J.P.Morgan

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These reports related to Equity Momentum, originally published as of the date stamp on each of them, are now presented as a single report within the Investment Strategies series of publications under number 89.

Enhanced Price Momentum

Viewing Price Momentum through the Lens of Market Breadth and Depth

- Price-return Momentum strategies have long been adopted by the investment community, with many investors having assigned considerable significance to such strategies, and some even going to the extent of labeling Price Momentum an "irreplaceable" part of their investment process. More recently (post 2007) that has certainly been less so the case as Price Momentum has come under a lot of pressure from a performance perspective. Irrespective of those challenges, we find it interesting that a lot of investors globally are consistently poking back at this topic in various shapes and forms.

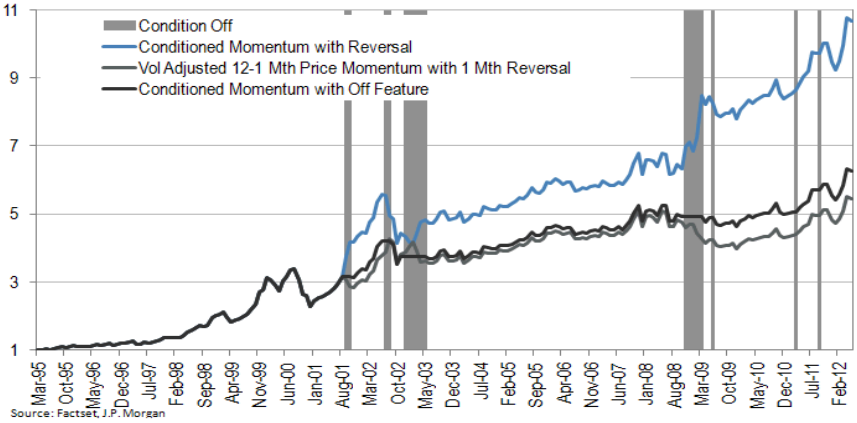
- In this report we attempt to understand possible shortcomings of Price Momentum and present potentially viable enhancements that show considerable improvement in results and that could serve as "food for thought" for future research.

- While attempting to time the market presents obvious risks, we believe that certain market dynamics, such as market breadth and depth, can serve as early warning indicators to potential upcoming changes in market direction. As such, we attempt to tackle the core of the problem by systematically conditioning Price Momentum and letting it run only during market environments which are considered favorable for trending strategies. Elsewhere, we allow for a contrarian view to be expressed.

- Bottom line, such an approach showed considerable improvement in Price Momentum as a strategy across regions globally and across US sectors. In fact, in the US our enhanced Price Momentum factor yielded an IR north of 1, while exhibiting an IC of 3.8% and a hit rate of 68% over the 17 years that were examined. In Europe the results were even stronger with the strategy yielding an IR of 1.1 and an IC of 5.5%. Even in Japan, which historically has been particularly "anti-friendly" to Momentum, the strategy exhibited an IR of 1 and an IC of 3.9%.

- Additionally, we use this report as an opportunity to review various enhancements that can be made to a basic Price Momentum strategy. While some of them might seem relatively evident, they do improve the effectiveness of such a strategy quite substantially and help mitigate potential draw-downs.

Enhanced Price Momentum - US



Source: Factset, J.P. Morgan

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See page 41 for analyst certification and important disclosures, including non-US analyst disclosures.

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Introduction

Price-return Momentum strategies have long been adopted by the investment community, with many investors having assigned considerable significance to such strategies, and some even going to the extent of labeling Price Momentum an 'irreplaceable' part of their investment process. More recently (post 2007) that has certainly been less so the case as Price Momentum has come under a lot of pressure from a performance perspective and overall has faced considerable scrutiny.

In fact, a commonly quoted reason for its shortcomings has simply been the overcrowding effect which has quite possibly resulted in its reduced form of effectiveness when it comes to persistently differentiating future winners from losers. Furthermore, the current risk-on / risk-off environment and constant swings in market sentiment add an additional layer of challenge to Momentum based strategies, especially given their natural contingency upon return persistence where "trends serve as friends."

In our US Factor Reference Book[1] we have previously examined various versions of Price Momentum; the main difference being the look-back horizon used to compute stock price appreciation. It is widely known that each strategy is faced with unique challenges and merits. For instance, short-term Price Momentum can respond to unexpected changes in market sentiment rather swiftly, minimizing a potentially large drawdown. However, not only can such responsiveness be costly from a turnover perspective, but short-term Momentum can be Value deteriorating especially during prolonged trending periods. On the other hand, intermediate-to-longer term Price Momentum may not be agile enough to recognize rapid shifts in market risk sentiment, especially during "trash rally" periods such as the exemplary one in early 2009 and to a smaller degree even the ones in subsequent years.

Irrespective of the challenges that Price Momentum has been facing, it is interesting to see that a lot of investors globally are consistently poking back at this topic in various shapes and forms. For instance, the more quantitative crowd has been examining different methods for dynamically conditioning such signals or implicitly including them within processes. Similarly, the fundamental crowd has been considering different ways of incorporating Momentum based information in their trade timing, while the retail crowd has been having a hard time giving up the use of Price Momentum due to some of its many attractive features including simplicity, transparency and ease of implementation.

As a result, we have decided to revisit this topic, with one of the major challenges being how to structure a more adaptable Price Momentum strategy which could also mitigate weaknesses such as the ones noted above. The main purpose of this report is to share our thinking process and some of the steps we have taken to address these issues, and by no means do we claim to have devised an "all weather" strategy. Instead, we attempt to understand the potential shortcomings of Price Momentum and present potentially viable enhancements that show improvement in results and could serve as "food for thought" for future research.

[1] US Factor Reference Book: What Drives Equity Returns? (Lakos-Bujas, January 2011)

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Background

Empirically, it has been shown that buying past winners and selling past losers has been a profitable strategy over time. In fact, there is an extensive list of literature that supports this theory, such as work done by Fama-French (1992) or by Jegadeesh and Titman (1993). Notably, Jegadeesh and Titman in "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency" document that over 3 to 12 month holding periods Price Momentum generates significant positive returns. Behavioral aspects, such as investor under-reaction or herd behavior, are often used to form the hypotheses for the Momentum effect.

Furthermore, this body of literature has also extended into areas that explore the interplay between momentum and other well known subjects: value - by Asness (2009), trading volume - by Lee and Swaminathan (2000), market capitalization - by Hong, Lim and Stein (2000), etc. For instance, Lee and Swaminathan show that past trading volume contains information on future price momentum's magnitude and persistence. Also, Hong, Lim and Stein note that profitability of momentum strategies is more prevalent with small cap stocks.

This paper explores similar ideas[2]. In fact, we will be incorporating additional market information, namely market depth and breadth, in order to have a better understanding of the expected payoff from Price Momentum and in order to explore potential applications of such information on momentum-based strategies. We will also attempt to integrate some of these aspects into our analysis of Price Momentum as a stock selection strategy.

[2] Special thanks to Sang H. Han for his contributions

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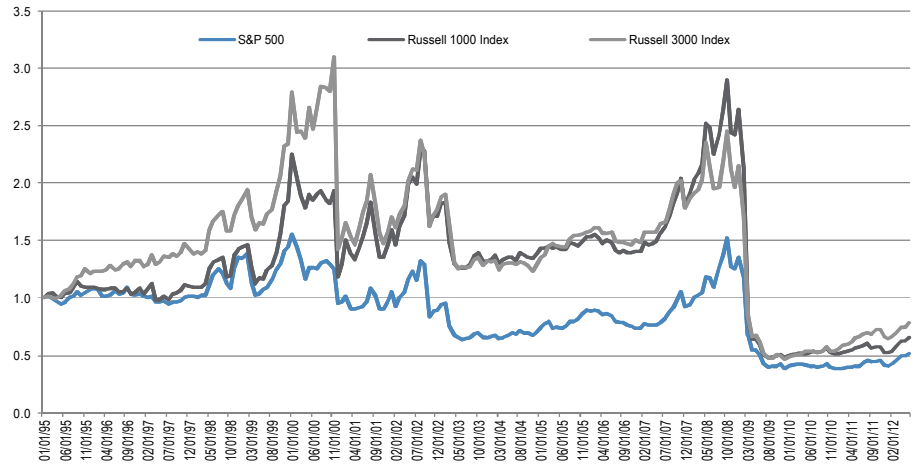
Price Momentum

Price Momentum, as the name inherently suggests, is based on the persistence of returns. In fact, the effectiveness of Price Momentum depends on past winners continuing to win and similarly past losers continuing to lose. This also means that by definition such a strategy will underperform during market Reversals when past losers outperform past winners.

Historical Effectiveness

Figure 1 below illustrates the historical performance of 12 month Price Momentum[3] in its simplest form since 1995 across various regions globally. Performance of Price Momentum has been very cyclical across the US cap spectrum during the period examined in our analysis.

Figure 1: Performance of 12M Price Momentum - US



Source: FactSet, J.P. Morgan

Not surprisingly, a similar trend was also observed across regions globally as shown in Figure 2, with Europe and Australia being the only two regions that have seen a more substantial recovery since its 2009 pitfalls. Furthermore, both Figures 1 and 2 reveal three distinct periods illustrating weakness in this strategy: the period right after TMT bubble peak, the recovery period following the TMT bubble burst and lastly the global financial crisis period. During these pronounced inflection points in the market, the strategy generated significant losses. This can be attributed in large part to the fact that Momentum, which in this case is based on a fixed longer-term window, was not nimble enough to adapt to sudden changes in market sentiment/direction.

[3] In this report we refer to 12 month Price Momentum as the conventional long/short version of this strategy. Standard construction was applied, such that stocks were ranked based on their 12 month price return. Subsequently, these rankings were used to form quintile or decile based (depending on the breadth of the universe) equal-weighted and sector-normalized portfolios, going long the top decile/quintile and going short the bottom decile/quintile. The strategy was rebalanced monthly.

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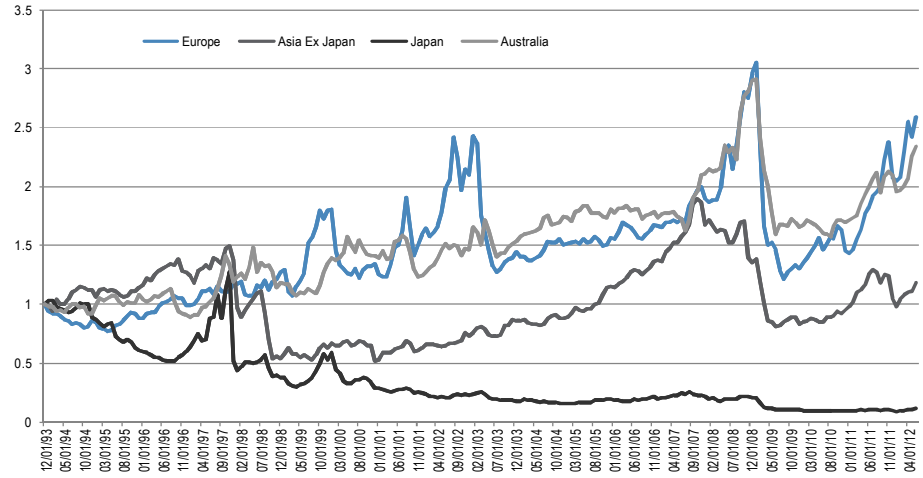
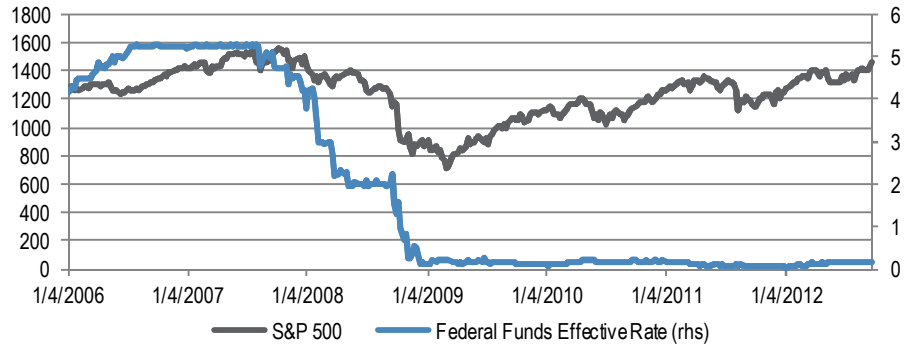
Figure 2: Performance of 12M Price Momentum – Global MSCI Regions



Source: Factset, J.P. Morgan

Among these episodic periods, the largest drawdown was seen during the latest financial crisis. During this period, VIX reached record levels and the market experienced a single day loss of 9%. Despite hostile market conditions, interestingly, Price Momentum held off relatively well while the crisis was unfolding. Profit generated by the short basket offset the loss generated by the long basket, as higher levels of correlation among stock returns persisted.

Figure 3: S&P 500 Index & Fed Funds Rate



Source: Bloomberg

As illustrated in Figure 3, the Fed counter-acted aggressively with a zero-interest rate policy. This action, coupled with the ban on naked short selling, kick-started a sharp market rally in early 2009. During this "trash rally" Price Momentum significantly underperformed. For instance, in March alone of that year, Price Momentum underperformed by more than 10% on a long/short basis across all regions globally and incurred the greatest loss in US and Europe, reaching levels of approximately -40% and -30% respectively (see Table 1).

As the market exhibited a sharp recovery the loss generated by the short leg overpowered the profit resulting from the long leg.

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Table 1: L/S Monthly Returns for 12M Price Momentum – Global MSCI Regions

	US	Europe	Japan	Asia Ex JP	Australia
10/31/08	11.27%	8.53%	1.33%	0.69%	5.62%
11/30/08	-13.32%	-1.73%	0.21%	-18.11%	1.45%
12/31/08	-0.37%	7.63%	-6.05%	-2.76%	3.05%
1/31/09	10.22%	3.04%	-0.28%	2.34%	0.53%
2/28/09	-11.88%	-23.58%	-18.87%	-14.29%	-17.34%
3/31/09	-41.17%	-28.38%	-23.01%	-15.11%	-11.32%
4/30/09	-16.21%	-9.83%	-8.62%	-15.15%	-6.21%
5/31/09	1.29%	1.24%	-2.96%	-1.15%	-11.01%
6/30/09	-7.78%	-4.13%	-1.59%	-4.44%	-10.76%
7/31/09	-12.75%	-11.29%	-6.33%	1.64%	5.14%
8/31/09	-4.70%	-6.24%	4.61%	3.18%	0.28%
9/30/09	1.88%	4.91%	-4.27%	2.66%	-0.56%
10/31/09	1.06%	2.20%	-1.26%	2.74%	3.53%

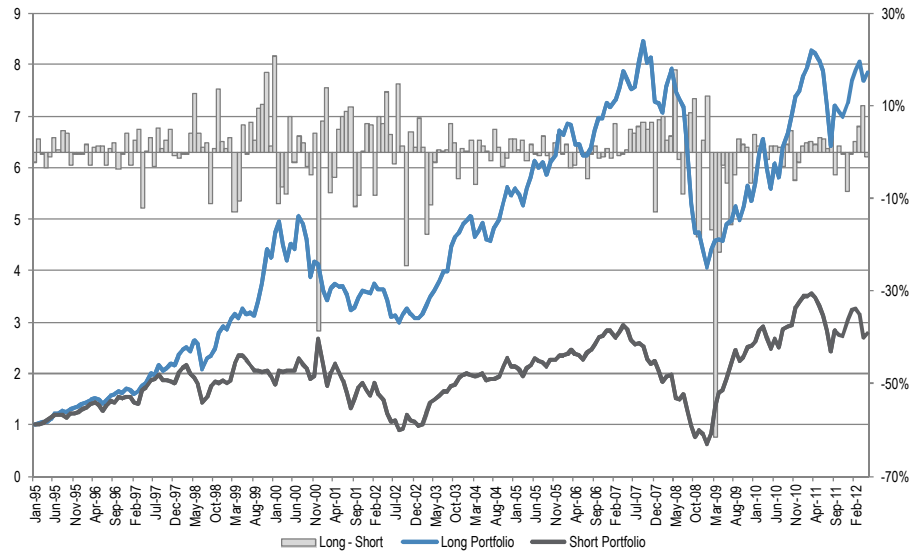
Source: FactSet, J.P. Morgan.

Return Attribution

So which leg of the portfolio caused this drawdown – the long side, the short side or both? For illustration purposes, in Figure 4, we show the historical performance of Price Momentum, separating out the long portfolio from the short portfolio.

The average annual returns of the long and short baskets were 12.8% and 6.4% respectively meanwhile the corresponding annualized standard deviations were 19.6% and 35.0%. The worst monthly long/short return came in March 2009 (aka "trash rally") incurring a loss of -61.6% on 3/2009, when the short portfolio alone exhibited a return of 65.8%.

Figure 4: Long & Short Performance of Price Momentum – Russell 1000



Source: FactSet, J.P. Morgan.

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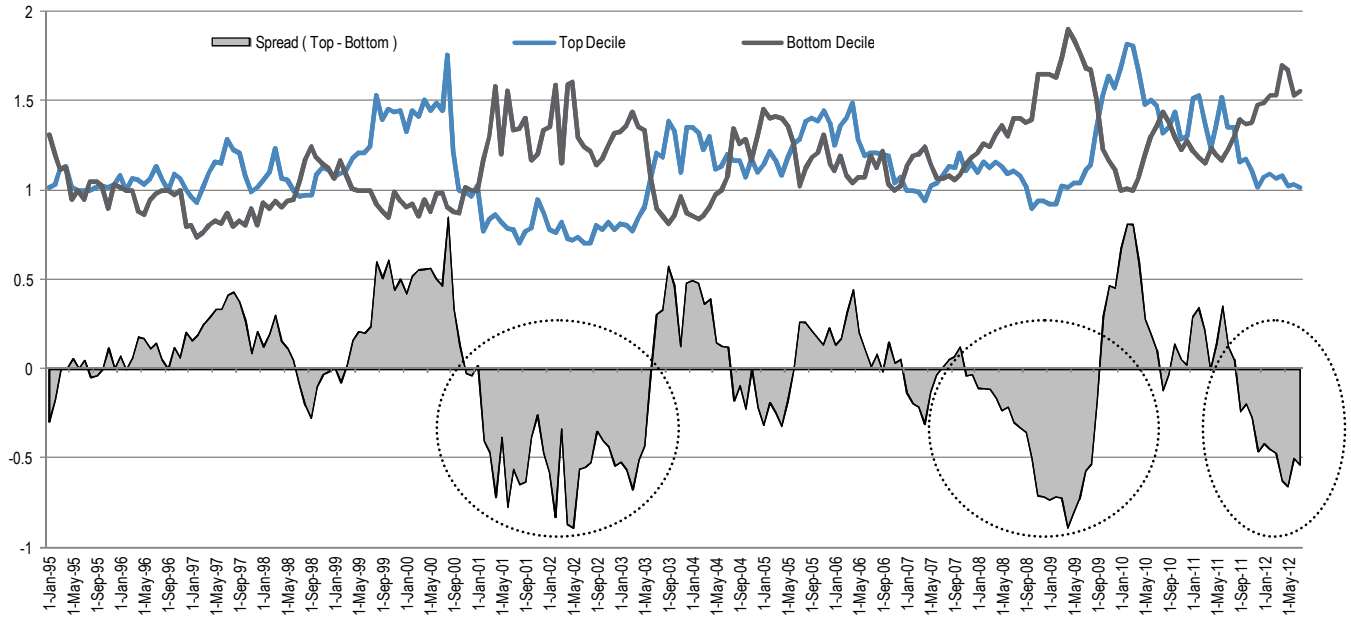
Beta Exposure of Price Momentum

In this section of the report, we turn our analysis to a somewhat surprising yet interesting fact about the relationship between Price Momentum and predicted Beta[4]. While it might seem insignificant at first glance over a longer history, the relationship between Price Momentum and Beta has actually been quite strong and dynamic over time.

In Figure 5 we illustrate through time the median Betas for Russell 1000 stocks that sit on the opposite ends of the Price Momentum distribution as well as the Beta of their spread. While the Betas of both deciles tend to range bound between 1.0 and 1.5, there are certain periods when they reach more extreme levels and the spread between them widens.

Figure 5: Median Beta Spread – 12M Price Momentum



Source: Factset, Barra, J.P. Morgan

For instance, during the final stages of the Tech bubble in the late '90s there was a fairly strong imbalance between the high Momentum names with a median Beta of ~1.5 and the low Momentum names with a median Beta south of 1.0. This positive spread acted in favor of Price Momentum as the long and higher Beta decile outperformed the short and lower Beta decile. However, as the market tipped over and started its slide, the Beta spread reversed. At this point, Price Momentum found itself carrying high Beta stocks in its short portfolio and low Beta stocks in its long portfolio, a recipe for potential disaster! Thereafter, any sort of market rebound and especially a "trash rally", which is typically always led by higher Beta stocks as investors become more risk embracing, puts Price Momentum on a very slippery slope. In fact this ended up being the case. The market rebound and the "trash rally" at the beginning of 2009 is another similar example when the Beta spread reached extreme negative level. Subsequently Price Momentum yet again took a substantial

[4] Predicted Beta from Barra

hit, predominantly driven by its short portfolio which loaded up on stocks with a high median Beta of almost 2, while the long portfolio carried stocks with market-like Beta.

