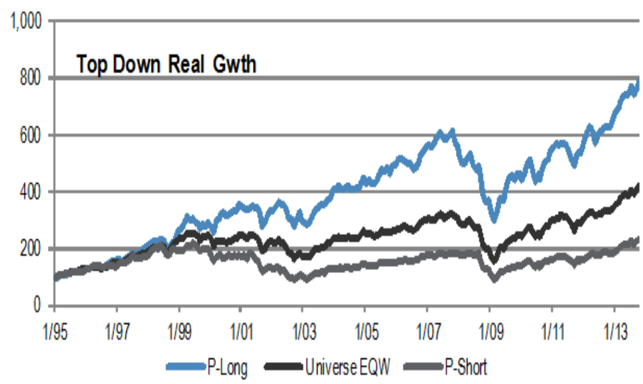


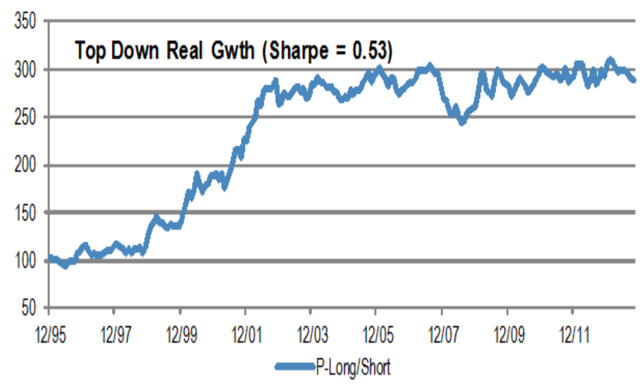
Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

Top-Down Factor 2. Real Economic Growth

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
1	1.0%	11.7%	4.7%	55%
2	0.7%	6.8%	4.9%	45%
3	0.5%	4.7%	5.0%	48%
Total Test				
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.7%	6.0%	5.5%	15

Long Short Strategy Statistics Portfolio 1 less Portfolio 3				
Portfolio	**Average Return**	**Annual Return**	**Standard Deviation**	**% Out Perf.**
Long/Short	0.5%	5.80%	3.1%	57%
L/S v Bnch	0.3%	3.33%	1.7%	55%
	T-Stat	**Sharpe**		
Long/Short	2.48	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.

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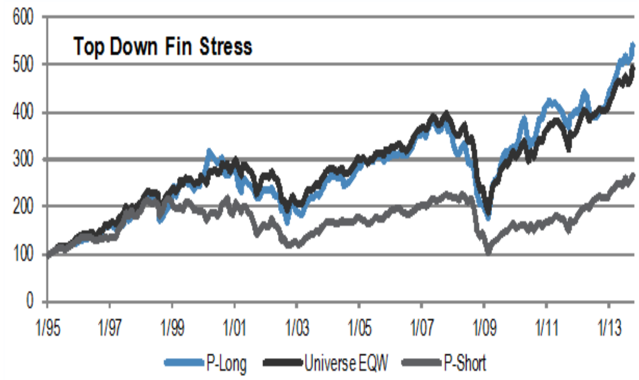
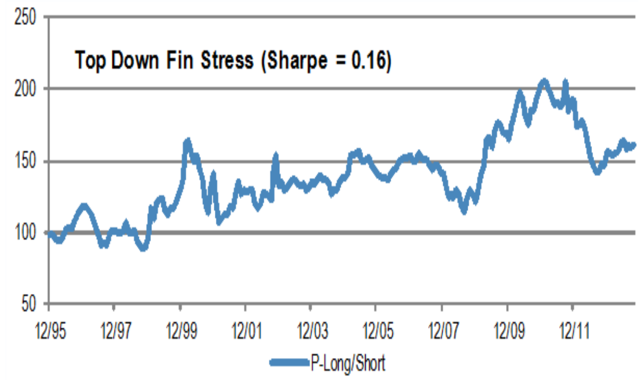
Top-Down Factor 3. Financial Stress Factor

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
1	0.9%	9.4%	5.5%	52%
2	1.0%	11.1%	5.0%	54%
3	0.6%	5.4%	5.3%	49%
Total Test				
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.8%	1.9%	1.7%	12