Furthermore, this suggests that the performance of Price Momentum can be heavily driven by the performance of Beta during periods when the magnitude of the correlation between these two factors is large. As a result, we urge investors that use Price Momentum within their investment process to pay close attention to its Beta exposure.

In fact, most recently (see Figure 5) the negative Beta spread between high and low Momentum stocks is not far off the extreme levels seen during the last decade, suggesting that Price Momentum could be facing disaster yet again!

Extensions to Price Momentum

One common extension of the basic12 month Price Momentum factor is to incorporate 1 month Reversal and further adjust it by stock volatility. The construction is as follows:

$$PMOM_{12-1Mth}(t) = \frac{Ret_{t-1,t-12} - Ret_{t,t-1}}{\sigma_{1m}}$$

The last month is excluded to account for the potential Reversal effect, often deemed to be driven by market micro-structure. Additionally, Price Momentum is scaled by short term stock volatility to provide a risk-neutrality component to the factor and to help avoid the long or short leg having a substantial volatility/Beta bias that we discussed in the previous section of this report.

Table 2 provides an in-depth summary of the back-test results across the US cap spectrum. These simple extensions bring substantial improvement to the efficacy of Price Momentum as a factor. Bottom line, the improvements are seen across the various universes.

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Table 2: Volatility Adjusted 12M-1M Price Momentum with 1M Reversal - Back-test Results

S&P 500

Total Period: 1/31/1995 to 7/31/2012
Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.2%	13.9%	5%	61%
2	1.1%	12.8%	5%	58%
3	1.2%	13.1%	5%	52%
4	1.1%	12.6%	5%	50%
5	1.1%	12.1%	5%	51%
6	1.0%	10.9%	6%	49%
7	1.1%	11.3%	6%	52%
8	0.9%	9.0%	6%	44%
9	0.8%	7.7%	6%	45%
10	0.5%	4.1%	6%	35%
		Total Test		
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	2.6%	2.4%	457

Long Short Strategy Statistics
Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Sho	0.7%	7.41%	3.9%	65%
Benchma	0.2%	2.06%	2.5%	61%
	T-Stat	Sharpe*	Assets	
Long/Sho	2.51	0.55	92	

Russell 1000 Index

Total Period: 1/31/1995 to 7/31/2012
Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.6%	18.4%	5%	61%
2	1.3%	15.3%	5%	55%
3	1.4%	15.9%	5%	60%
4	1.4%	16.6%	6%	60%
5	1.1%	12.4%	5%	51%
6	1.1%	12.4%	6%	50%
7	1.2%	13.5%	6%	47%
8	0.9%	9.7%	6%	44%
9	0.9%	8.7%	6%	40%
10	0.6%	4.8%	6%	32%
		Total Test		
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.2%	3.1%	3.1%	743

Long Short Strategy Statistics
Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Sho	1.0%	10.98%	4.4%	66%
Benchma	0.4%	4.37%	2.8%	61%
	T-Stat	Sharpe*	Assets	
Long/Sho	3.18	0.72	149	

Russell 3000 Index

Total Period: 1/31/1995 to 7/31/2012
Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.8%	21.7%	6%	64%
2	1.7%	19.9%	5%	59%
3	1.5%	17.7%	5%	59%
4	1.6%	18.9%	6%	62%
5	1.3%	14.9%	6%	53%
6	1.4%	15.1%	6%	50%
7	1.2%	12.4%	6%	41%
8	1.1%	11.4%	6%	40%
9	1.2%	12.0%	6%	41%
10	0.7%	5.6%	6%	31%
		Total Test		
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.3%	3.2%	3.2%	1177

Long Short Strategy Statistics
Portfolio 1 less Portfolio 10

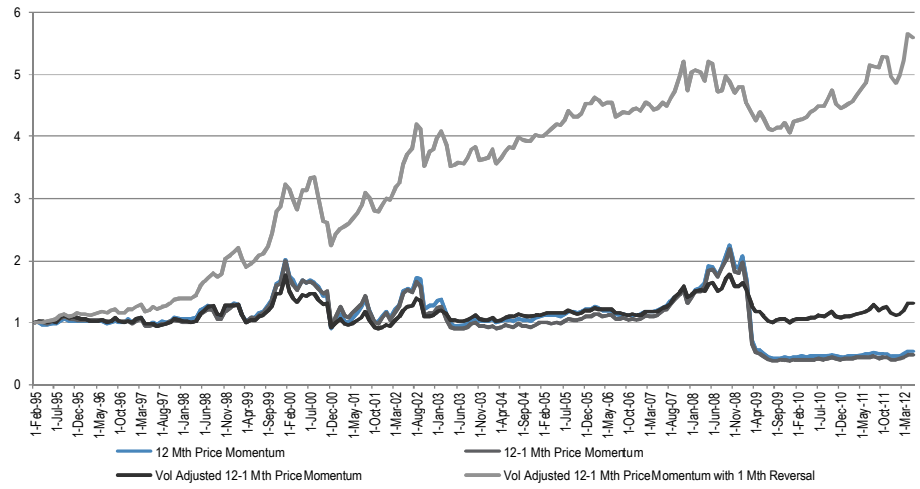
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Sho	1.1%	13.20%	4.4%	66%
Benchma	0.5%	5.24%	2.8%	64%
	T-Stat	Sharpe*	Assets	
Long/Sho	3.71	0.86	236	

Source: Factset, J.P. Morgan

Effectiveness of Price Momentum Extensions

So what exactly drives the improvement in Price Momentum? Essentially, there are three components to this strategy: one month delayed long-term Price Momentum, short-term Reversal, and the volatility adjustment. Each component adds some benefit. However, as shown in Figure 6, the majority of the contributions stemmed from the latter two components - addition of short-term Reversal and vol adjustment.

Figure 6: Price Momentum with 1 Month Reversal Composition: Russell 1000



Source: FactSet, J.P. Morgan.

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In fact, when tested within the Russell 1000 universe over the last 17 years the IR for 12M Price Momentum improved from 0.05 to 0.78 after lagging Price Momentum by 1M, adding the 1M Reversal component and adopting the volatility adjustment (see Table 3).

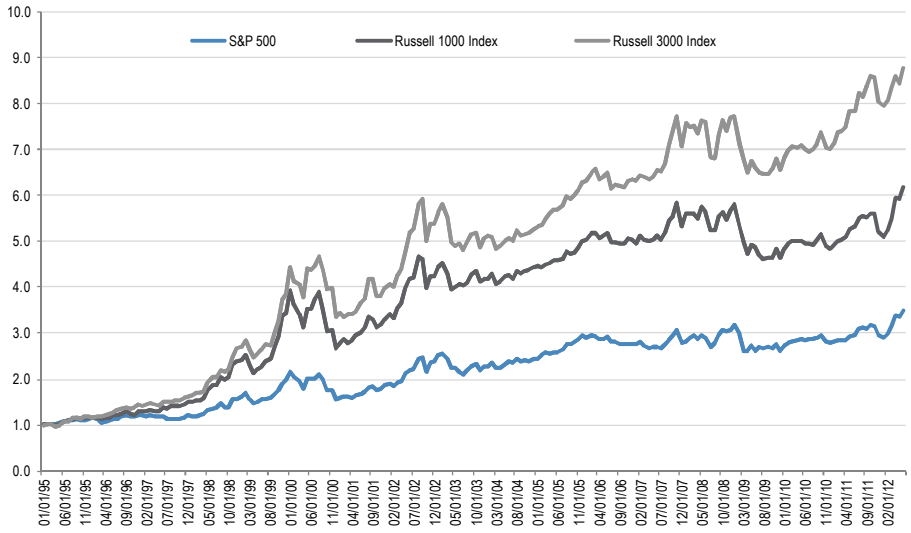
Table 3: Vol Adj 12M-1M Momentum with 1M Reversal – IR Decomposition

	IR
12 Mth Price Momentum	0.05
12-1 Mth Price Momentum	0.04
Vol Adjusted 12-1 Mth Price Momentum	0.19
Vol Adjusted 12-1 Mth Price Momentum with 1 Mth Reversal	0.76

Source: FactSet, J.P. Morgan

As illustrated in Figure 7, the new signal construction provides noticeable improvements and reduces the strategy's shortcomings. However, market inflection points still present challenging periods even though to a lesser extent. Furthermore, with the extensions in place the strategy adapts to new regimes more effectively and recovers faster. In fact, the strategy recovered all of its losses and reached new highs within the S&P 500 and Russell 1000 universes. See appendix for more detailed performance results.

Figure 7: Performance of Vol Adj 12M-1M Momentum with 1M Reversal - US



Source: Factset, J.P. Morgan

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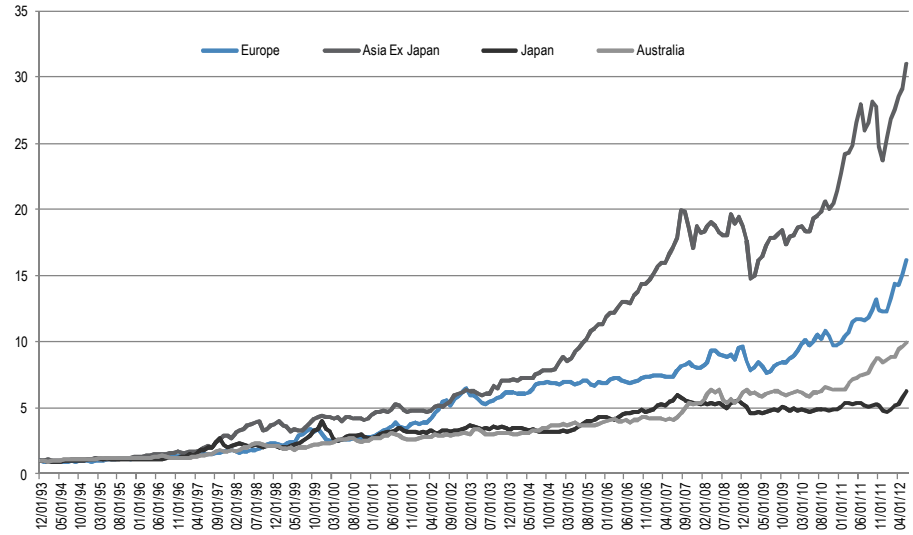
At the global level the most dramatic improvements were actually seen in non-US markets, especially in Asia ex Japan and Europe (see Figure 8).

Figure 8: Performance of Vol Adj 12M-1M Momentum with 1M Reversal – Global Regions



Source: FactSet, J.P. Morgan

Referring back to the L/S monthly returns of Price Momentum, the aforementioned enhancements to the strategy resulted in substantial drawdown improvements in early 2009 - one of the toughest periods that Momentum has faced. For instance, during March the drawdown in the US decreased from -41% to -7%, in Europe from -28% to -6%, in Japan from -23% to -10%, and in Australia from -11% to -4%. While the drawdown essentially remained unchanged in the Asia ex Japan region during that month, it improved during the surrounding months.

Table 4: L/S Monthly Returns for Vol Adj 12M-1M Momentum with 1M Reversal – Global Regions

	US	Europe	Japan	Asia Ex JP	Australia
10/31/08	-1.17%	2.33%	8.28%	8.67%	6.09%
11/30/08	-1.55%	-4.52%	1.82%	-3.63%	-6.40%
12/31/08	1.06%	9.94%	1.27%	2.94%	6.91%
1/31/09	1.98%	1.32%	-5.25%	-3.52%	8.42%
2/28/09	-4.57%	-11.65%	-3.10%	-6.16%	2.49%
3/31/09	-7.47%	-8.27%	-10.43%	-15.92%	-4.29%
4/30/09	-3.28%	2.65%	0.70%	1.29%	1.79%
5/31/09	1.81%	4.44%	2.38%	7.87%	-3.06%
6/30/09	-3.12%	-3.45%	-2.56%	1.56%	-1.84%
7/31/09	-3.88%	-5.56%	2.17%	5.02%	3.80%
8/31/09	-1.21%	1.20%	1.93%	3.62%	1.44%
9/30/09	-0.44%	5.03%	1.19%	-0.18%	1.85%
10/31/09	-1.26%	2.73%	-0.92%	1.51%	-0.24%

Source: FactSet, J.P. Morgan.

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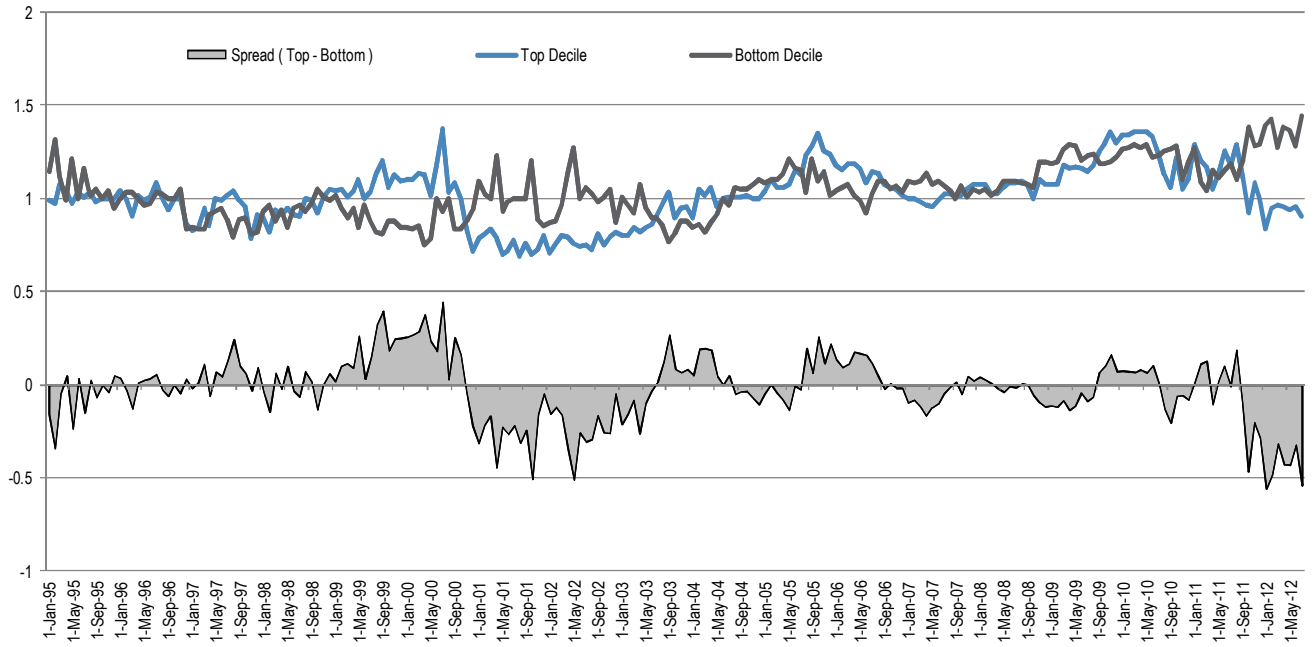
Improvements in Beta Exposure

In this section of the report, we revisit the Beta exposure analysis. Here, the objective is to examine whether the extended version of Price Momentum, especially given the incorporated volatility adjustment, has more risk balance and is better able to cope with market/Beta shifts.

As illustrated in Figure 9, not surprisingly, the median Betas of top/bottom deciles end up tracking each other more closely resulting in an overall tighter Beta spread. The only periods that still do show some degree of imbalance include the period right after the Tech bubble burst as well as the most recent period, however to a smaller degree.

Figure 9: Beta Spread - Vol Adjusted 12M-1M Price Momentum with 1M Reversal



Source: FactSet, Beta, J.P. Morgan

On average while both factors have Beta spreads around -2.5%, the volatility of the "naked" 12M Momentum Beta spread is twice as high as that of the enhanced one, with much wider min/max points (see Table 5).

Table 5: Beta Spread

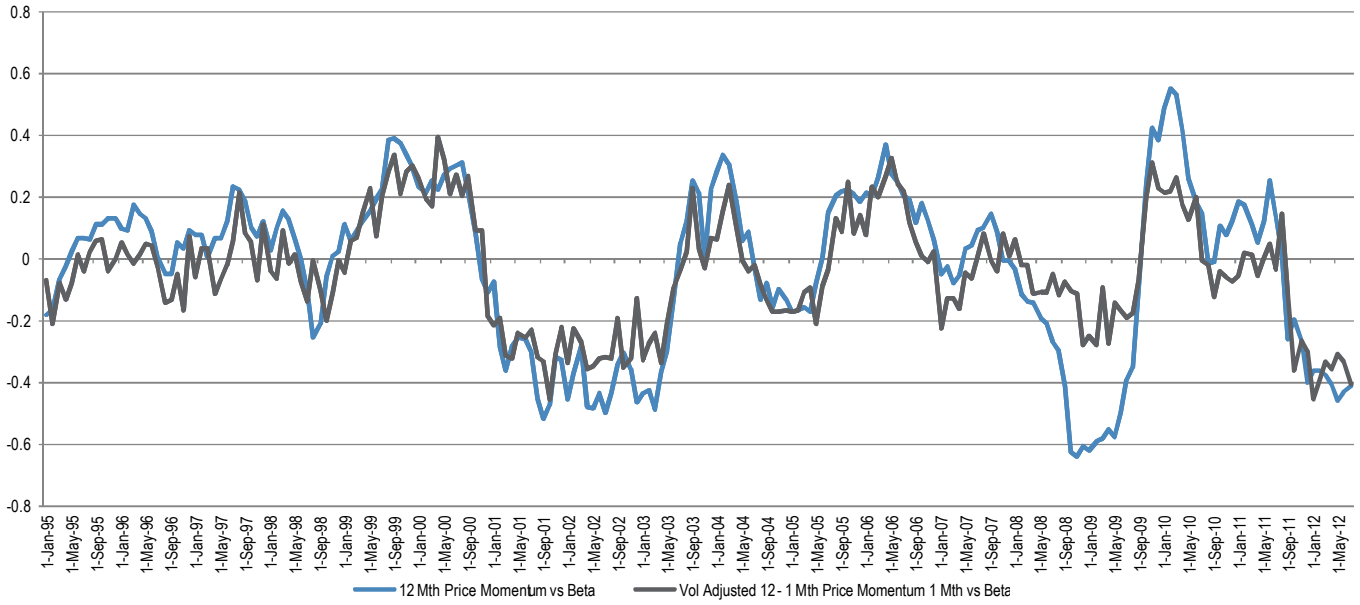
Beta Spread (Top/Bottom Deciles)	Average	Std Dev	Min	Max
12 Mth Price Momentum	-0.03	37.4%	-0.89	0.85
Vol Adjusted 12-1 Mth Price Mom with 1 Mth Rev	-0.02	17.5%	-0.56	0.44

Source: FactSet, Beta, J.P. Morgan

In addition, we examined the factors' relationship with Beta by computing their cross-sectional rank correlation through time. As illustrated in Figure 10, the results

were similar to what was originally observed with the Beta spread. As expected the enhanced Momentum strategy exhibited overall milder sensitivity to Beta.

Figure 10: Cross-Sectional Rank Correlation against Beta (Sector-Neutralized)



Source: FactSet,, Beta, J.P, Morgan

What More Could Be Done?

In earlier sections of this report, we point out that basic Price Momentum is simply not robust enough to navigate constantly changing market directions, especially during periods of sudden and abrupt market reversals. Incorporating a reversal component and better neutralizing volatility imbalances among stocks certainly provides greater stability to the Price Momentum factor. However, by imposing a constant Reversal trade on top of a constant Momentum trade could also suggest one is not taking full advantage of changes in market direction but is rather constantly hedging oneself, which could be rather costly.

So what more could potentially be done? While attempting to time the market presents obvious risks, we believe that certain market dynamics, such as market sentiment and technicals, can serve as early warning indicators to a potential upcoming change in market direction. As such, we attempt to tackle the core of the problem by letting Price Momentum run only during periods which are considered favorable for trending strategies. Elsewhere, we allow for a contrarian view to be expressed. These ideas set the stage for the subsequent part of the report. But before we dive into this next step, we quickly explore the idea of Absolute Momentum.