Long Short Strategy Statistics
Portfolio 1 less Portfolio 3

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
Long/Short	0.3%	2.58%	4.7%	52%
L/S v Bnch	0.1%	0.54%	2.6%	52%
	T-Stat	**Sharpe**		
Long/Short	1.02	0.16		





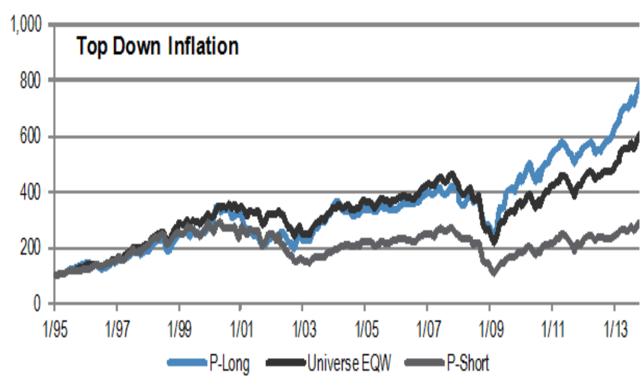
Source: Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.
Note: All price performance excludes commissions and fees. Past performance is not indicative of future returns.

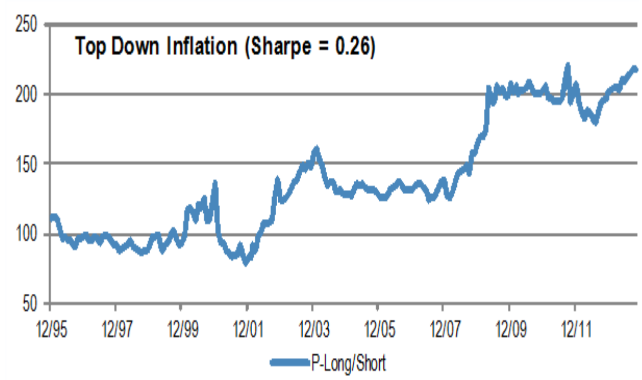
Top-Down Factor 4. Inflation Factor

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
1	1.1%	11.7%	5.6%	53%
2	1.0%	11.7%	4.8%	51%
3	0.6%	5.8%	5.4%	42%
Total Test				
	Average Return	Rank IC	Avg IC	Avg # of Assets
Universe	0.9%	3.0%	3.4%	11

Long Short Strategy Statistics
Portfolio 1 less Portfolio 3

Portfolio	Average Return	Annual Return	Standard Deviation	% Out Perf.
Long/Short	0.5%	4.22%	4.6%	56%
L/S v Bnch	0.2%	1.52%	2.6%	53%
	T-Stat	**Sharpe**		
Long/Short	1.46	0.26		





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.

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Table 11a: Industries 1 to 8 of 24 versus Macro Variables 1 to 13 of 26

T-Stat Heat Map – Relative Industry Group Returns 1, 3, 6, 12 Months Forward, Regressed on Macro Variables, changes = 0,1,3,6,12

Sector Name		Energy				Materials				Capital Gds				Comm Svs				Transportation				Auto & Comp				Cons Durable				Cons Servs			
Returns, Mths Fwd		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
3-month yield average of daily (change, # of lags)	0																									-3	-2	-2		-3	-2	-2	
	1																																
	3													-2																			
	6																													-2			
	12										2	2														-2							
10-year yield average of daily (change, # of lags)	0																					-2	-3	-2						-2			
	1																																
	3									2																							
	6																						-3										
	12																																
Credit Spread BAA-AAA average of daily (change, # of lags)	0																						2	3	2								
	1																						-2										
	3									-2	-3											-3								3			
	6																																
	12										-2																						
Yield Curve, avg 10yr - 2yr average of daily (change, # of lags)	0																									3	3	3	2	2	2	2	2
	1																																
	3														2																		
	6										-2																						
	12																																
VIX average of daily (change, # of lags)	0			-2	-2																			2									
	1																																
	3																					-3	-3										
	6																																
	12																																
Citigroup Surprise Index average of daily (change, # of lags)	0																																
	1																																
	3													-2								3								-2			
	6																																
	12									2	2																			-2			
St Louis Fed Financial Stress Index average of daily (change, # of lags)	0																							2	2								
	1																						-3										
	3										-2											-4	-3			-2							
	6																																
	12																																
Cleveland Fed Fin Stress Index average of daily (change, # of lags)	0																																
	1					-2																				-2							
	3																																
	6																																
	12																					-2											
Kansas City Fed Financial Stress Index (change, # of lags)	0																																
	1																									-2							
	3																					-3	-3			-2	-2						
	6																																
	12																																
Expected Inflation, next 5Yrs average of daily (change, # of lags)	0																						-2	-3									
	1																						2										
	3										2											3				2				-2	-2		
	6																							-2						-2			
	12																																
Expected Inflation, next 10Yrs average of daily (change, # of lags)	0																							-2									
	1										2												2										
	3									3	3											3				3				-2			
	6																							-2									
	12																																
Log(Oil Price) average of daily (change, # of lags)	0														2	2	2	3	3	3	2	-3	-3	-3									
	1					2								-3								2								-3	-2		
	3									2													-2	-3						-3			
	6																					-3	-5	-4	-3								
	12																					-3	-4	-4									
Log(Gold Price) average of daily (change, # of lags)	0																																
	1																																
	3																					2											
	6																	2															
	12																																

KEY

2 t-stat >= 2
1 < t <= 2
0 < t <= 1
-1 < t <= 0
-2 < t <= -1
-2 t-stat < -2

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.

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

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Table 11b: Industries 9 to 16 of 24 versus Macro Variables 1 to 13 of 26

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

Sector Name		Media				Retailing				Fd Stpl Retail				Fd Bev Tob				Hhld & PPds				Health Equip				Pharma				Banks			
Returns, Mths Fwd		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
3-month yield	0																									3	3	3	3				
average of daily	1																																
(change, # of lags)	3					-2	-2	-2	-2																								
	6					-2	-2	-2	-2																								
	12					-3	-3	-2																									
10-year yield	0	-2				-2								3	3	3	2					2	2			3	3	3					
average of daily	1																																
(change, # of lags)	3																													2			
	6																										2						
	12					-3	-3	-2																									
Credit Spread	0																																
BAA-AAA	1																														-3		
average of daily	3									2				2								2				2				-4	-3		
(change, # of lags)	6																																
	12																																
Yield Curve, avg	0																									-3	-3	-3	-3				
10yr - 2yr	1																																
average of daily	3																																
(change, # of lags)	6																																
	12																																
VIX	0						2	2	2																					-2			
average of daily	1					-2																-2				3							
(change, # of lags)	3																									3				-3	-4		
	6																													-3			
	12																													-2			
Citigroup Surprise	0					-2	-2																							3			
Index	1																														2		
average of daily	3						-2																							3	2		
(change, # of lags)	6																																
	12					-3																		-2						4			
St Louis Fed Financial	0																													-2			
Stress Index	1																														-3		
average of daily	3													2												3	2			-4	-6	-3	
(change, # of lags)	6																													-4	-3		
	12																													-2			
Cleveland Fed Fin	0																																
Stress Index	1																									3							
average of daily	3														-2															-3			
(change, # of lags)	6													-2	-3																		
	12																																
Kansas City Fed	0																																
Financial Stress	1													2				2								3							
Index	3																									3				-3	-4		
(change, # of lags)	6									2																				-3			
	12																													-2			
Expected Inflation,	0						-2																							2			
next 5Yrs	1																										-2						
average of daily	3						-3			-2																-3				3	4		
(change, # of lags)	6																																
	12																																
Expected Inflation,	0																													2			
next 10Yrs	1										-2																-3				3		
average of daily	3					-2	-3			-3	-2			-2												-4				4	4		
(change, # of lags)	6					-2				-2																							
	12						-2																		2								
Log(Oil Price)	0													3	3	2	2																
average of daily	1																																
(change, # of lags)	3					-2																											
	6																																
	12																																
Log(Gold Price)	0																																
average of daily	1																										-2			-2			
(change, # of lags)	3																									-4	-3						
	6																									-2							
	12																																

KEY

2	t-stat >= 2		-1 < t <= 0
	1 < t <= 2		-2 < t <= -1
	0 < t <= 1	-2	t-stat < -2

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.