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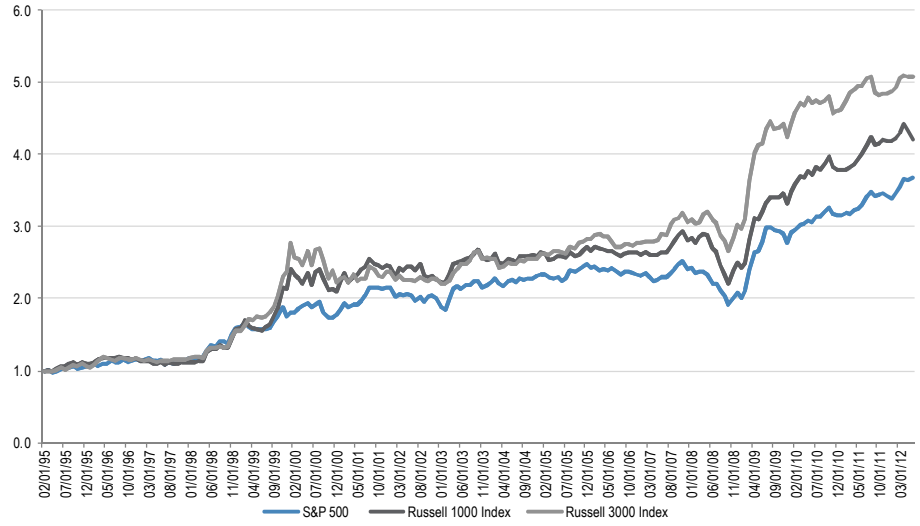
Absolute Momentum

As previously noted, traditional Price Momentum can be very vulnerable during inflection points when the market sharply reverts from its lows, such as "trash rally" periods. Given that timing such inflection points can be challenging, one naïve and potentially interesting (at least in our opinion) approach for addressing this shortcoming could be to simply purchase the traditional short leg along with the long leg of the portfolio. The purchase of the short leg could be essentially thought of as purchasing "protection" especially against the aforementioned market Reversals. The factor score can be constructed as follows:

$$PMOM(t) = \left|\frac{Ret_{t,t-12}}{\sigma_{1m}}\right|$$

In other words, this would suggest going long the extremes and going short the middle part (i.e. the market) of the Price Momentum score/ranking distribution. The idea is to buy the worst Price Momentum stocks, hoping that during sharp market rebounds, the potential payoff from the short leg would overcome the loss incurred by the strategy during normal/trending market conditions. While this could be thought of as some form of insurance, the main pitfall of constantly paying for this permanent downside protection would occur if the market goes through prolonged negative trending environments.

Figure 11: Absolute Momentum



Source: FactSet, J.P. Morgan

Historical performance of Absolute Price Momentum is illustrated in Figure 11. As noted above, insurance from going long the short leg goes into effect especially during market Reversals, such as the "trash rally" in early 2009, during which the portfolio realizes a positive payoff. This strategy substantially reduces both the drawdown and the recovery period of a "naked" Price Momentum strategy.

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Furthermore, for comparison purposes in Figure 12 we illustrate side-by-side the performance of simple Price Momentum and that of Absolute Price Momentum. The differences are quite astonishing!

Figure 12: Basic Price Momentum vs. Absolute Price Momentum

Source: Factset, J.P. Morgan

Table 6 provides an in-depth summary of the Absolute Momentum back-test results across the US cap spectrum. Overall the results are fairly robust, with solid ICs and hit rates, while exhibiting a well-behaved pay-off structure.

Table 6: Absolute Momentum - Back-test Results

S&P 500

Total Period: 1/31/1995 to 7/31/2012
Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	%Out Perf.
1	1.2%	13.6%	5%	57%
2	1.3%	14.5%	6%	57%
3	1.3%	14.5%	6%	59%
4	1.0%	10.4%	6%	45%
5	1.1%	12.4%	6%	53%
6	1.0%	10.5%	5%	50%
7	0.9%	9.7%	5%	45%
8	0.8%	8.8%	5%	44%
9	0.8%	7.9%	5%	43%
10	0.6%	5.4%	5%	47%

	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	2.2%	2.0%	446

Long Short Strategy Statistics
Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Std Devn	%Out Perf.
Long/Sho	0.7%	7.64%	3.0%	61%

	T-Stat	Avg Assets
Long/Sho	3.20	90

Russell 1000 Index

Total Period: 2/28/1995 to 7/31/2012
Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	%Out Perf.
1	1.5%	17.3%	6%	59%
2	1.4%	16.3%	6%	56%
3	1.3%	14.3%	6%	61%
4	1.3%	14.0%	6%	55%
5	1.2%	13.2%	6%	56%
6	1.1%	11.8%	6%	47%
7	1.1%	12.1%	6%	52%
8	0.8%	7.7%	5%	43%
9	0.8%	7.9%	5%	44%
10	0.8%	7.8%	5%	47%

	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	2.3%	2.3%	781

Long Short Strategy Statistics
Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Std Devn	%Out Perf.
Long/Sho	0.7%	8.60%	3.5%	56%

	T-Stat	Avg Assets
Long/Sho	3.13	157

Russell 3000 Index

Total Period: 2/28/1995 to 7/31/2012
Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	%Out Perf.
1	1.6%	17.7%	6%	65%
2	1.6%	17.8%	6%	65%
3	1.6%	17.5%	6%	68%
4	1.4%	15.7%	6%	65%
5	1.3%	13.5%	6%	58%
6	1.2%	12.3%	6%	57%
7	1.1%	12.0%	6%	54%
8	1.0%	10.2%	6%	50%
9	1.0%	10.3%	6%	53%
10	0.7%	7.1%	5%	49%

	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.9%	2.0%	1.9%	1962

Long Short Strategy Statistics
Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Std Devn	%Out Perf.
Long/Sho	0.8%	9.83%	3.4%	62%

	T-Stat	Avg Assets
Long/Sho	3.53	393

Source: Factset, J.P. Morgan

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Capturing Sentiment Using Market Depth and Breadth

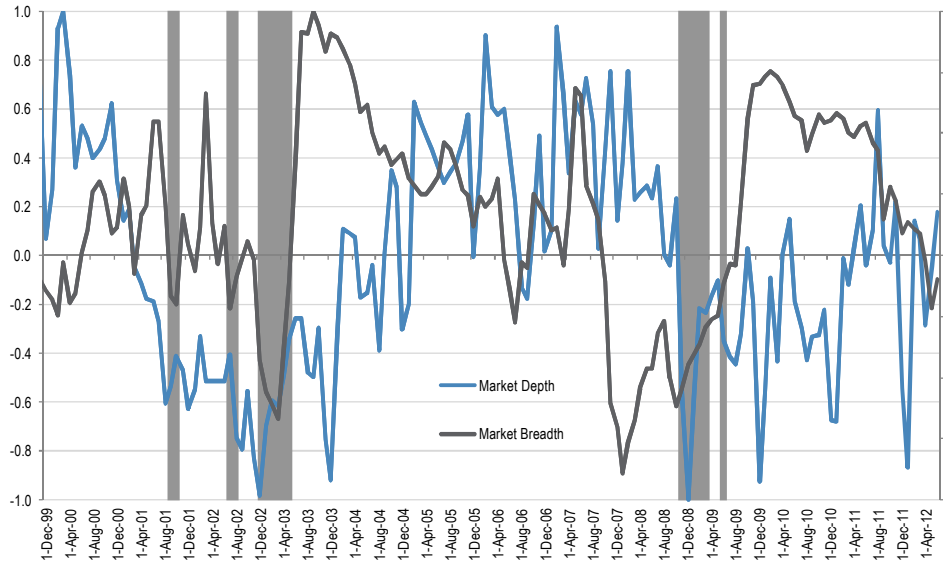
There are numerous ways to capture market sentiment. In this section, we focused on using market dynamics for identifying periods of over-stretched negative market sentiment. Such exaggerated periods are often succeeded by market snap-backs, which can be challenging for momentum-based/trending strategies.

The two indicators that we deem to be effective, while also possessing an objective and intuitive appeal, are market "depth" and "breadth". The relative degree of market participation was essentially used to measure the level of market "depth", while relative strength across stocks was used to indicate the level of market “breadth”. While each indicator provides an independent view on market sentiment, it is really the interaction between them that provides the actual level of conviction with respect to a potential change in overall market sentiment.

For instance, while a contraction in market “breadth" suggests deteriorating market sentiment and a contraction in market "depth" is indicative of decreasing market participation, it is really the deterioration in both that would suggest a potential market snap-back..

Figure 13 shows how both indicators, market depth and market breadth, vary through time. For illustration purposes, we highlight the overlapping periods when both indicators are simultaneously negative, indicating that they are both contracting. As a result, this suggests that a snap-back is quite likely given the over-stretched market sentiment condition and that the upcoming market environment does not favor momentum-based/trending strategies.

Figure 13: Interaction between Market Breadth and Market Depth



Source: Bloomberg, J.P. Morgan

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Conditioned Price Momentum

Sometimes Just Momentum Is Not Enough

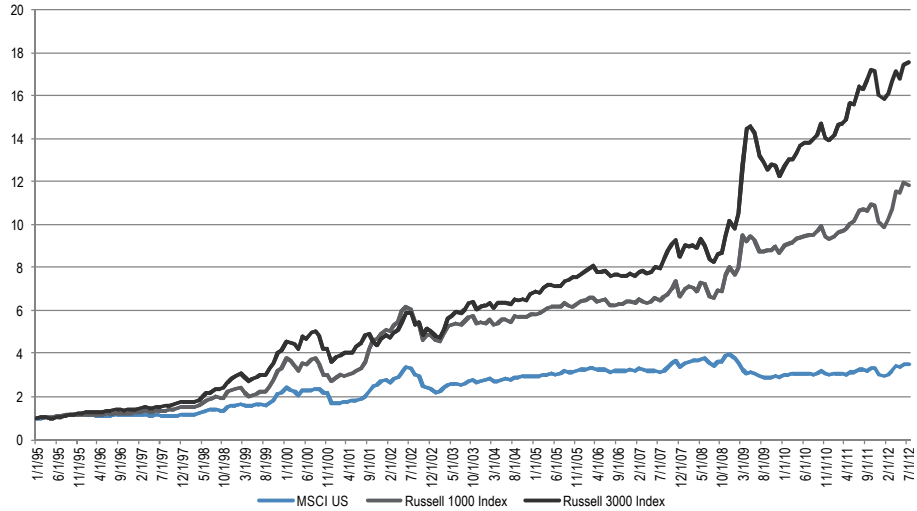
In the earlier part of this report, we examined 12 month Price Momentum with a permanent 1 month Reversal component embedded within. In this section of the report, we condition the strategy and systematically rotate between the volatility adjusted Price Momentum with embedded Reversal and flat out Reversal per se.

The condition for rotating the strategy is based on the interaction between market "breadth" and market "depth" that was introduced in the previous section. When the condition gets triggered and both indicators are in contraction mode, our analysis suggests there is an increased likelihood of a market snapback. As a result, the Reversal trade is favored over Momentum.

$$PMOM_{COND} \begin{cases} COND = 1: & PMOM_{12-1Mth} \\ COND = 0: & PriceReversal \end{cases}$$

Obviously, the success of this strategy is based on the accuracy of the underlying model. As we are well aware that any sort of market timing strategy is prone to potential data fitting, for robustness purposes we also tested this strategy across all US sectors as well as global regions and found the results to be consistent. This consistency in performance coupled with relatively intuitive market indicators that were used for conditioning purposes give us additional confidence in the robustness of this strategy. However, as always, the true out-of-sample test can only be based on the period going forward.

Figure 14: Conditioned Price Momentum - US



Source: Bloomberg, FactSet, J.P. Morgan

As illustrated in Figure 14, conditioned Price Momentum strategy yielded strong and relatively persistent performance results across the US cap spectrum over the 17

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years that were examined in this analysis – exhibiting strong persistence and minimal drawdowns, especially in the Russell 1000 space.

To put some numbers into context, the strategy exhibited a since inception IC of 3.8% with a perfectly monotonic decile pay-off distribution. Moreover, it yielded on average an annual active return of 16% with an IR north of 1.0. The return pay-off was also very persistent as indicted by the long/short hit rate of 68% (see Table 7).

Table 7: Conditioned Price Momentum – Back-test Results

MSCI US

Total Period: 1/31/1995 to 7/31/2012
Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	%Out Perf.
1	1.2%	13.4%	5%	59%
2	1.2%	14.0%	5%	57%
3	1.0%	11.0%	5%	56%
4	1.0%	11.0%	5%	52%
5	1.0%	10.1%	6%	53%
6	0.9%	9.7%	5%	53%
7	0.9%	9.3%	6%	49%
8	0.8%	8.0%	6%	47%
9	0.6%	4.8%	6%	42%
10	0.5%	3.7%	6%	40%
		Total Test		
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.9%	3.1%	2.6%	450

Long Short Strategy Statistics
Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Std Devn	%Out Perf.
Long/Sho	0.7%	7.61%	4.3%	58%
Benchma	0.3%	3.00%	2.5%	59%
	T-Stat	Sharpe*	Assets	IR
Long/Sho	2.37	0.51	91	0.3

Russell 1000 Index

Total Period: 1/31/1995 to 8/31/2012
Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	%Out Perf.
1	1.6%	18.0%	6%	62%
2	1.5%	16.9%	6%	57%
3	1.3%	14.8%	6%	58%
4	1.2%	13.3%	6%	53%
5	1.2%	12.5%	6%	56%
6	1.1%	11.8%	6%	51%
7	0.9%	9.6%	6%	46%
8	0.8%	8.3%	6%	41%
9	0.5%	4.3%	6%	35%
10	0.3%	1.3%	6%	33%
		Total Test		
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	3.8%	3.4%	939

Long Short Strategy Statistics
Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	%Out Perf.
Long/Sho	1.3%	15.13%	4.6%	68%
Benchma	0.5%	6.02%	2.7%	62%
	T-Stat	Sharpe*	Assets	IR
Long/Sho	4.03	0.94	189	0.7

Russell 3000 Index

Total Period: 1/31/1995 to 8/31/2012
Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	%Out Perf.
1	1.5%	17.0%	6%	63%
2	1.6%	18.7%	6%	71%
3	1.3%	14.4%	6%	60%
4	1.3%	14.1%	6%	63%
5	1.1%	11.9%	6%	58%
6	1.0%	9.4%	6%	52%
7	0.8%	7.7%	7%	45%
8	0.6%	4.6%	7%	39%
9	0.4%	2.2%	6%	32%
10	0.1%	-1.5%	6%	32%
		Total Test		
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	4.2%	3.1%	2791

Long Short Strategy Statistics
Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Std Devn	%Out Perf.
Long/Sho	1.5%	17.69%	4.3%	69%
Benchma	0.6%	6.38%	2.7%	63%
	T-Stat	Sharpe*	Assets	IR
Long/Sho	4.91	1.18	559	0.7

Source: Bloomberg, FactSet, J.P. Morgan

Furthermore, the conditioned strategy showed improvement in results across essentially all US sectors, including stronger IRs and lower drawdowns (see Table 8). For instance, within Materials space we saw an improvement in IR from 0.17 for the Momentum strategy with the embedded Reversal to and IR of 0.43 for the conditioned strategy and a reduction in maximum drawdown from -66% to -48%.

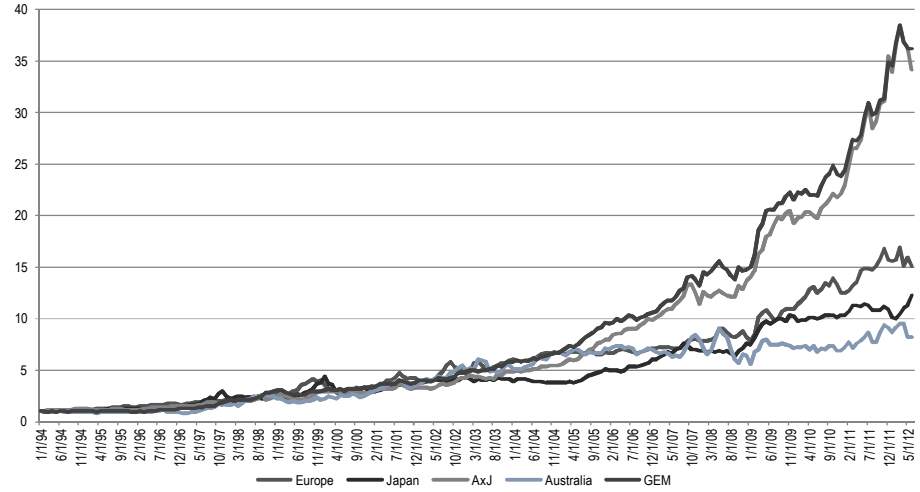
Table 8: US Sector Backtest – Russell 1000 Index

IR	Energy	Materials	Industrials	Con Discre	Con Staples	Health Care	Financials	IT	Tele	Utilities
12 Mth Price Momentum	-0.05	-0.06	-0.24	0.34	-0.18	-0.16	0.01	0.04	0.07	0.13
12 Mth Price Mom with 1 Mth Rev	-0.01	0.17	0.42	0.88	0.34	0.01	0.66	0.62	0.30	0.38
Conditioned Price Momentum	0.19	0.43	0.50	0.98	0.50	0.13	0.85	0.76	0.47	0.37
Hit Rate										
12 Mth Price Momentum	51%	57%	54%	61%	52%	52%	55%	52%	54%	56%
12 Mth Price Mom with 1 Mth Rev	55%	55%	57%	63%	52%	50%	61%	59%	57%	57%
Conditioned Price Momentum	56%	57%	58%	63%	53%	50%	62%	61%	57%	57%

Source: Bloomberg, FactSet, J.P. Morgan

Similarly, as illustrated in Figure 15, the conditioned Price Momentum strategy yielded strong results globally, exhibiting persistent effectiveness in Asia ex Japan, GEM and Europe. Even in Japan, which has been known as an anti-friendly momentum region, the strategy chugged along pretty nicely without incurring much of a drawdown at all. Australia was the only region where this strategy had a tougher time outperforming, and essentially remained flat for the last several years.

Figure15: Conditioned Price Momentum – Global Regions



Source: FactSet, J.P. Morgan

Or Is Just Momentum Enough?

We also examined the conditioned Price Momentum strategy with an on/off feature. Under this version the condition is used to rotate between Price Momentum with embedded Reversal (when feature is "on") and outright cash (when feature is "off").

$$PMOM_{COND} \begin{cases} COND = 1: & PMOM_{12-1Mth} \\ COND = 0: & Outright\ Cash \end{cases}$$

We deem this to be a more conservative approach, as it could prevent a potentially large loss from the Reversal trade caused by an incorrect timing call, while minimizing a potential drawdown in Momentum in the case of the timing call being correct.

Figure 16 shows the performance results for the US. As indicated by the shaded parts, the condition was triggered a handful of times over the last 17 years, mainly concentrated during the Tech Crisis and the Global Financial Crisis. Conditioned Momentum with Reversal came out as the dominant winner. This was driven in large part by the correct reversal play that the model put on during the end/beginning of years '02/'03 and '08/'09.

However, Conditioned Momentum with the "Off" Feature did well by turning off the momentum play during those same periods and mitigating losses that would have otherwise resulted from market rebounds.

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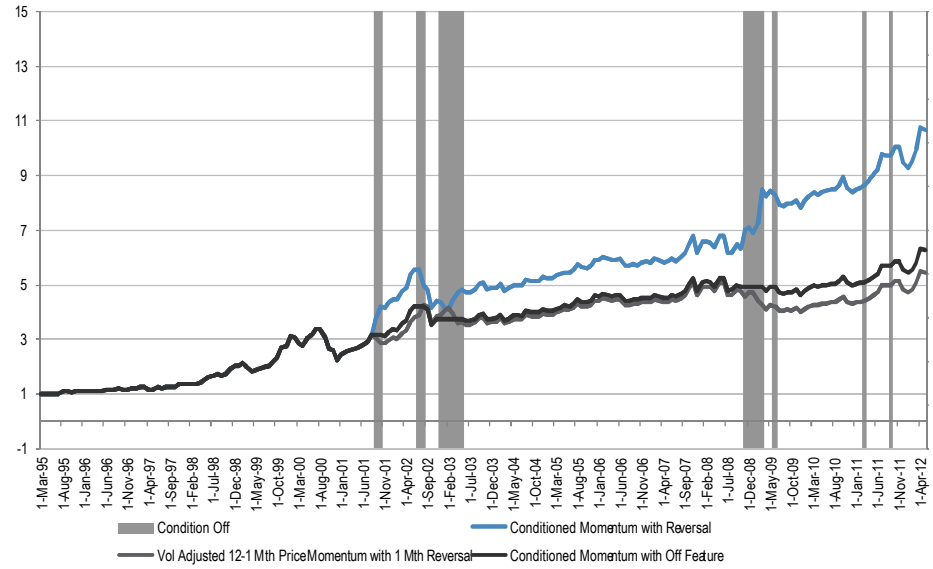
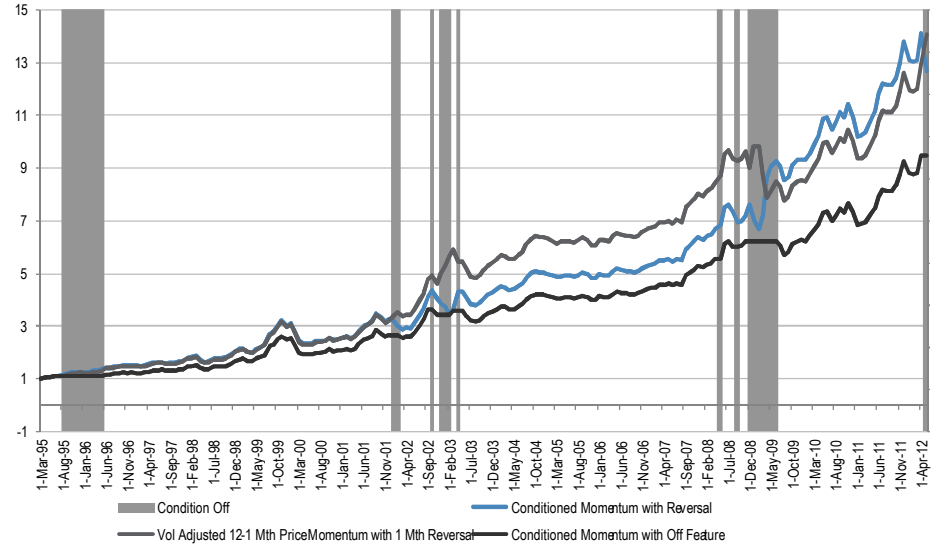
Figure16: Price Momentum with On/Off Feature: Russell 1000 Index



Source: FactSet, J.P. Morgan

The performance results for Europe are illustrated in Figure 17. As indicated by the shaded parts, the condition was also triggered a handful of times over the last 17 years. While we see some overlap with the US, it is interesting to note that market dynamics in Europe initiated the conditioning of the strategy also during different points in the history, one being in '95 and another being in the most recent past. The latter does not come as a surprise to us, given that the Beta spread between high and low momentum is already at fairly stretched levels suggesting that tough times might be ahead of Price Momentum.