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

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Table 11c: Industries 17 to 24 of 24 versus Macro Variables 1 to 13 of 26

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

Sector Name		Divs Finan				Insurance				Real Estate				Software				Tech Hard				Semi				Telecom				Utilities			
Returns, Mths Fwd		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
3-month yield average of daily (change, # of lags)	0																																
	1		2																														
	3	3	2				2			2																							
	6																																
	12					2	2																										
10-year yield average of daily (change, # of lags)	0																													2	3	2	
	1																																
	3									3	2																						
	6																																
	12						2				2																						2
Credit Spread BAA-AAA average of daily (change, # of lags)	0																																
	1	-3	-3																														
	3	-4								-2	-2																						
	6																																
	12																																
Yield Curve, avg 10yr - 2yr average of daily (change, # of lags)	0																																
	1																																
	3		-3																														
	6	-2																															
	12	-2																															
VIX average of daily (change, # of lags)	0														2			2	2														
	1	-2	-2							-3																2							
	3	-4	-3								-3				3											3	3						
	6	-2								-2	-2				2											2							
	12																																
Citigroup Surprise Index average of daily (change, # of lags)	0	3												-2				-2															
	1	2	2												-2											-2							
	3	4	2											-3												-3				-3			
	6																																
	12	3				3	3																										
St Louis Fed Financial Stress Index average of daily (change, # of lags)	0																																
	1	-3	-3							-2																2							
	3	-5	-4				-3			-2	-4				2											3	3			2			
	6	-3								-2	-2																						
	12																																
Cleveland Fed Fin Stress Index average of daily (change, # of lags)	0																	3	2														
	1														2																		
	3									-2				3	3			3	2														
	6													3				2															
	12					-2	-2											2															
Kansas City Fed Financial Stress Index (change, # of lags)	0																																
	1	-3								-4																3							
	3	-4	-3				-2				-3				2											3	2						
	6									-3	-2																						
	12									-2																							
Expected Inflation, next 5Yrs average of daily (change, # of lags)	0													-2	-2																2	3	2
	1		2								2																						
	3	4	3							3	4	2			-2											-3	-2						
	6									3	3																						
	12														-2																2	3	2
Expected Inflation, next 10Yrs average of daily (change, # of lags)	0									2																						2	2
	1	2	3								3															-2	-2						
	3	4					2			3	4	2			-2											-3							
	6									3	3																						
	12														-2	-2	-2															2	2
Log(Oil Price) average of daily (change, # of lags)	0																-2													2	2	3	2
	1									3	2																						
	3					2				3	3																						
	6									2																							
	12																-2													3	3	3	2
Log(Gold Price) average of daily (change, # of lags)	0	-2	-2	-3	-3																												
	1																																
	3																																
	6				-2					2	3	2																					
	12	-2	-3	-3	-3																												

KEY

2	t-stat >= 2
(dark green)	1 < t <= 2
(light green)	0 < t <= 1
(light pink)	-1 < t <= 0
(dark pink)	-2 < t <= -1
-2	t-stat < -2

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.

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

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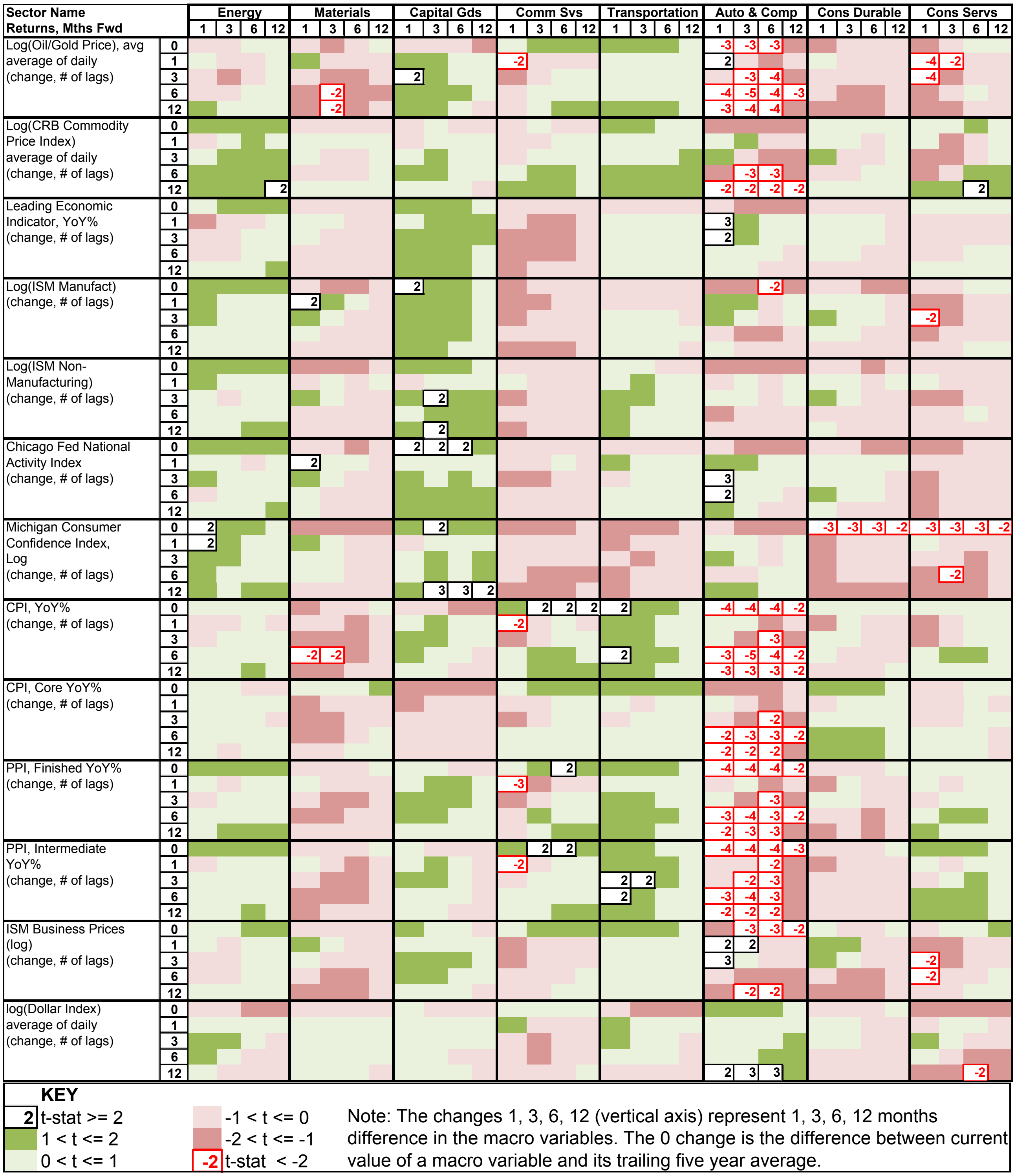
Table 11d: Industries 1 to 8 of 24 versus Macro Variables 14 to 26 of 26

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



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

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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		Media				Retailing				Fd Stpl Retail				Fd Bev Tob			
Returns, Mths Fwd		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					-2											
	6																
	12																
Log(CRB Commodity Price Index) average of daily (change, # of lags)	0																
	1																
	3						-3	-2									
	6					-2	-3										
	12						-2									2	
Leading Economic Indicator, YoY% (change, # of lags)	0																
	1																
	3																
	6																
	12																
Log(ISM Manufact) (change, # of lags)	0					-3	-2	-2									
	1																
	3									-3	-2						
	6																
	12					-2											
Log(ISM Non-Manufacturing) (change, # of lags)	0																
	1	-3															
	3						-2										
	6																
	12																
Chicago Fed National Activity Index (change, # of lags)	0					-2	-2	-2									
	1																
	3									-3	-2						
	6																
	12						-2										
Michigan Consumer Confidence Index, Log (change, # of lags)	0																
	1																
	3																
	6																
	12						-3	-3									
CPI, YoY% (change, # of lags)	0									2	2			3	3	3	2
	1																
	3																
	6																
	12																
CPI, Core YoY% (change, # of lags)	0													3	2	2	
	1																
	3																
	6									2	2						
	12																
PPI, Finished YoY% (change, # of lags)	0													2		2	
	1																
	3																
	6																
	12																
PPI, Intermediate YoY% (change, # of lags)	0																
	1																
	3																
	6																
	12																
ISM Business Prices (log) (change, # of lags)	0					-2	-3										
	1																
	3																
	6																
	12																
log(Dollar Index) average of daily (change, # of lags)	0																
	1																
	3																
	6																
	12																