Figure 17: Price Momentum with On/Off Feature: Europe



Source: Factset, J.P. Morgan

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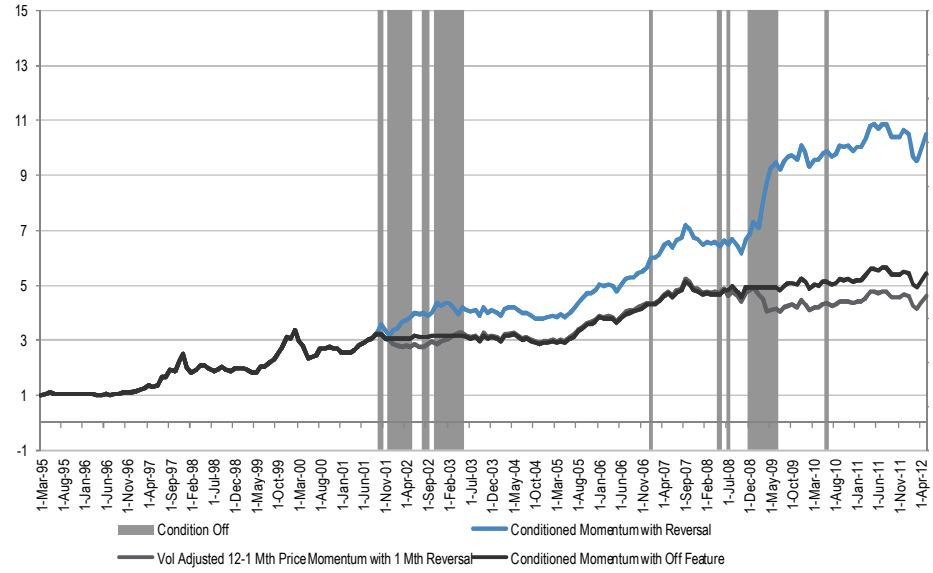
Overall, both conditioned Momentum with Reversal as well as conditioned Momentum with the "Off" Feature have done an impressive job at persistently balancing between trend-friendly versus reversion-friendly market trends over the 17 years that were analyzed. Even the Momentum strategy without the conditioning feature has managed to keep up with the rest, but at the cost of higher performance volatility.

Lastly, Figure 18 illustrates the performance results of the enhanced Momentum strategies within Japan. The conditioned Momentum strategy with the Reversal feature turned out to be the dominant winner taking leads both during Tech Crisis and Global Financial Crisis.

It is also interesting to note that the conditioned Momentum strategy with the "Off" feature held its own relatively well especially considering the fact that by inherent construction the strategy takes on less direct risk. In fact, over the last 17 years that strategy de facto either added or preserved value.

Figure 18: Price Momentum with On/Off Feature: Japan



Source: Factset, J.P. Morgan

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Long-Only Momentum

So far, we have covered different versions of L/S Momentum strategies:

- Basic 12M Momentum
- 12M-1M Momentum with 1M Reversal
- Conditioned Momentum with Reversal

Each enhanced version has outperformed the basic Momentum strategy over the 17 years that were examined. However, each version likewise possesses inherent risks due to the nature of factor construction which needs to be thoroughly examined.

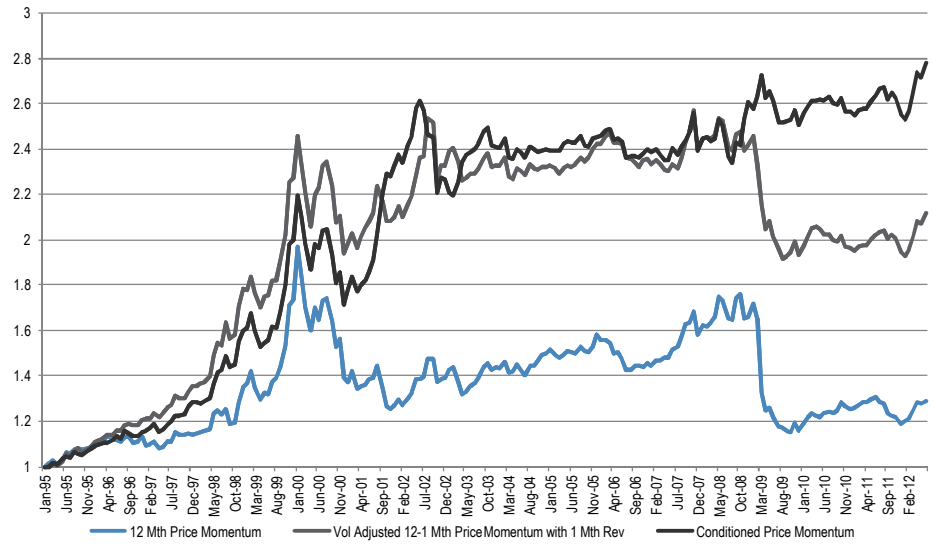
Table 9: Active Long Only Price Momentum

Russell 1000	Annualized Average Active Ret	Annualized Average Active Risk	IR
12 Mth Price Mom	2.11%	11.58%	0.18
12 Mth Price Mom w / 1 Mth Rev	4.75%	9.71%	0.49
Conditioned Price Mom	6.29%	9.26%	0.68

Source: FactSet, J.P. Morgan

One area that we have not covered thus far and that is more relevant for the typical long-only manager is the effectiveness of the various Momentum strategies listed above from a long-only point of view. To that extent, in Table 9 we show the performance characteristics for the long-only side. While the basic 12 month Momentum fails, the conditioned Momentum strategy delivers quite an impressive and relatively steady performance, yielding an average annual active return of 6.3% and a Sharpe Ratio of 0.7! The historical performance curves are also shown in Figure 19.

Figure 19: Performance of Active Long-Only Price Momentum – Russell 1000



Source: FactSet, J.P. Morgan

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An Improved Multi-Factor Composite

In this section of the report, we examine the effectiveness of the conditioned Momentum factor within a multi-factor framework – the objective being to see what additional benefit the conditioned Momentum factor brings.

The JPM Q-Score is a simple combination of 4 key alpha "families" (Valuation, Earnings, Quality, Momentum) and is used as the basis of our analysis in this section. It represents a good proxy for traditional Quant "factor-based" investing and a basis for much of our stock selection research (see JPM Q-Score definition in appendix).

Two new versions of the Q-Score were constructed and tested. In the first version, we replaced the original (basic) Momentum Composite, which carried a 30% weight within the Q-Score, with the new conditioned Momentum factor. Since we are well aware of the risk of going "against" Momentum as the conditioned strategy might do, provided the right condition, we also constructed a new Momentum Composite - an equal-weighted blend of the conditioned Momentum factor and the Volatility Adjusted 12M-1M Momentum with embedded Reversal factor. Iin the second version of the Q-Score we replaced the old Momentum Composite with the new one.

In Table 10 below we summarize the comparison results between the original Q-Score and the 2 new versions. Bottom line, the improvement seen in the new versions of the Q-Scores is significant across various parameters:

- Almost two-fold improvement in IR and max draw-down cut almost by half
- Improvement in IC from ~2.5% to ~3.5%
- Turnover is lowered by more than 10%

Table 10: US Composite Backtest

Factor	StartDate	EndDate	Universe	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over (P1)	Avg Ret LS	Avg StdDev Ret LS	Annual IR	Max Drawdown
Q Score (Cond Pmom & Pmom w ith 1 Mth Reversal)	31-Jan-95	31-Jul-12	RUSSELL 1000	854	3.5%	3.75	68%	40%	1.17%	4.54%	0.86	36%
Q Score (Cond Pmom)	31-Jan-95	31-Jul-12	RUSSELL 1000	854	3.6%	4.33	67%	42%	1.31%	4.39%	1.02	25%
Q Score	31-Jan-95	31-Jul-12	RUSSELL 1000	854	2.6%	2.50	64%	47%	0.83%	4.80%	0.53	44%
Q Score (Cond Pmom & Pmom w ith 1 Mth Reversal)	31-Jan-95	31-Jul-12	RUSSELL 3000	2,600	4.1%	4.10	69%	38%	1.65%	5.84%	0.94	41%
Q Score (Cond Pmom)	31-Jan-95	31-Jul-12	RUSSELL 3000	2,600	4.1%	4.41	71%	40%	1.72%	5.68%	1.03	38%
Q Score	31-Jan-95	31-Jul-12	RUSSELL 3000	2,600	3.9%	3.64	69%	47%	1.48%	5.93%	0.81	41%
Q Score (Cond Pmom & Pmom w ith 1 Mth Reversal)	31-Jan-95	31-Jul-00	MSCI US	412	2.8%	2.30	63%	43%	0.81%	5.10%	0.48	42%
Q Score (Cond Pmom)	31-Jan-95	31-Dec-00	MSCI US	412	2.9%	2.39	61%	45%	0.80%	4.89%	0.50	42%
Q Score	31-Jan-95	30-Jun-12	MSCI US	411	2.1%	1.56	59%	46%	0.55%	5.12%	0.29	46%
Q Score (Cond Pmom & Pmom w ith 1 Mth Reversal)	31-Dec-93	31-Jul-12	MSCI Europe	503	4.9%	4.39	64%	45%	1.18%	4.01%	1.01	39%
Q Score (Cond Pmom)	31-Dec-93	31-Jul-12	MSCI Europe	503	4.8%	4.53	64%	47%	1.21%	3.98%	1.04	31%
Q Score	31-Dec-93	31-Jul-12	MSCI Europe	503	3.8%	3.07	66%	51%	0.78%	3.81%	0.67	48%
Value + (Cond Pmom & Pmom w ith 1 Mth Reversal)	31-Jan-95	31-Jul-12	RUSSELL 1000	664	3.9%	5.04	68%	44%	1.56%	4.50%	1.23	
Value + Cond Pmom	31-Jan-95	31-Jul-12	RUSSELL 1000	836	4.2%	5.07	71%	45%	1.84%	5.28%	1.24	
Value + Pmom	31-Jan-95	31-Jul-12	RUSSELL 1000	828	2.1%	2.96	59%	50%	0.73%	3.57%	0.67	
Value + (Cond Pmom & Pmom w ith 1 Mth Reversal)	31-Jan-95	31-Jul-12	RUSSELL 3000	1,073	3.9%	4.83	68%	42%	1.54%	4.64%	1.16	
Value + Cond Pmom	31-Jan-95	31-Jul-12	RUSSELL 3000	2,511	4.4%	5.55	72%	43%	2.11%	5.53%	1.37	
Value + Pmom	31-Jan-95	31-Jul-12	RUSSELL 3000	2,341	3.3%	4.48	72%	54%	1.45%	4.71%	1.06	
Value + (Cond Pmom & Pmom w ith 1 Mth Reversal)	31-Jan-95	31-Jul-12	MSCI US	412	2.8%	2.30	63%	43%	0.81%	5.10%	0.48	
Value + Cond Pmom	31-Jan-95	31-Jul-12	MSCI US	412	2.9%	2.39	61%	45%	0.80%	4.89%	0.50	
Value + Pmom	31-Jan-95	30-Jun-12	MSCI US	411	2.1%	1.56	59%	46%	0.55%	5.12%	0.29	
Value + (Cond Pmom & Pmom w ith 1 Mth Reversal)	31-Jan-94	31-Jul-12	MSCI Europe	493	4.7%	4.84	65%	50%	1.31%	4.04%	1.13	
Value + Cond Pmom	31-Jan-94	31-Jul-12	MSCI Europe	493	4.5%	4.53	65%	52%	1.28%	4.23%	1.05	
Value + Pmom	31-Dec-93	31-Jul-12	MSCI Europe	502	2.8%	3.15	61%	57%	0.66%	3.14%	0.70	

Source: Factset, J.P. Morgan.

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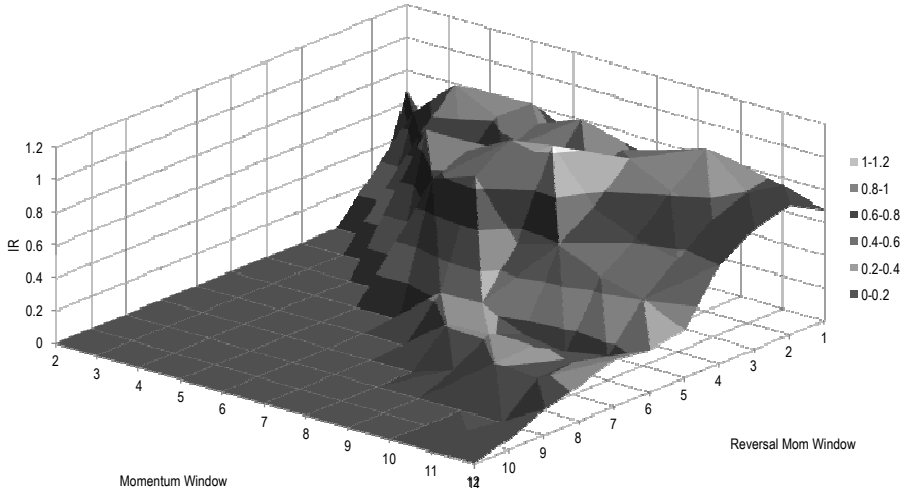
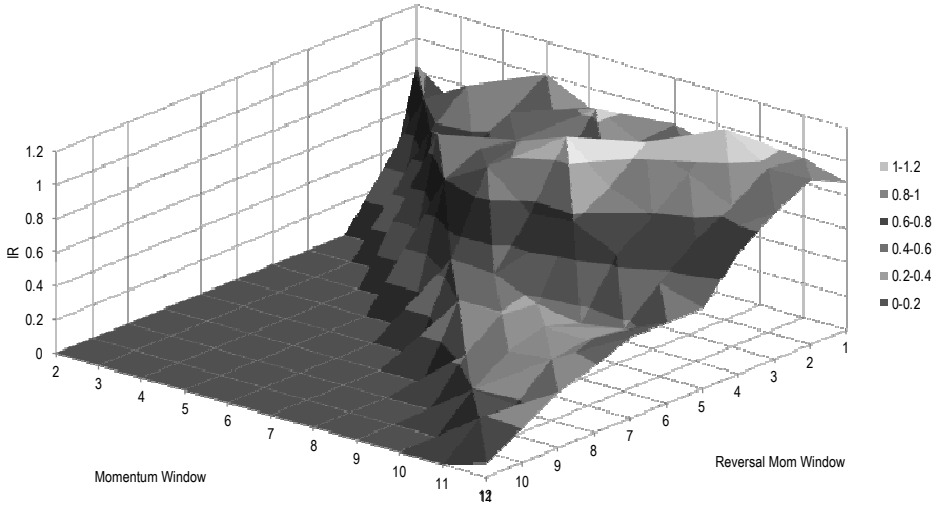
Appendix I: Parameter Sensitivity

Figure 20: Volatility Adjusted Momentum with Reversal



Source: Factset, J.P. Morgan

Figure 21: Conditioned Price Momentum



Source: Factset, J.P. Morgan

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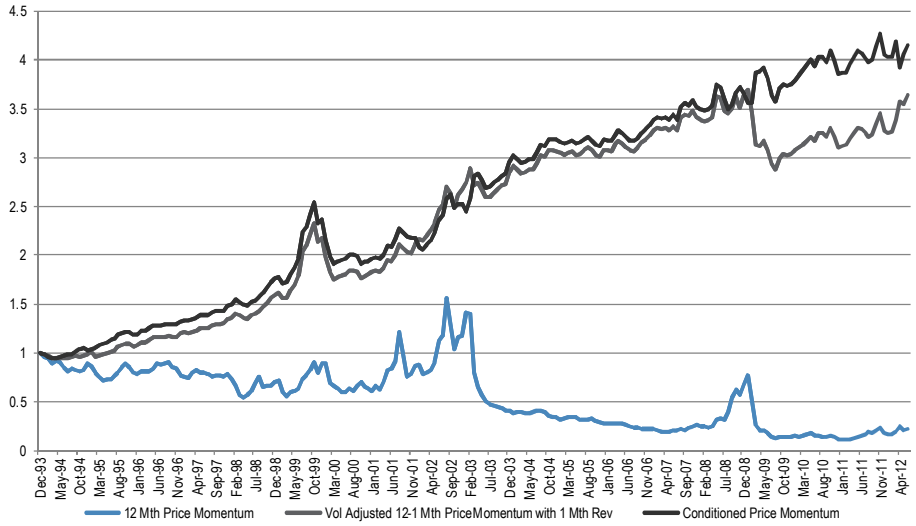
Appendix II: Active Long-Only Momentum for Europe

Table 11: Active Long Only Price Momentum - Europe

Europe	Annualized Average Active Ret	Annualized Average Active Risk	IR
12 Mth Price Mom	-1.27%	37.05%	-0.03
12 Mth Price Mom w / 1 Mth Rev	7.43%	9.40%	0.79
Conditioned Price Mom	8.37%	9.18%	0.91

Source: FactSet, J.P. Morgan

Figure 22: Active Long Only Price Momentum Backtest - Europe



Source: FactSet, J.P. Morgan

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Appendix III: Conditioned Price Momentum

Conditioned Momentum - Russell 1000 Index

1 Year: 8/31/2011 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.6%	18.6%	5%	50%
2	1.3%	14.4%	6%	58%
3	1.4%	15.4%	6%	58%
4	1.2%	12.5%	6%	50%
5	1.7%	19.8%	6%	83%
6	1.5%	16.9%	6%	67%
7	1.4%	15.7%	6%	42%
8	1.4%	15.7%	7%	58%
9	0.7%	5.6%	7%	17%
10	0.6%	3.7%	7%	25%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.3%	4.6%	3.7%	951

3 Year(s): 8/31/2009 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.7%	20.1%	5%	61%
2	1.6%	18.7%	5%	61%
3	1.5%	17.0%	5%	53%
4	1.6%	18.5%	6%	61%
5	1.5%	18.0%	5%	56%
6	1.6%	18.7%	6%	64%
7	1.4%	16.4%	6%	36%
8	1.5%	16.8%	6%	44%
9	1.0%	9.9%	6%	31%
10	0.8%	7.3%	6%	31%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.4%	4.2%	3.4%	946

5 Year(s): 8/31/2007 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	0.9%	7.8%	7%	60%
2	1.2%	10.9%	8%	63%
3	0.9%	7.4%	8%	52%
4	0.8%	5.8%	8%	62%
5	0.8%	6.8%	7%	58%
6	0.6%	4.3%	8%	53%
7	0.6%	4.3%	7%	42%
8	0.6%	3.7%	7%	45%
9	0.0%	-3.1%	7%	33%
10	-0.2%	-5.6%	7%	32%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.6%	4.0%	3.2%	952

Total Period: 1/31/1995 to 8/31/2012 Portfolio Statistics

Port Universe	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.6%	18.0%	6%	62%
2	1.5%	16.9%	6%	57%
3	1.3%	14.8%	6%	58%
4	1.2%	13.3%	6%	53%
5	1.2%	12.5%	6%	56%
6	1.1%	11.8%	6%	51%
7	0.9%	9.6%	6%	46%
8	0.8%	8.3%	6%	41%
9	0.5%	4.3%	6%	35%
10	0.3%	1.3%	6%	33%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	3.8%	3.4%	939

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.0%	11.7%	4%	**50%**
Benchmark	0.3%	3.3%	2%	**50%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**0.89**	**0.9**	191	0.5

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.9%	10.7%	3%	**69%**
Benchmark	0.3%	3.1%	1%	**61%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**1.94**	**1.12**	190	0.6

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

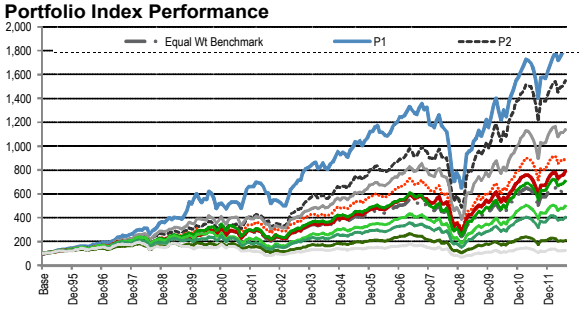
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.1%	12.9%	4%	**63%**
Benchmark	0.3%	3.0%	2%	**60%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**1.98**	**0.9**	191	0.4

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

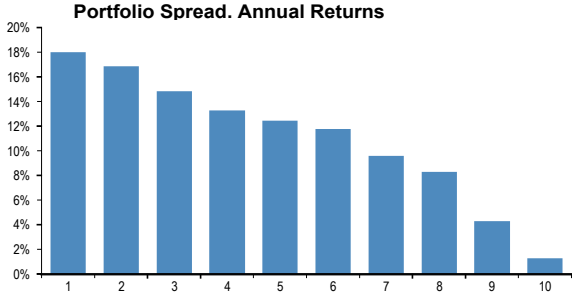
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.3%	15.13%	4.6%	**68%**
Benchmark	0.5%	6.02%	2.7%	**62%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**4.03**	**0.94**	189	0.7

* assumes Risk Free Rate of 0%

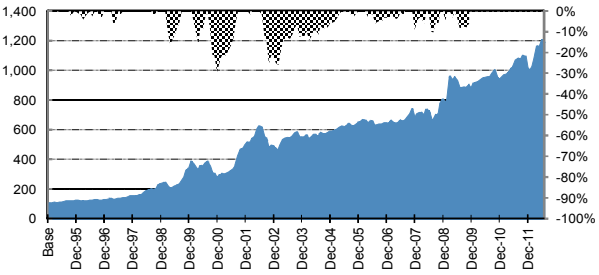
Portfolio Index Performance



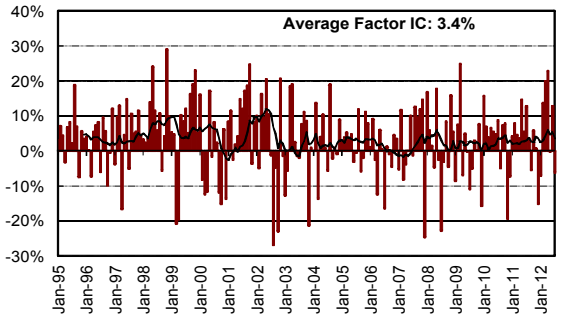
Portfolio Spread. Annual Returns



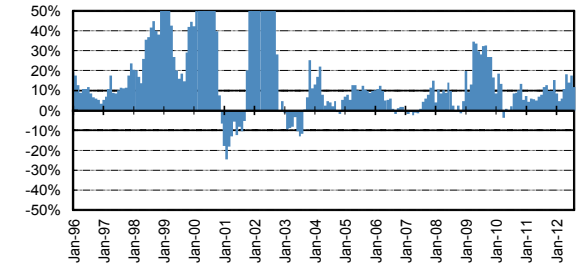
Cumulative Returns Max Drawdown: -29.3%



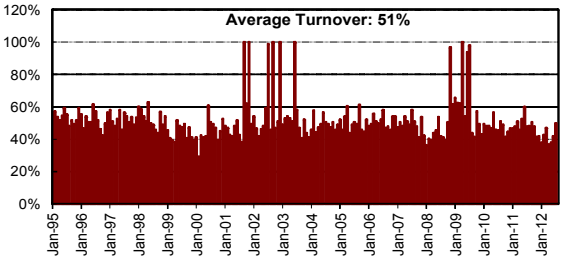
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



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Conditioned Momentum - Russell 2000 Index

Conditioned Momentum Avg of 3m and 12m Russell 2000 Index — **Rebalance every 1 month(s)**

1 Year: 8/31/2011 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.5%	17.1%	7%	67%
2	1.7%	19.5%	6%	67%
3	1.5%	16.9%	7%	67%
4	1.3%	13.3%	7%	50%
5	1.4%	15.9%	7%	58%
6	1.1%	10.1%	7%	42%
7	1.6%	18.1%	7%	58%
8	0.9%	8.5%	8%	33%
9	0.9%	8.3%	7%	42%
10	1.0%	9.5%	7%	42%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.3%	2.7%	1.4%	1807

3 Year(s): 8/31/2009 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	15.4%	7%	58%
2	1.6%	18.5%	6%	72%
3	1.6%	18.4%	6%	69%
4	1.3%	14.4%	6%	53%
5	1.4%	15.3%	6%	61%
6	1.1%	11.0%	7%	42%
7	1.3%	13.9%	7%	50%
8	1.0%	8.9%	7%	36%
9	1.2%	12.2%	7%	47%
10	0.5%	2.7%	7%	28%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.2%	3.1%	1.9%	1850

5 Year(s): 8/31/2007 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.2%	8.7%	10%	63%
2	1.4%	12.7%	9%	73%
3	0.9%	5.7%	9%	65%
4	0.7%	3.5%	9%	52%
5	0.5%	1.5%	9%	50%
6	0.3%	-0.3%	8%	47%
7	0.6%	3.2%	8%	48%
8	0.2%	-1.3%	8%	40%
9	0.2%	-0.8%	8%	43%
10	-0.4%	-7.8%	7%	28%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.6%	3.4%	2.5%	1851

Total Period: 1/31/1995 to 8/31/2012 Portfolio Statistics

Port Universe	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.5%	16.2%	7%	63%
2	1.6%	18.3%	7%	68%
3	1.4%	14.4%	7%	64%
4	1.3%	12.8%	7%	55%
5	1.1%	10.4%	7%	56%
6	0.9%	8.1%	7%	46%
7	0.8%	7.4%	7%	45%
8	0.5%	3.5%	7%	42%
9	0.4%	2.0%	7%	36%
10	0.0%	-2.9%	6%	27%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.9%	4.0%	3.0%	1851

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.5%	6.3%	3%	**67%**
Benchmark	0.2%	2.8%	2%	**67%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**0.68**	**0.6**	362	0.5

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.0%	11.7%	3%	**72%**
Benchmark	0.2%	2.2%	1%	**58%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**2.15**	**1.26**	371	0.5

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

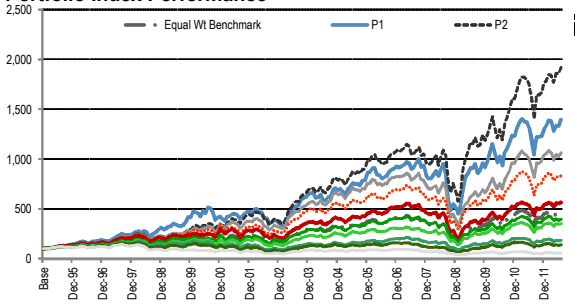
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.6%	18.4%	6%	**70%**
Benchmark	0.6%	7.0%	3%	**63%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**2.19**	**1.0**	371	0.7

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

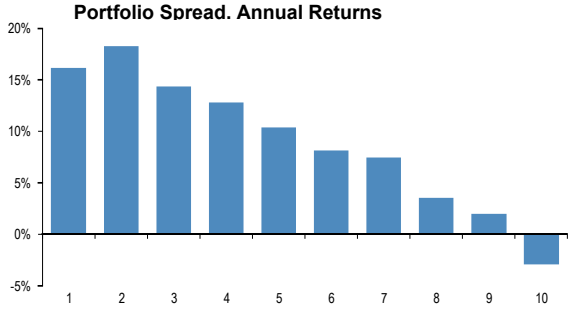
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.6%	18.98%	4.6%	**71%**
Benchmark	0.6%	6.67%	2.9%	**63%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**4.95**	**1.19**	371	0.7

* assumes Risk Free Rate of 0%

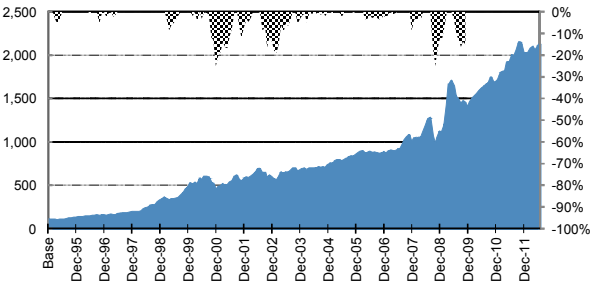
Portfolio Index Performance



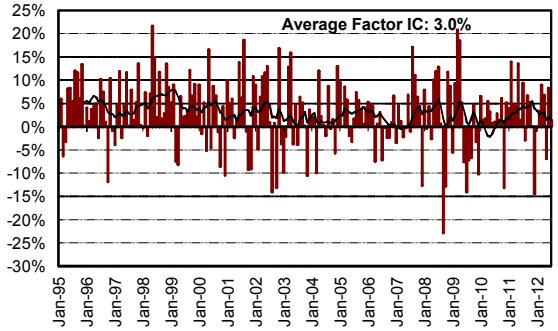
Portfolio Spread. Annual Returns



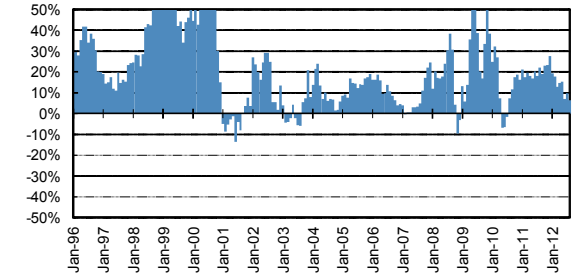
Cumulative Returns — **Max Drawdown:** -25.0%



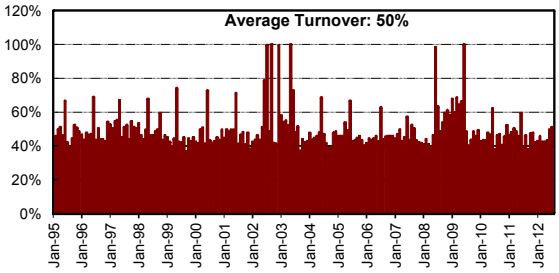
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



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Conditioned Momentum - Russell 3000 Index

1 Year: 8/31/2011 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	16.2%	6%	58%
2	1.6%	19.0%	6%	50%
3	1.4%	16.0%	7%	50%
4	1.3%	14.0%	7%	58%
5	1.4%	15.3%	7%	67%
6	1.5%	16.4%	7%	67%
7	1.2%	11.9%	7%	42%
8	1.3%	12.8%	7%	42%
9	1.0%	8.9%	7%	42%
10	0.8%	7.6%	7%	33%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.3%	3.3%	1.8%	2757

3 Year(s): 8/31/2009 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	16.0%	6%	58%
2	1.7%	19.6%	6%	67%
3	1.5%	17.2%	6%	61%
4	1.4%	15.9%	6%	64%
5	1.4%	15.1%	6%	64%
6	1.4%	16.1%	6%	64%
7	1.3%	13.8%	6%	42%
8	1.2%	11.9%	7%	33%
9	1.1%	11.0%	7%	36%
10	0.6%	4.7%	7%	33%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.3%	3.4%	2.2%	2795

5 Year(s): 8/31/2007 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.1%	10.1%	8%	62%
2	1.4%	13.1%	8%	68%
3	0.9%	7.8%	8%	60%
4	0.8%	5.9%	8%	63%
5	0.6%	3.8%	8%	58%
6	0.6%	3.1%	8%	58%
7	0.4%	0.7%	8%	45%
8	0.2%	-1.1%	8%	37%
9	0.0%	-4.2%	8%	33%
10	-0.3%	-6.8%	7%	38%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.6%	4.0%	2.8%	2803

Total Period: 1/31/1995 to 8/31/2012 Portfolio Statistics

Port Universe	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.5%	17.0%	6%	63%
2	1.6%	18.7%	6%	71%
3	1.3%	14.4%	6%	60%
4	1.3%	14.1%	6%	63%
5	1.1%	11.9%	6%	58%
6	1.0%	9.4%	6%	52%
7	0.8%	7.7%	7%	45%
8	0.6%	4.6%	7%	39%
9	0.4%	2.2%	6%	32%
10	0.1%	-1.5%	6%	32%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	4.2%	3.1%	2791

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.6%	6.8%	3%	**58%**
Benchmark	0.1%	1.7%	2%	**58%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**0.69**	**0.7**	552	0.3

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.8%	9.9%	3%	**67%**
Benchmark	0.1%	1.6%	1%	**58%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**1.85**	**1.07**	560	0.4

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

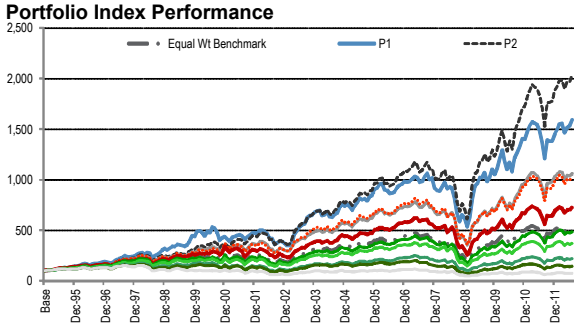
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.4%	17.2%	5%	**65%**
Benchmark	0.6%	6.5%	3%	**62%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**2.37**	**1.1**	561	0.8

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

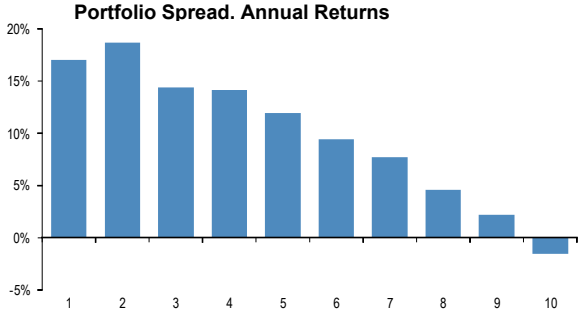
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.5%	17.69%	4.3%	**69%**
Benchmark	0.6%	6.38%	2.7%	**63%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**4.91**	**1.18**	559	0.7

* assumes Risk Free Rate of 0%

Portfolio Index Performance

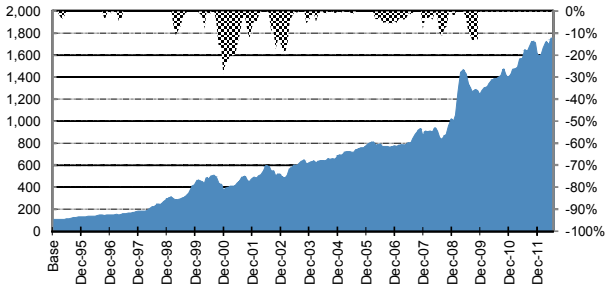


Portfolio Spread. Annual Returns

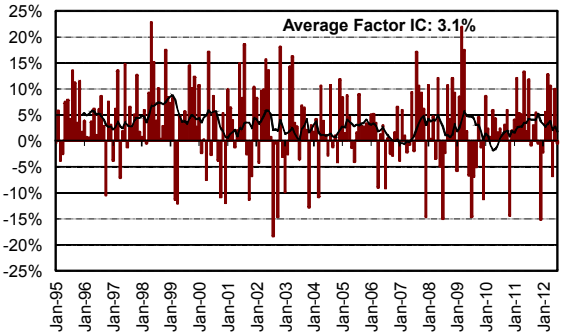


Cumulative Returns

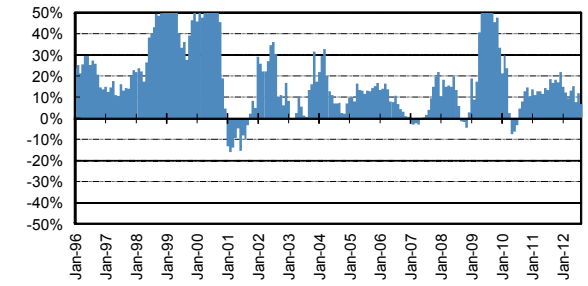
Max Drawdown: -28.2%



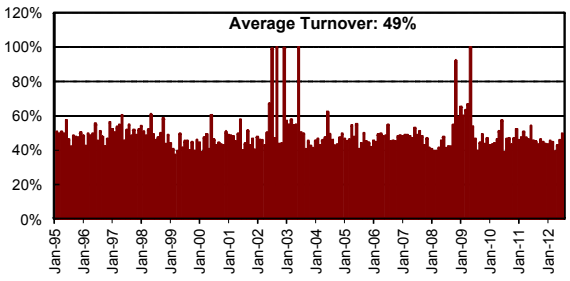
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



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Conditioned Momentum - MSCI Europe Index

1 Year: 7/31/2011 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	-1.1%	-17.1%	10%	58%
2	-1.0%	-14.2%	8%	67%
3	-1.0%	-15.4%	9%	58%
4	-0.8%	-13.4%	9%	67%
5	-1.0%	-15.2%	9%	58%
6	-1.3%	-18.1%	9%	50%
7	-0.9%	-14.1%	8%	58%
8	-1.5%	-19.6%	9%	33%
9	-2.1%	-26.1%	9%	42%
10	-2.2%	-26.4%	8%	25%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	-1.3%	4.9%	4.9%	449

3 Year(s): 7/31/2009 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	0.7%	5.8%	7%	64%
2	1.0%	10.2%	7%	72%
3	1.0%	9.2%	8%	64%
4	1.1%	10.1%	7%	69%
5	0.7%	4.9%	7%	53%
6	0.4%	2.2%	7%	47%
7	0.7%	4.8%	7%	56%
8	0.1%	-1.8%	8%	28%
9	-0.4%	-8.0%	8%	33%
10	-0.7%	-11.4%	8%	28%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.5%	7.6%	7.0%	456

5 Year(s): 7/31/2007 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	0.0%	-4.4%	9%	60%
2	0.3%	-0.6%	9%	67%
3	0.2%	-2.7%	9%	63%
4	0.1%	-3.6%	9%	65%
5	-0.1%	-5.6%	9%	50%
6	-0.4%	-9.3%	9%	38%
7	-0.3%	-7.3%	9%	48%
8	-0.8%	-12.6%	8%	32%
9	-0.8%	-13.0%	9%	42%
10	-1.5%	-19.9%	8%	30%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	-0.3%	6.4%	5.9%	487

Total Period: 1/31/1994 to 7/31/2012 Portfolio Statistics

Port Universe	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	15.1%	6%	64%
2	1.2%	12.5%	6%	65%
3	1.1%	10.9%	6%	57%
4	0.8%	8.1%	6%	59%
5	0.8%	7.9%	6%	55%
6	0.6%	5.5%	6%	45%
7	0.6%	5.1%	6%	47%
8	0.3%	1.2%	6%	38%
9	0.2%	0.0%	6%	38%
10	0.0%	-1.8%	6%	36%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.7%	5.5%	4.9%	545

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.1%	12.5%	5%	**58%**
Benchmark	0.2%	1.9%	3%	**58%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**0.72**	**0.7**	91	0.2

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.4%	17.3%	4%	**69%**
Benchmark	0.3%	2.9%	2%	**64%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**1.98**	**1.15**	92	0.3

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

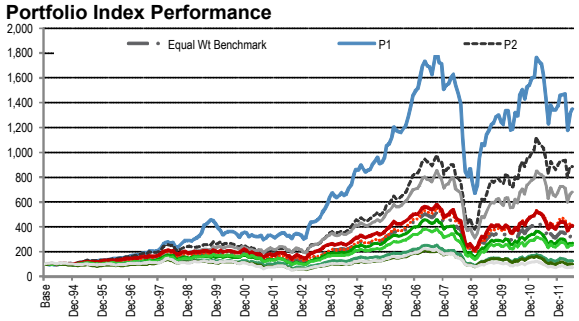
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.5%	18.6%	5%	**65%**
Benchmark	0.4%	3.9%	3%	**60%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**2.43**	**1.1**	98	0.4

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

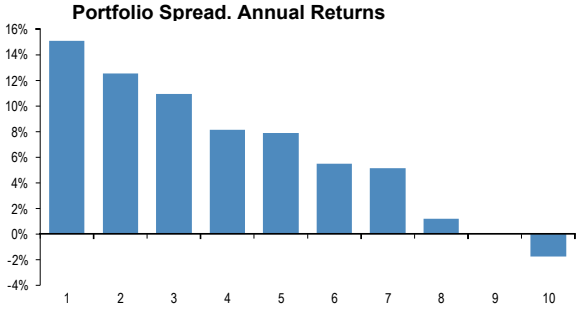
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.3%	15.98%	4.4%	**68%**
Benchmark	0.7%	8.00%	2.7%	**64%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**4.51**	**1.04**	110	0.9