Sector Name		Hhld & PPds				Health Equip				Pharma				Banks			
Returns, Mths Fwd		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	2								2							
	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			
	3																
	6																
	12																
Log(ISM Manufact) (change, # of lags)	0																
	1													2			
	3		2											2			
	6	2	2														
	12																
Log(ISM Non-Manufacturing) (change, # of lags)	0																
	1																
	3													2	3		
	6																
	12																
Chicago Fed National Activity Index (change, # of lags)	0																
	1																
	3																
	6													2			
	12																
Michigan Consumer Confidence Index, Log (change, # of lags)	0																
	1													3			
	3													2			
	6																
	12																
CPI, YoY% (change, # of lags)	0									2	2						
	1																
	3													3			
	6																
	12																
CPI, Core YoY% (change, # of lags)	0																
	1																
	3									2							
	6							2									
	12					2				2							
PPI, Finished YoY% (change, # of lags)	0																
	1																
	3													2			
	6																
	12																
PPI, Intermediate YoY% (change, # of lags)	0																
	1																
	3																
	6																
	12																
ISM Business Prices (log) (change, # of lags)	0																
	1									-2							
	3					-2				-3				2			
	6																
	12																
log(Dollar Index) average of daily (change, # of lags)	0																
	1					-2											
	3																
	6																
	12																

KEY

2	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.

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Table 11f: Industries 17 to 24 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		Divs Finan				Insurance				Real Estate				Software				Tech Hard				Semi				Telecom				Utilities			
Returns, Mths Fwd		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				-2																			
	3					2				2																							
	6																																
	12																													2	2	3	
Log(CRB Commodity Price Index) average of daily (change, # of lags)	0	-3	-3	-3	-3			-2	-2																								
	1										2																						
	3									2	3																						
	6		-2	-3	-2																												
	12	-3	-3	-3	-3																											2	
Leading Economic Indicator, YoY% (change, # of lags)	0																																
	1																																
	3										3	2																					
	6										2																						
	12																																
Log(ISM Manufact) (change, # of lags)	0									2	2																					2	2
	1	3																															
	3	3								2	3															-2							
	6									2																							
	12									2	2																						
Log(ISM Non-Manufacturing) (change, # of lags)	0																															2	2
	1																																
	3	3									3				-2																		
	6																																
	12																																
Chicago Fed National Activity Index (change, # of lags)	0										2																						
	1																																
	3	2				2					2															-3							
	6									2	2																						
	12										3																						
Michigan Consumer Confidence Index, Log (change, # of lags)	0						2																										
	1																																
	3	2																															
	6																																
	12						2																										
CPI, YoY% (change, # of lags)	0																													2	2	2	
	1																																
	3																																
	6																																
	12																																
CPI, Core YoY% (change, # of lags)	0																					-2	-2										
	1																																
	3																																
	6																																
	12																					-2	-2	-2									
PPI, Finished YoY% (change, # of lags)	0																													3	2	2	
	1																																
	3																																
	6																																
	12																													2			
PPI, Intermediate YoY% (change, # of lags)	0																													3	3	3	
	1																																
	3																																
	6																															2	
	12																													2	2		
ISM Business Prices (log) (change, # of lags)	0										2																					3	2
	1																																
	3	3								2	3															-2							
	6									2	2																						
	12																															2	2
log(Dollar Index) average of daily (change, # of lags)	0																																
	1																																
	3																																
	6																																
	12																																

KEY

2	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.

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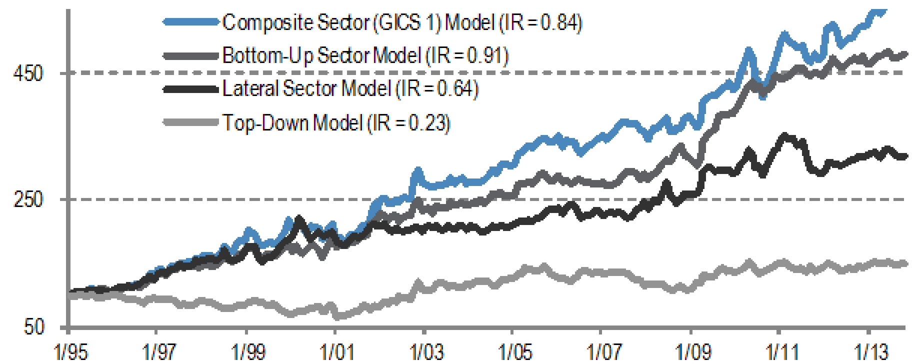
F: Sector GICS Level I Model—Using Same Factors as the Industry Model

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.

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