* assumes Risk Free Rate of 0%

Portfolio Index Performance

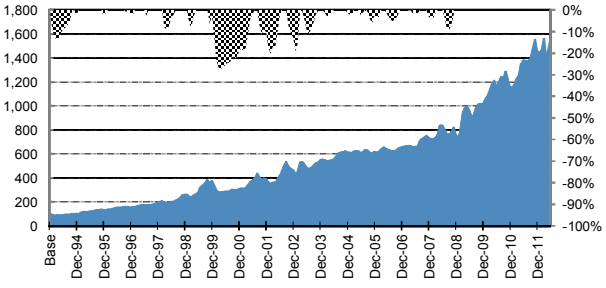


Portfolio Spread. Annual Returns

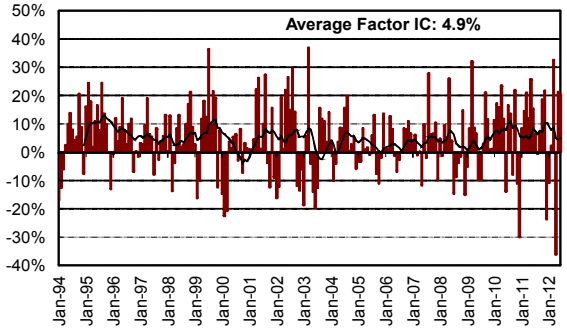


Cumulative Returns

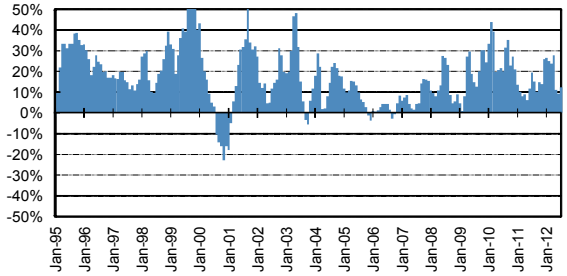
Max Drawdown: -27.2%



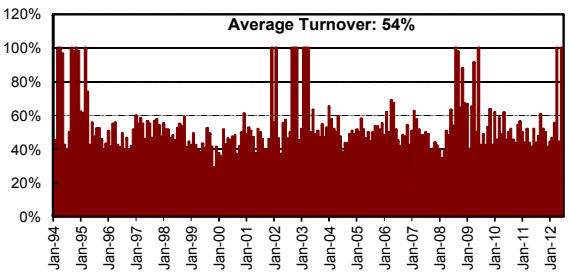
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



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Conditioned Momentum - MSCI Japan Index

1 Year: 7/31/2011 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	-0.8%	-10.5%	4%	50%
2	-0.6%	-8.2%	4%	58%
3	-0.4%	-6.0%	4%	67%
4	-1.6%	-18.5%	4%	33%
5	-0.5%	-7.3%	4%	67%
6	-1.4%	-16.4%	5%	42%
7	-1.0%	-13.0%	5%	42%
8	-0.9%	-12.2%	5%	58%
9	-1.1%	-13.8%	6%	33%
10	-1.5%	-17.8%	6%	33%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	-1.0%	4.7%	3.8%	316

3 Year(s): 7/31/2009 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	0.4%	4.5%	4%	53%
2	0.5%	4.7%	4%	56%
3	0.3%	2.2%	4%	53%
4	0.3%	2.6%	4%	56%
5	0.4%	4.0%	4%	58%
6	0.0%	-0.6%	4%	47%
7	0.0%	-1.6%	4%	44%
8	0.2%	0.7%	4%	50%
9	0.1%	0.2%	5%	50%
10	-0.3%	-4.7%	5%	47%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.2%	2.7%	2.9%	331

5 Year(s): 7/31/2007 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	0.1%	-0.7%	6%	48%
2	0.0%	-2.2%	6%	52%
3	0.1%	-0.4%	6%	55%
4	0.0%	-2.3%	6%	50%
5	-0.1%	-2.8%	6%	52%
6	-0.2%	-4.3%	6%	50%
7	0.0%	-2.3%	6%	53%
8	-0.2%	-3.8%	5%	53%
9	-0.4%	-6.5%	6%	48%
10	-0.9%	-11.5%	5%	43%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	-0.2%	2.6%	2.9%	344

Total Period: 1/31/1994 to 7/31/2012 Portfolio Statistics

Port Universe	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	0.7%	6.8%	6%	55%
2	0.5%	4.0%	6%	52%
3	0.4%	3.5%	6%	52%
4	0.3%	1.4%	6%	50%
5	0.3%	1.2%	6%	53%
6	0.3%	1.5%	6%	52%
7	0.2%	-0.1%	6%	49%
8	0.2%	0.1%	6%	44%
9	-0.1%	-3.9%	7%	44%
10	-0.5%	-8.4%	6%	38%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.2%	3.9%	4.0%	313

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.6%	6.7%	4%	**50%**
Benchmark	0.1%	1.4%	3%	**50%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**0.50**	**0.4**	64	0.2

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.7%	8.4%	3%	**53%**
Benchmark	0.3%	2.9%	2%	**53%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**1.39**	**0.78**	67	0.5

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

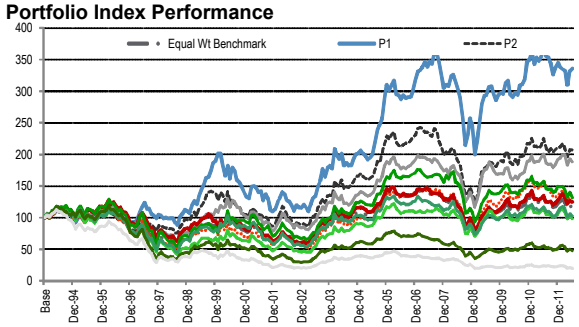
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.0%	11.8%	4%	**53%**
Benchmark	0.3%	3.2%	2%	**48%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**2.08**	**0.9**	69	0.4

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

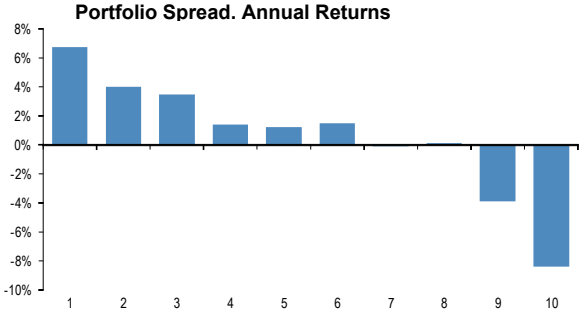
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.3%	14.50%	4.8%	**61%**
Benchmark	0.5%	5.38%	3.3%	**55%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**3.85**	**0.87**	63	0.5

* assumes Risk Free Rate of 0%

Portfolio Index Performance

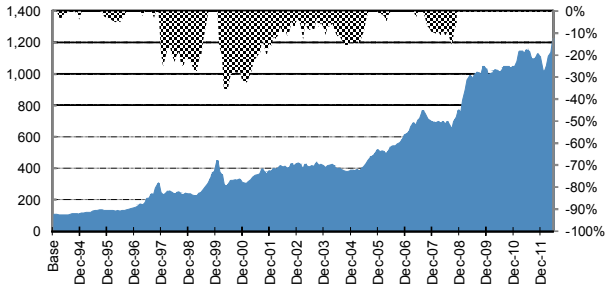


Portfolio Spread. Annual Returns

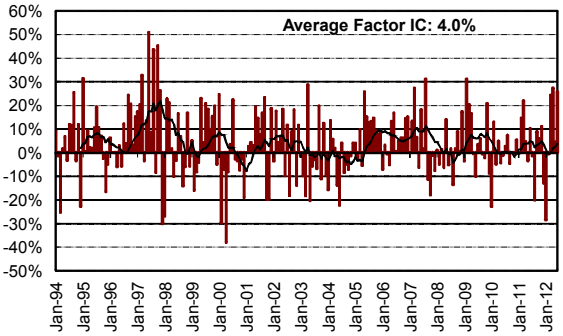


Cumulative Returns

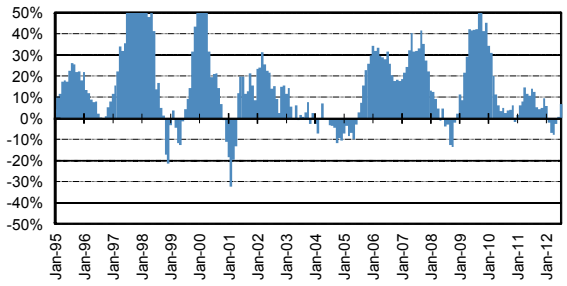
Max Drawdown: -36.3%



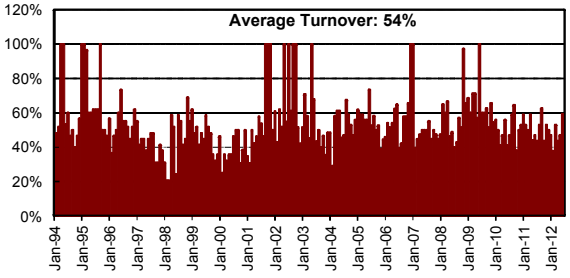
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



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Conditioned Momentum - MSCI Asia Ex Japan Index

1 Year: 7/31/2011 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	-0.6%	-13.6%	11%	50%
2	-0.5%	-10.1%	9%	67%
3	-1.1%	-16.6%	9%	42%
4	-0.5%	-10.1%	9%	67%
5	-0.8%	-13.7%	9%	58%
6	-1.1%	-16.3%	9%	50%
7	-1.1%	-16.9%	9%	58%
8	-1.3%	-18.1%	9%	50%
9	-1.7%	-22.3%	8%	50%
10	-2.2%	-27.1%	9%	42%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	-1.1%	4.2%	4.4%	609

3 Year(s): 7/31/2009 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	14.7%	8%	64%
2	1.3%	14.0%	7%	64%
3	1.1%	10.4%	7%	56%
4	1.1%	10.9%	7%	50%
5	0.9%	7.9%	7%	50%
6	0.7%	6.4%	7%	53%
7	0.6%	4.8%	7%	53%
8	0.6%	4.5%	7%	39%
9	0.3%	0.8%	7%	42%
10	-0.4%	-7.6%	7%	31%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.8%	5.1%	5.3%	574

5 Year(s): 7/31/2007 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.1%	7.8%	10%	58%
2	1.1%	8.4%	10%	63%
3	0.9%	5.7%	10%	53%
4	1.2%	9.8%	10%	60%
5	0.7%	3.2%	10%	52%
6	0.6%	2.9%	9%	52%
7	0.4%	-0.5%	9%	50%
8	0.2%	-2.8%	9%	42%
9	-0.2%	-7.4%	9%	37%
10	-0.8%	-13.5%	8%	28%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.5%	5.3%	5.2%	564

Total Period: 1/31/1994 to 7/31/2012 Portfolio Statistics

Port Universe	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.3%	11.8%	8%	62%
2	1.2%	11.0%	8%	64%
3	1.0%	8.7%	8%	59%
4	1.3%	11.0%	9%	57%
5	0.7%	4.3%	9%	50%
6	0.8%	5.8%	9%	46%
7	0.8%	5.8%	9%	52%
8	0.3%	0.0%	8%	42%
9	0.3%	-0.8%	8%	41%
10	-0.4%	-8.6%	8%	28%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.7%	4.6%	4.1%	515

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.6%	18.2%	6%	**58%**
Benchmark	0.5%	4.8%	4%	**50%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**0.87**	**0.8**	123	0.4

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.9%	23.7%	4%	**69%**
Benchmark	0.7%	8.2%	3%	**64%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**2.57**	**1.56**	116	0.9

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

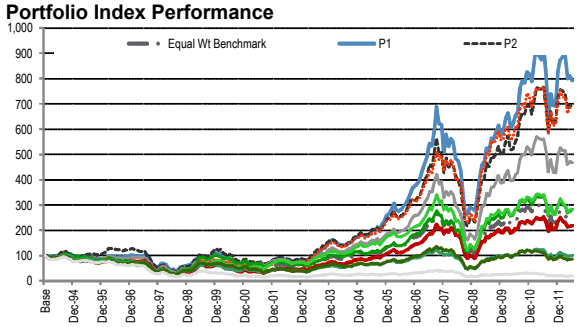
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	2.0%	24.8%	5%	**67%**
Benchmark	0.6%	6.9%	3%	**58%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**3.29**	**1.5**	114	0.7

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

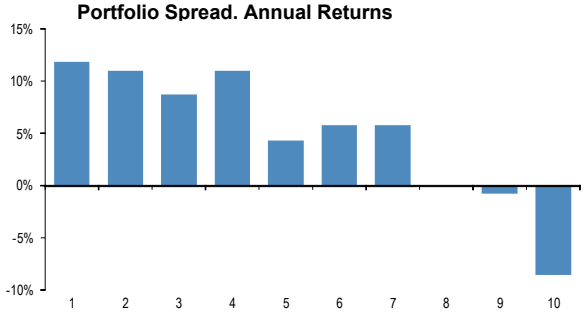
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.7%	21.28%	4.4%	**70%**
Benchmark	0.5%	6.16%	2.9%	**62%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**5.82**	**1.40**	104	0.6

* assumes Risk Free Rate of 0%

Portfolio Index Performance

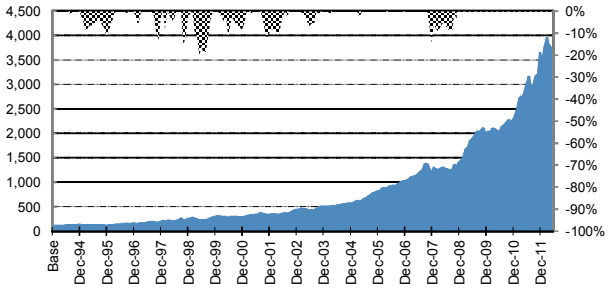


Portfolio Spread. Annual Returns

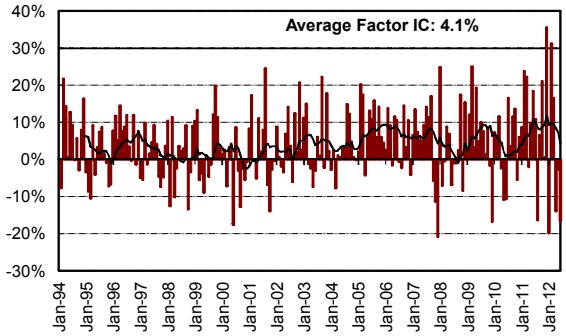


Cumulative Returns

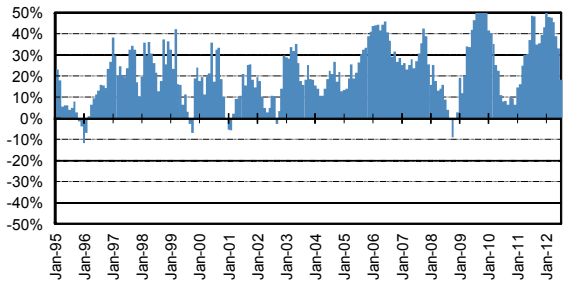
Max Drawdown: -20.4%



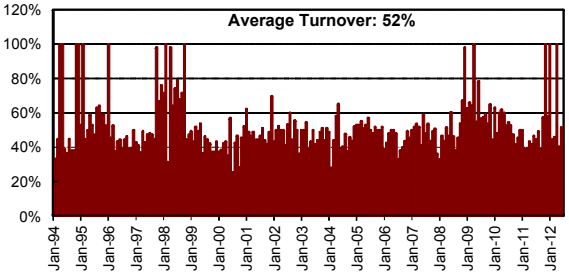
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



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Conditioned Momentum - Australia (ASX200)

1 Year: 8/31/2011 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	%Out Perf.
1	-0.2%	-6.9%	9%	50%
2	0.1%	-1.8%	8%	58%
3	-0.3%	-7.2%	9%	50%
4	-0.6%	-13.0%	11%	50%
5	-1.2%	-18.9%	11%	42%

Total Test

	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	-0.4%	3.7%	2.2%	191

3 Year(s): 8/31/2009 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	%Out Perf.
1	0.8%	6.5%	8%	58%
2	1.2%	12.0%	7%	64%
3	0.7%	5.7%	7%	56%
4	0.6%	3.0%	8%	53%
5	-0.1%	-5.5%	9%	36%

Total Test

	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.6%	4.7%	2.9%	192

5 Year(s): 8/31/2007 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	%Out Perf.
1	0.9%	2.2%	12%	57%
2	0.9%	4.0%	11%	63%
3	0.2%	-5.2%	11%	48%
4	0.1%	-4.3%	10%	45%
5	0.1%	-4.6%	10%	43%

Total Test

	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.4%	3.2%	2.4%	181

Total Period: 1/31/1994 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	%Out Perf.
1	1.8%	19.3%	8%	63%
2	1.4%	14.5%	7%	60%
3	0.8%	7.2%	7%	47%
4	0.6%	4.8%	7%	43%
5	0.3%	0.2%	8%	34%

Total Test

	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	6.4%	6.1%	185

Long Short Strategy Statistics Portfolio 1 less Portfolio 5

	Avg Ret	Ann Ret	Avg S.D.	%Out Perf.
Long/Short	1.0%	10.0%	6%	**50%**
Benchmark	0.2%	2.0%	3%	**50%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**0.54**	**0.5**	77	0.2

Long Short Strategy Statistics Portfolio 1 less Portfolio 5

	Avg Ret	Ann Ret	Avg S.D.	%Out Perf.
Long/Short	0.9%	10.2%	4%	**56%**
Benchmark	0.2%	1.8%	2%	**58%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**1.23**	**0.66**	78	0.2

Long Short Strategy Statistics Portfolio 1 less Portfolio 5

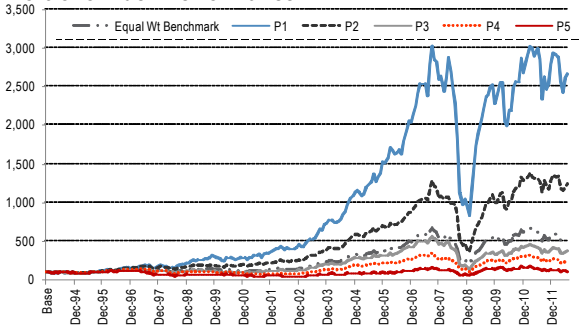
	Avg Ret	Ann Ret	Avg S.D.	%Out Perf.
Long/Short	0.8%	6.8%	7%	**55%**
Benchmark	0.4%	4.6%	3%	**57%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**0.90**	**0.3**	73	0.4

Long Short Strategy Statistics Portfolio 1 less Portfolio 5

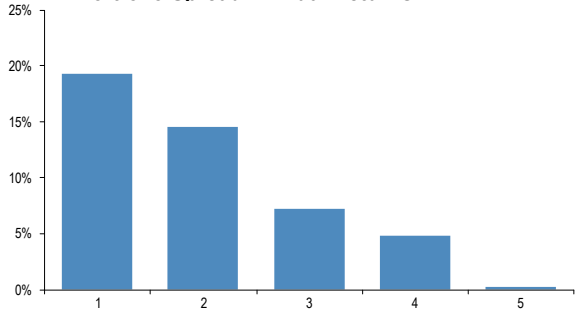
	Avg Ret	Ann Ret	Avg S.D.	%Out Perf.
Long/Short	1.5%	17.17%	5.2%	**66%**
Benchmark	0.8%	9.46%	2.6%	**63%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**4.22**	**0.96**	75	1.1

* assumes Risk Free Rate of 0%

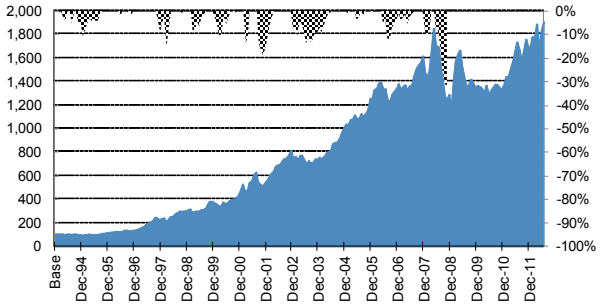
Portfolio Index Performance



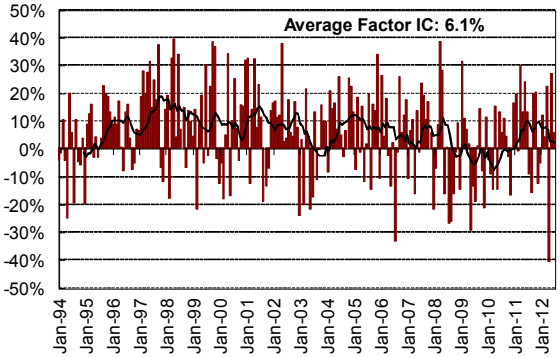
Portfolio Spread. Annual Returns



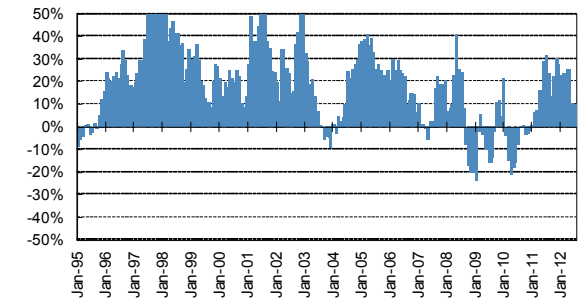
Cumulative Returns Max Drawdown: -32.7%



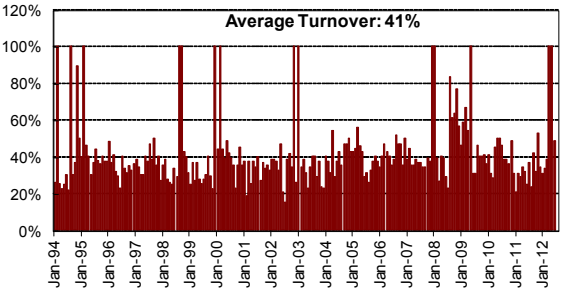
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



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Conditioned Momentum - MSCI GEM Index

1 Year: 7/31/2011 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	-0.7%	-13.4%	10%	42%
2	-0.2%	-6.8%	10%	67%
3	-0.8%	-13.1%	9%	50%
4	-0.3%	-8.7%	10%	75%
5	-0.7%	-12.9%	10%	50%
6	-1.0%	-15.6%	9%	67%
7	-1.3%	-18.5%	10%	50%
8	-1.3%	-18.0%	8%	42%
9	-1.9%	-23.9%	8%	42%
10	-2.0%	-24.7%	9%	33%

Total Test

	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	-1.0%	5.8%	4.9%	808

3 Year(s): 7/31/2009 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	14.7%	7%	58%
2	1.4%	15.0%	7%	61%
3	1.2%	12.2%	7%	53%
4	1.3%	14.1%	7%	67%
5	1.0%	10.2%	7%	53%
6	0.8%	7.3%	7%	56%
7	0.7%	6.1%	7%	50%
8	0.6%	4.4%	6%	39%
9	0.1%	-1.0%	6%	33%
10	-0.1%	-3.1%	6%	31%

Total Test

	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.9%	5.6%	5.2%	770

5 Year(s): 7/31/2007 to 7/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.1%	7.3%	10%	55%
2	1.1%	8.3%	10%	58%
3	1.0%	6.6%	9%	55%
4	1.3%	10.9%	9%	70%
5	0.9%	5.0%	9%	53%
6	0.7%	3.6%	9%	58%
7	0.4%	-0.2%	9%	47%
8	0.2%	-2.4%	9%	38%
9	-0.3%	-8.3%	9%	35%
10	-0.7%	-12.1%	8%	30%

Total Test

	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.6%	5.6%	5.2%	776

Total Period: 1/31/1994 to 7/31/2012 Portfolio Statistics

Port Universe	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.5%	15.4%	8%	62%
2	1.3%	13.7%	7%	64%
3	1.1%	10.7%	8%	55%
4	1.3%	12.8%	8%	61%
5	1.0%	8.3%	8%	52%
6	0.9%	6.9%	8%	47%
7	0.9%	7.2%	8%	48%
8	0.5%	3.1%	7%	41%
9	0.2%	-1.1%	7%	39%
10	-0.2%	-5.1%	7%	30%

Total Test

	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.8%	4.4%	3.9%	747

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.3%	14.9%	5%	**58%**
Benchmark	0.3%	3.4%	3%	**42%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**0.88**	**0.9**	162	0.3

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.5%	18.4%	4%	**61%**
Benchmark	0.6%	6.7%	2%	**58%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**2.46**	**1.47**	155	0.9

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

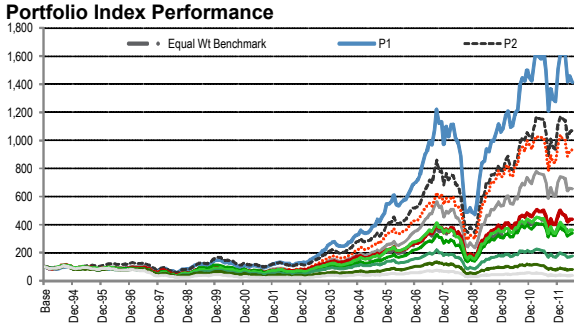
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.8%	22.9%	4%	**63%**
Benchmark	0.5%	6.2%	3%	**55%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**3.32**	**1.6**	156	0.7

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

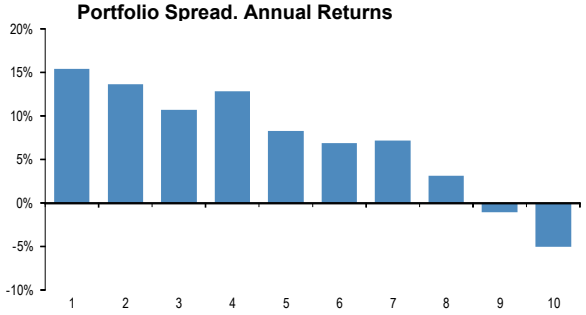
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.7%	21.03%	3.7%	**68%**
Benchmark	0.6%	7.65%	2.2%	**62%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**6.74**	**1.64**	150	1.0

* assumes Risk Free Rate of 0%

Portfolio Index Performance

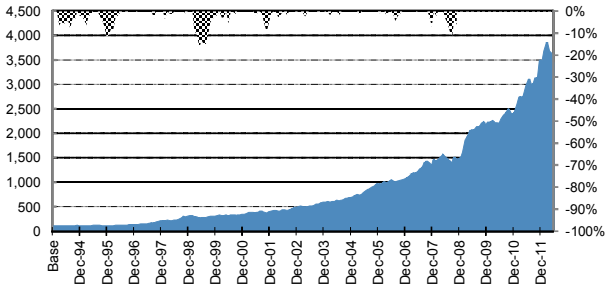


Portfolio Spread. Annual Returns

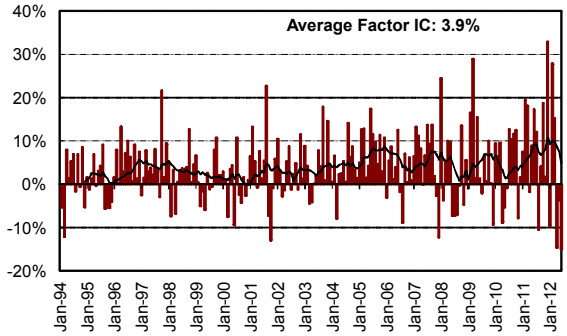


Cumulative Returns

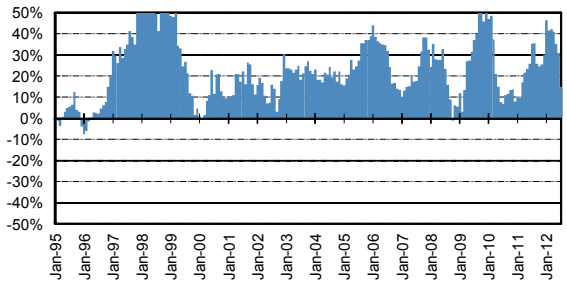
Max Drawdown: -16.5%



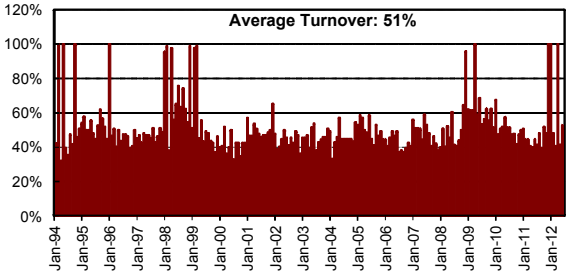
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



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Appendix IV: Enhanced vs Default JPM Q-Score

Q-Score Composite – Russell 1000 Index w/ Conditioned Price Momentum

1 Year: 8/31/2011 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.6%	18.4%	6%	75%
2	1.4%	16.2%	6%	67%
3	1.3%	14.0%	6%	50%
4	1.1%	12.5%	6%	42%
5	1.4%	15.3%	6%	50%
6	1.1%	11.4%	6%	42%
7	1.1%	11.5%	6%	25%
8	1.4%	15.5%	6%	50%
9	1.2%	12.7%	7%	58%
10	0.9%	7.3%	8%	33%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.2%	2.5%	2.6%	966

3 Year(s): 8/31/2009 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.6%	19.2%	5%	67%
2	1.6%	18.5%	5%	64%
3	1.4%	15.7%	5%	47%
4	1.3%	15.5%	5%	47%
5	1.5%	17.6%	5%	61%
6	1.3%	14.7%	5%	44%
7	1.5%	17.9%	6%	61%
8	1.5%	17.9%	5%	50%
9	1.2%	13.7%	6%	47%
10	0.9%	7.4%	7%	39%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.4%	2.8%	2.6%	945

5 Year(s): 8/31/2007 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	0.8%	6.8%	8%	60%
2	0.9%	8.4%	7%	60%
3	0.7%	6.0%	7%	50%
4	0.6%	5.1%	7%	52%
5	0.8%	6.6%	7%	62%
6	0.6%	4.1%	7%	50%
7	0.7%	5.5%	7%	60%
8	0.6%	3.9%	7%	43%
9	0.5%	2.7%	8%	48%
10	-0.1%	-6.1%	10%	37%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.6%	2.9%	2.4%	946

Total Period: 1/31/1995 to 8/31/2012 Portfolio Statistics

Port Universe	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.5%	17.3%	6%	64%
2	1.5%	16.8%	6%	61%
3	1.4%	15.5%	6%	64%
4	1.2%	13.4%	6%	57%
5	1.2%	12.6%	6%	56%
6	1.0%	10.6%	6%	51%
7	1.0%	10.1%	6%	49%
8	0.7%	7.0%	6%	38%
9	0.7%	6.1%	6%	41%
10	0.2%	-0.9%	8%	37%
	Total Test			
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	4.1%	3.6%	854

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.7%	7.5%	3%	**58%**
Benchmark	0.3%	3.9%	1%	**75%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**0.67**	**0.6**	194	1.2

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.7%	8.7%	3%	**58%**
Benchmark	0.2%	2.6%	1%	**67%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**1.47**	**0.83**	190	0.8

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

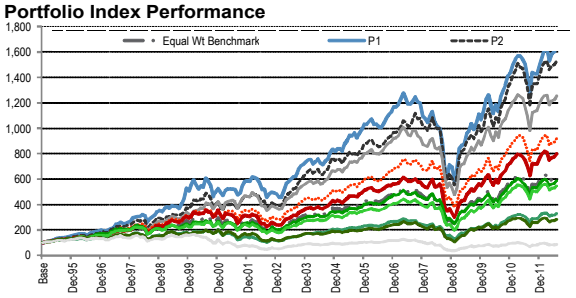
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.9%	10.2%	4%	**63%**
Benchmark	0.2%	2.4%	2%	**60%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**1.61**	**0.7**	190	0.3

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

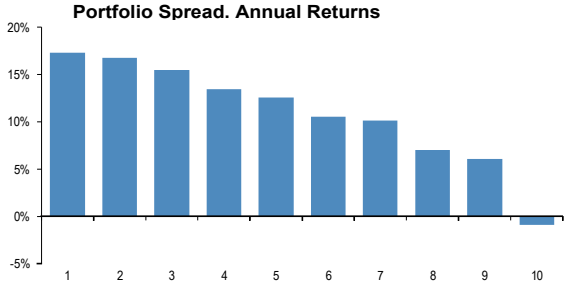
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.3%	15.53%	4.4%	**67%**
Benchmark	0.5%	5.61%	2.5%	**64%**
	T-Stat	Sharpe*	Assets	IR
Long/Short	**4.33**	**1.02**	171	0.6

* assumes Risk Free Rate of 0%

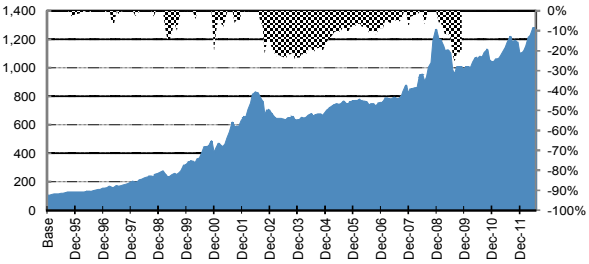
Portfolio Index Performance



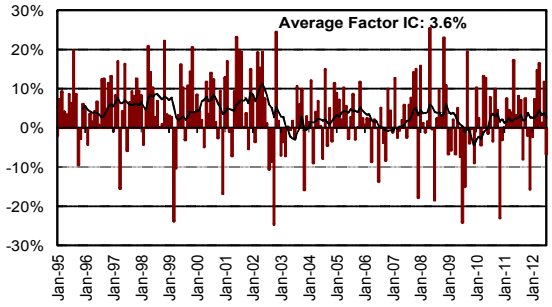
Portfolio Spread. Annual Returns



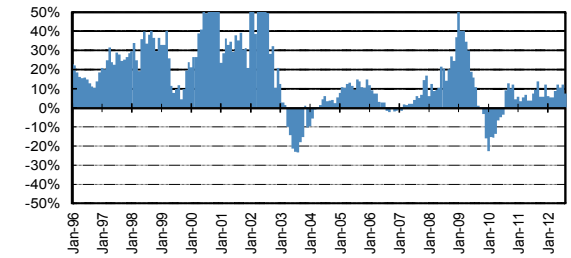
Cumulative Returns Max Drawdown: -25.2%



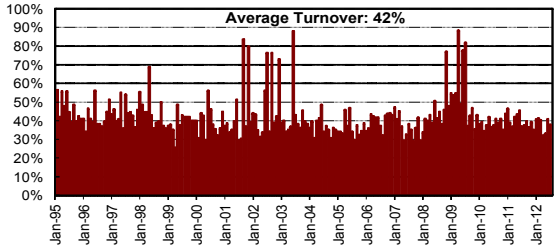
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



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Q-Score Composite – Russell 2000 Index w/ Conditioned Price Momentum

1 Year: 8/31/2011 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	14.8%	7%	67%
2	1.7%	19.7%	7%	75%
3	1.5%	16.2%	7%	58%
4	1.5%	16.5%	7%	67%
5	1.8%	20.9%	7%	75%
6	1.3%	14.2%	7%	42%
7	1.3%	14.3%	7%	50%
8	0.9%	9.1%	7%	42%
9	1.3%	13.6%	7%	50%
10	-0.2%	-6.4%	9%	33%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.3%	3.8%	3.2%	1921

3 Year(s): 8/31/2009 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.3%	14.2%	7%	61%
2	1.7%	19.7%	6%	75%
3	1.5%	17.3%	6%	72%
4	1.4%	16.0%	6%	67%
5	1.6%	18.4%	6%	64%
6	1.3%	13.9%	6%	47%
7	1.4%	14.9%	6%	47%
8	1.0%	9.6%	7%	36%
9	1.1%	11.3%	7%	47%
10	-0.1%	-5.0%	9%	31%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.2%	4.1%	3.6%	1897

5 Year(s): 8/31/2007 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.1%	7.0%	10%	58%
2	1.1%	8.7%	8%	72%
3	1.0%	8.3%	8%	70%
4	0.6%	4.2%	8%	60%
5	0.7%	5.6%	8%	55%
6	0.6%	3.8%	8%	50%
7	0.4%	1.4%	7%	40%
8	0.3%	0.2%	8%	38%
9	0.2%	-1.4%	8%	43%
10	-0.3%	-8.8%	10%	35%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.6%	3.9%	3.1%	1886

Total Period: 1/31/1995 to 8/31/2012 Portfolio Statistics

Port Universe	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.7%	18.1%	7%	66%
2	1.5%	17.3%	6%	70%
3	1.4%	14.8%	6%	64%
4	1.3%	13.5%	6%	64%
5	1.1%	11.9%	6%	56%
6	0.9%	9.0%	7%	50%
7	0.9%	7.8%	7%	45%
8	0.6%	4.1%	7%	39%
9	0.1%	-2.2%	8%	33%
10	-0.2%	-8.1%	10%	32%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.9%	5.5%	4.2%	1746

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.5%	19.4%	4%	**75%**
Benchmark	0.1%	1.2%	1%	**67%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**1.48**	**1.5**	385	0.3

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.4%	17.5%	3%	**75%**
Benchmark	0.1%	1.3%	1%	**61%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**2.50**	**1.49**	380	0.3

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

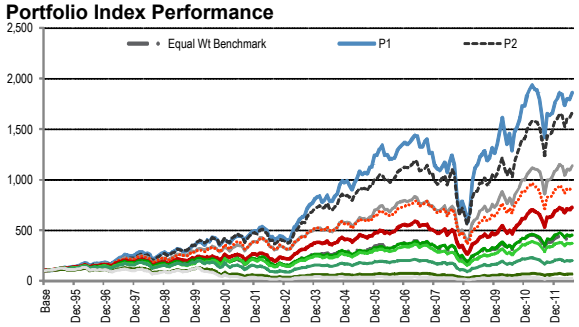
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.3%	16.3%	4%	**70%**
Benchmark	0.5%	5.5%	3%	**58%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**2.59**	**1.2**	378	0.5

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

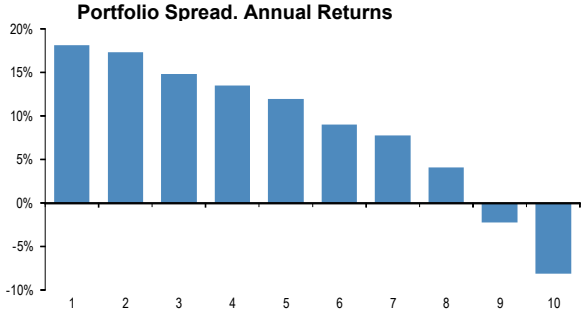
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.9%	21.42%	6.3%	**71%**
Benchmark	0.7%	8.63%	2.9%	**66%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**4.25**	**0.98**	350	0.9

* assumes Risk Free Rate of 0%

Portfolio Index Performance

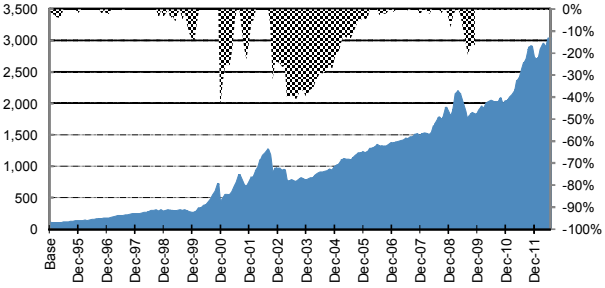


Portfolio Spread. Annual Returns

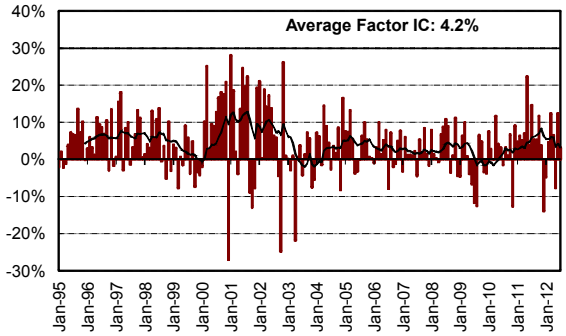


Cumulative Returns

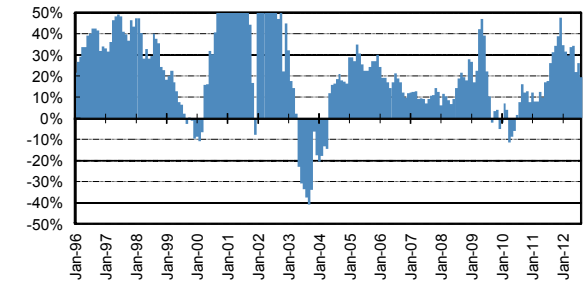
Max Drawdown: -44.4%



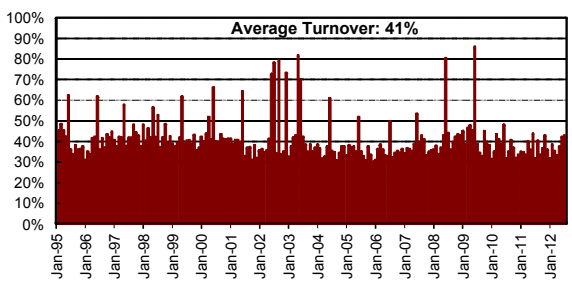
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



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J.P.Morgan

Q-Score Composite – Russell 3000 Index w/ Conditioned Price Momentum

1 Year: 8/31/2011 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	15.6%	6%	67%
2	1.6%	19.0%	6%	58%
3	1.3%	14.3%	6%	58%
4	1.4%	15.1%	6%	75%
5	1.6%	18.1%	6%	75%
6	1.2%	13.1%	7%	42%
7	1.4%	15.8%	7%	67%
8	1.3%	14.4%	7%	58%
9	1.1%	11.1%	7%	42%
10	0.1%	-2.7%	9%	33%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.3%	3.4%	3.0%	2887

3 Year(s): 8/31/2009 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	15.6%	6%	64%
2	1.7%	19.4%	6%	67%
3	1.4%	16.3%	6%	58%
4	1.4%	16.1%	6%	64%
5	1.5%	17.4%	6%	58%
6	1.4%	16.5%	6%	56%
7	1.4%	15.3%	6%	56%
8	1.3%	13.9%	6%	50%
9	1.0%	10.5%	7%	33%
10	0.3%	-0.9%	8%	28%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.3%	3.8%	3.4%	2842

5 Year(s): 8/31/2007 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.0%	8.0%	9%	60%
2	1.2%	11.3%	8%	70%
3	0.9%	7.5%	7%	62%
4	0.7%	5.7%	7%	65%
5	0.6%	4.1%	7%	52%
6	0.6%	3.9%	8%	55%
7	0.4%	1.3%	8%	47%
8	0.4%	1.6%	8%	47%
9	0.3%	-0.9%	8%	37%
10	-0.2%	-7.7%	10%	33%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.6%	3.8%	3.0%	2832

Total Period: 1/31/1995 to 8/31/2012 Portfolio Statistics

Port Universe	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.6%	18.1%	7%	67%
2	1.6%	18.3%	6%	73%
3	1.4%	15.8%	6%	66%
4	1.2%	13.5%	6%	64%
5	1.1%	11.2%	6%	56%
6	1.0%	9.7%	6%	50%
7	0.9%	8.2%	6%	47%
8	0.6%	5.2%	7%	36%
9	0.4%	1.1%	7%	33%
10	-0.1%	-6.6%	10%	34%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	5.3%	4.1%	2600

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.3%	15.7%	4%	**75%**
Benchmark	0.2%	1.7%	1%	**67%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**1.21**	**1.2**	578	0.4

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.2%	14.1%	3%	**75%**
Benchmark	0.1%	1.5%	1%	**64%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**2.16**	**1.27**	569	0.4

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

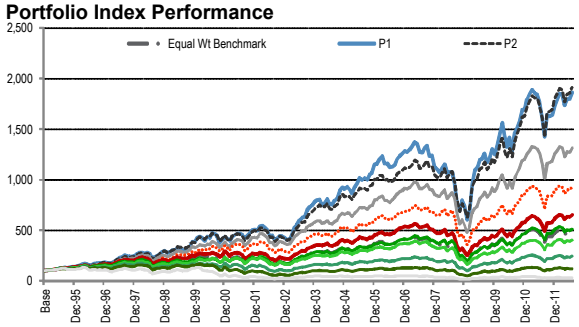
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.2%	14.5%	4%	**70%**
Benchmark	0.4%	4.9%	3%	**60%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**2.38**	**1.1**	567	0.5

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

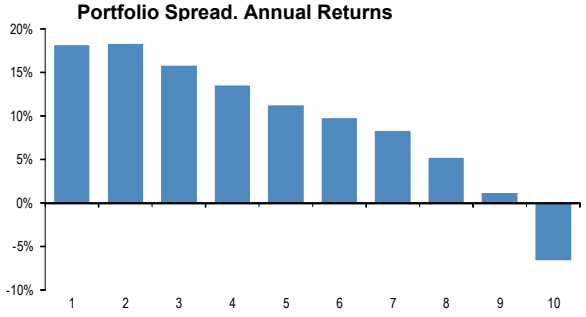
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.7%	20.28%	5.7%	**71%**
Benchmark	0.7%	7.72%	2.5%	**67%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**4.41**	**1.03**	521	0.9

* assumes Risk Free Rate of 0%

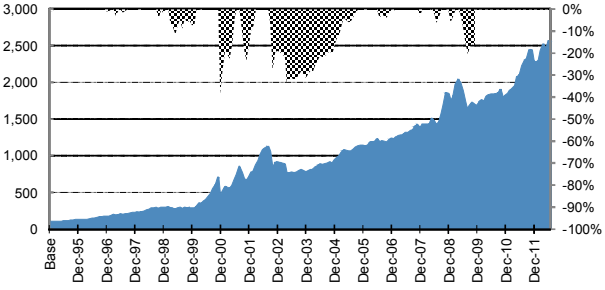
Portfolio Index Performance



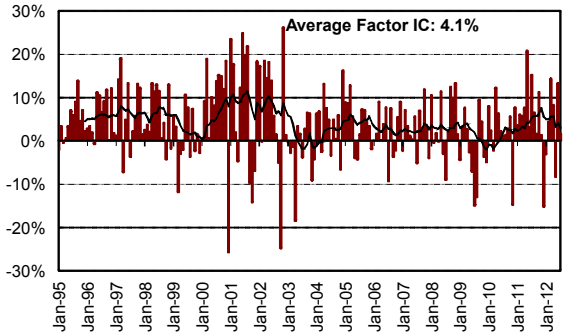
Portfolio Spread. Annual Returns



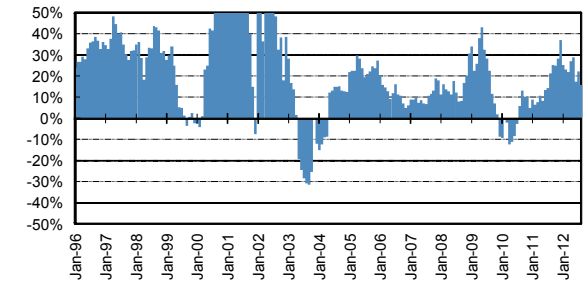
Cumulative Returns Max Drawdown: -38.4%



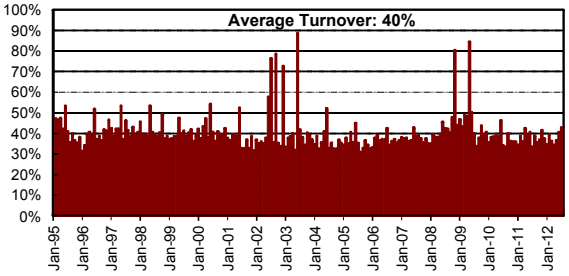
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



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Q-Score Composite – MSCI Europe w/ Conditioned Price Momentum

1 Year: 8/31/2011 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.0%	8.8%	9%	67%
2	0.0%	-4.1%	9%	50%
3	0.3%	-0.2%	8%	50%
4	0.6%	2.5%	9%	67%
5	0.3%	-0.3%	8%	75%
6	0.1%	-2.4%	9%	50%
7	0.8%	6.1%	9%	75%
8	-0.4%	-8.1%	9%	25%
9	-0.8%	-12.9%	8%	33%
10	-2.1%	-25.7%	9%	17%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.0%	7.7%	10.0%	440

3 Year(s): 8/31/2009 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.0%	9.6%	7%	64%
2	0.8%	6.2%	7%	61%
3	0.6%	4.0%	7%	47%
4	1.0%	8.9%	7%	72%
5	0.5%	3.1%	7%	58%
6	0.5%	3.5%	7%	56%
7	0.6%	4.0%	7%	64%
8	0.0%	-2.7%	8%	31%
9	-0.3%	-6.4%	8%	33%
10	-1.0%	-14.9%	9%	28%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.4%	7.1%	7.8%	445

5 Year(s): 8/31/2007 to 8/31/2012 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	0.2%	-2.3%	9%	57%
2	-0.1%	-5.6%	9%	58%
3	0.0%	-4.3%	8%	55%
4	0.1%	-3.3%	9%	58%
5	0.0%	-3.8%	8%	60%
6	-0.2%	-6.5%	8%	53%
7	-0.1%	-5.7%	9%	58%
8	-0.7%	-11.9%	9%	35%
9	-0.7%	-12.0%	8%	33%
10	-0.7%	-12.5%	10%	40%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	-0.2%	4.7%	4.4%	476

Total Period: 12/31/1993 to 8/31/2012 Portfolio Statistics

Port Universe	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	15.8%	6%	65%
2	1.1%	11.2%	6%	59%
3	1.0%	10.7%	6%	58%
4	1.0%	10.4%	6%	58%
5	0.9%	9.6%	6%	59%
6	0.7%	6.0%	6%	48%
7	0.6%	5.0%	6%	46%
8	0.4%	1.9%	6%	35%
9	0.1%	-0.6%	6%	31%
10	0.2%	-0.2%	7%	38%

	Total Test Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.7%	5.6%	4.8%	503

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	3.1%	42.5%	5%	**67%**
Benchmark	1.1%	13.2%	2%	**67%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**2.21**	**2.5**	89	1.6

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	2.0%	25.3%	4%	**67%**
Benchmark	0.6%	7.6%	2%	**64%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**2.85**	**1.75**	90	1.1

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

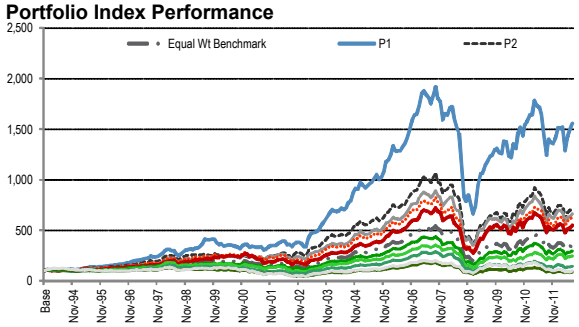
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.9%	9.8%	4%	**58%**
Benchmark	0.4%	4.9%	2%	**57%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**1.55**	**0.6**	96	0.6

Long Short Strategy Statistics Portfolio 1 less Portfolio 10

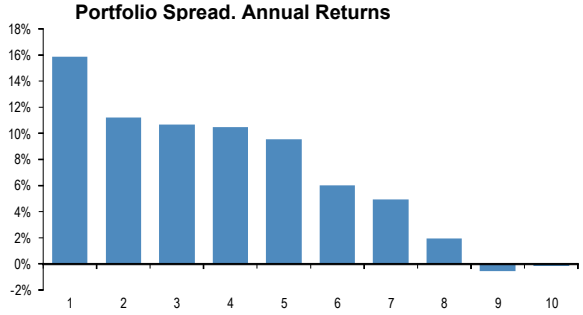
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.2%	14.40%	4.0%	**64%**
Benchmark	0.7%	8.24%	2.2%	**65%**
	T-Stat	**Sharpe***	Assets	IR
Long/Short	**4.53**	**1.04**	101	1.1

* assumes Risk Free Rate of 0%

Portfolio Index Performance

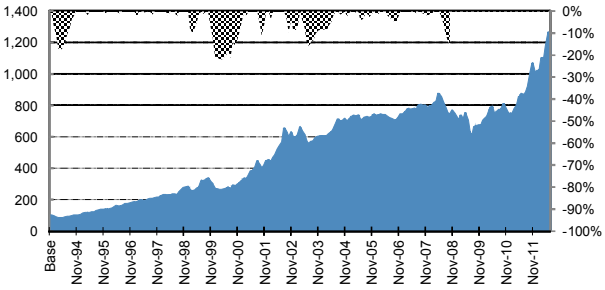


Portfolio Spread. Annual Returns

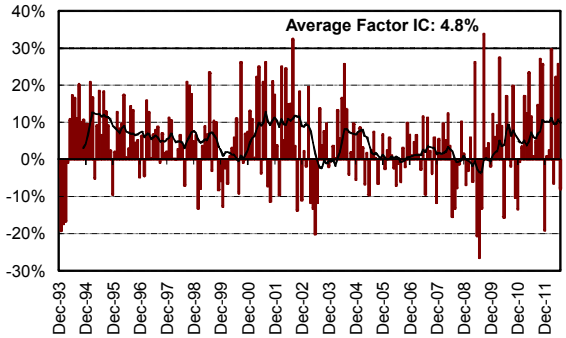


Cumulative Returns

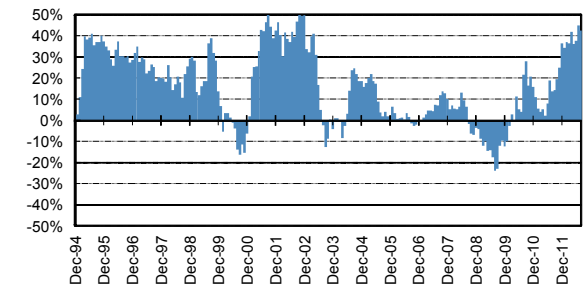
Max Drawdown: -22.0%



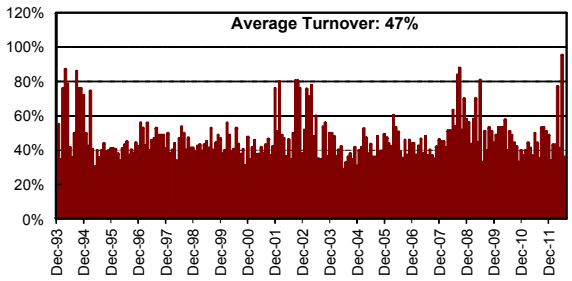
Information Co-Efficients (IC)



12 Month Rolling Returns Of L/S Strategy



Turnover within Portfolio 1



Appendix V: JPM Q-Score Definition

"CHEAP" ON A VALUATION BASIS	"POSITIVE" EARNINGS & SENTIMENT
Many quant researchers (ourselves included) have explored the 'Value Anomaly' and it is widely recognised that low PE stocks outperform high PE stocks over the long term. Similar analysis has shown consistent results using P/Sales, P/Dividend and P/Book ratios. Our studies have also shown that Earnings Growth can complement straight Value factors in many markets.	We believe that the market is not efficient at incorporating new information and a window of opportunity exists to exploit recent analyst revisions in earnings and recommendations. Similarly analyst behavioural biases lead to subsequent changes suggesting an exploitable serial correlation in earnings upgrades/downgrades.
TYPICAL FACTORS P/E Vs Market (12mth fwd EPS) P/E Vs Country Sector (12mth fwd EPS) EPS Growth (forecast FY1 mean to FY2 mean)	**TYPICAL FACTORS** Earnings Momentum 3mth avg FY1&FY2 (Risk Adjusted) 1Mth change in consensus recommendations Net Revisions (upgrades-downgrades) to mean FY2 EPS
RECENT WINNERS WITH GOOD MOMENTUM	**SOLID BUSINESSES WITH A GOOD QUALITY PROFILE**
Momentum theory for stock prices suggests that companies that do well in one (long term) investment period will continue to do well in the subsequent investment horizon. Over short time frames (<1month) studies have also highlighted the tendency of stocks to overreact leading to short term reversion. We have widely observed these phenomenon in our own testing	Whilst arguably less readily observable than some other factors, it is generally accepted that it is desirable to tilt portfolios towards highly profitable and good quality businesses. Similarly over the long term the market also appears to reward 'earnings certainty' and penalise those stocks that carry a large degree of earnings risk.
TYPICAL FACTORS 12Mth Price Momentum (Total Return in Local Currency) 1Mth Price Reversion (Total Return in Local Currency)	**TYPICAL FACTORS** ROE (average of FY1 and FY2 mean forecast) Earnings Risk (Variation in FY1 and FY2 forecast EPS)

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The Trend Is Your Friend

A robust return predictor using a blend of price trends

"The trend is your friend" is the old adage, but it is usually followed with "until there's a bend." And the saying is quite true; put another way, momentum factors work well, until they don't. We've seen plenty of times when price momentum is effective for a good while, but then suffers a massive drawdown (March 2009 still haunts us).

So, when we read the research paper "*Trend Factor: A New Determinant of Cross-Section Stock Returns*" (Han & Zhou, 2013), we were surprised to see how *consistent* a predictor a set of "trend deviations" can be if combined in a certain way. The authors demonstrate that their new "trend factor" does in fact generate a high amount of alpha that cannot be explained by the Fama-French factors, or after controlling for short-term reversal, valuations, industry portfolios and momentum factors.

Their novel approach uses a blend of simple Moving Price Averages (MPAs) each month-end (normalized by month-end close) over different short-term periods (5, 10, 20 days, etc). They calculate the cross-sectional regression coefficients of these MPAs against the subsequent month's forward returns. The prior 12-month rolling average of the regression coefficients is then used on the most current MPAs to predict the next month's returns. This was for U.S. stock markets from 1926 to 2010.

Inspired by their paper, we did the same in Asia and were very impressed with the results. We used MSCI Asia (ex Japan) as a starting point, but also tested all the global MSCI markets in our database. In all regions, we were able to use the factor to consistently generate alpha that is better than any momentum or reversion factor we currently track.

Our implementation of the Trend Factor for Asia adds more long-term trend deviations than in the original paper (whose authors indeed suggest it might be beneficial, and in Asia and EM it certainly is). Our tests are all long-short, quintile-based, per the original paper.

The turnover is quite high at around 60-70% per month (one way), and this is because of the short-term flavor of the trends being exploited. It is around what most reversion indicators would have. However, we find that if we can incorporate some fundamental factors into the regression, we can *reduce* the turnover (and *strengthen the signal* even further).

We find that the pair-wise correlations of this Trend Factor against other factors in Asia are low, but, not surprisingly, it has most in common with a 1-month reversion factor. The main difference is the dynamic nature of this new approach, which allows it to behave as a momentum factor that can "change its spots" through time.

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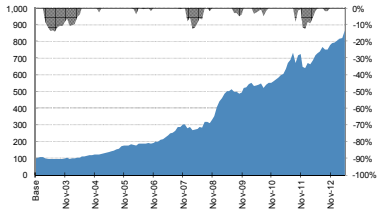
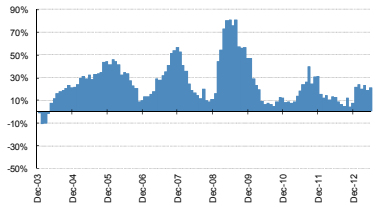
Trend Factor in MSCI Asia (ex Japan)

With strong alpha and little drawdown, the TF tested in Asia (ex Jp) has been a very robust predictor of returns.

Cumulative L/S Index



Rolling 12-month L/S returns



Source: J.P. Morgan, MSCI Barra, FactSet. Universe: MSCI AxJ; Test period: Dec 2002 – June 2013.

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Appendices

Several times in this report we refer to the "price momentum event" during March 2009 – please see our paper "*Quant Factors - A Global Analysis of Recent Performance,*" Malin/Smith, May 2009, for more details.

For more information on this analysis, please contact Robert Smith (robert.z.smith@jpmorgan.com).

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A blend of trends – Your *better* friend?

While "a trend might be your friend," it turns out a "blend of trends is an even *better* friend…"

The paper "*Trend Factor: A New Determinant of Cross-Section Stock Returns*" by Han & Zhou (2013) [1] investigates how average prices can be used to better predict subsequent returns – the authors argue that the strength of trends can wax and wane through the market cycles, and using various moving price averages is an intuitive way of capturing these trends. Add to this an element of dynamic weighting between them according to recent *explanatory power*, and this is their "Trend Factor."

Steps to calculate the Han & Zhou Trend Factor

The steps to calculate the Han-Zhou Trend Factor (TF) are as follows:

1. Calculate the simple Moving Price Average (MPA) of each stock for periods of 1, 3, 5, 10 and 20 trading days at month-end (say time *t-1*)
2. Divide the MPAs[2] by the closing price at month-end (also time *t-1*)
3. Find the linear regression coefficients of these normalized MPAs on the returns to the next month-end (time *t*)
4. Do this same *cross-sectional* regression for each month-end historically
5. Take the 12-month[3] average of these regression coefficients (i.e., from time *t-12* through to time *t*)
6. Use the average coefficients to predict the 1-month forward return for the next month (through to time *t+1*).

Rationale behind the Trend Factor

Each of the steps of the Trend Factor has a specific rationale behind it. We go through the main parts in turn.

Normalizing the moving average prices

Normalizing the MPAs with respect to the closing month-end price is useful for controlling the possibly biasing effects of very large price averages (and very low "penny stocks" price averages) on the regressions.

This transformation is akin to turning the MPAs into a "Trend Deviation" indicator popular with technical analysts (i.e., the deviation of the current price from the recent trend – as measured in this instance by the ratio of the two.)

Regression coefficients

The rolling regression coefficients on the trend deviations give this factor a dynamic element. The linear regression determines which trend deviations at the start of a month best explain the returns for that month. The regression coefficients can move about quite quickly and switch between negative and positive such that the trends can be used inversely.

---

[1] Link to paper on SSRN.
[2] For all except the single-period price average (as the 1-day "average" price is not really an average, but rather the authors use the closing price at the month-end, and it is *not* normalized – for outside the U.S., we convert all these month-end prices to USD).
[3] Using just the last month's coefficients also works, but is more volatile.

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Smoothing the coefficients

The regression coefficients are smoothed using a 12-month rolling average to filter out noisy months that perhaps are not consistent with the broader medium-term themes in the market. We know that factor trends tend to persist certainly for more than a month at a time.

Using 12 months is not a magic number – in fact, we tested their factor with different smoothing periods, and it was robust to the time period. For some regions, shorter worked better; sometimes longer, but we used 12 months throughout our testing, as well, to be consistent with the Han & Zhou approach.

Decomposing the Factor

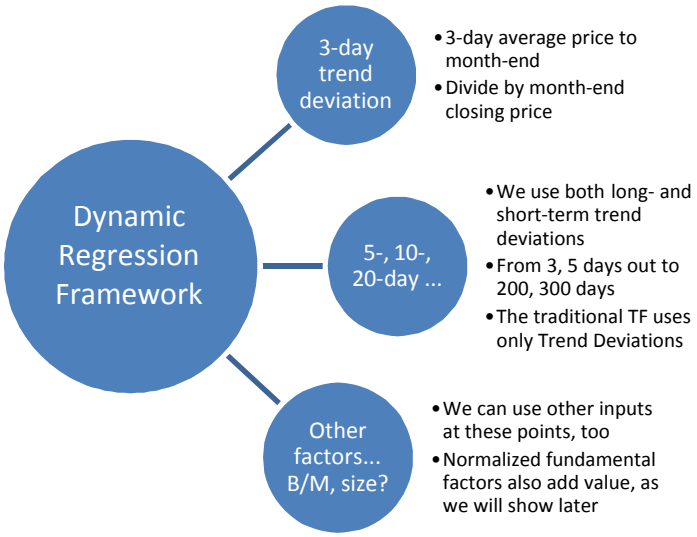
The Trend Factor can be basically broken into two parts – the sub-factors and their dynamic weightings:

- The sub-factor **inputs are the moving average prices** (MAPs) that are normalized to effectively form what we will call "trend deviations."
- The **dynamic weightings are from the regression coefficients** (with a rolling average to smooth them).

The regressions are run every month – and we can use these coefficients directly or, even better, in the 12-month smoothed average, as already described.

Thinking about the TF like this is useful, as it more clearly separates the inputs and the framework used to build it. (In fact, it is possible to replace the "trend deviation" inputs with other factors, which we will demonstrate later.)

Figure 1: Trend factor framework and inputs



Source: J.P. Morgan

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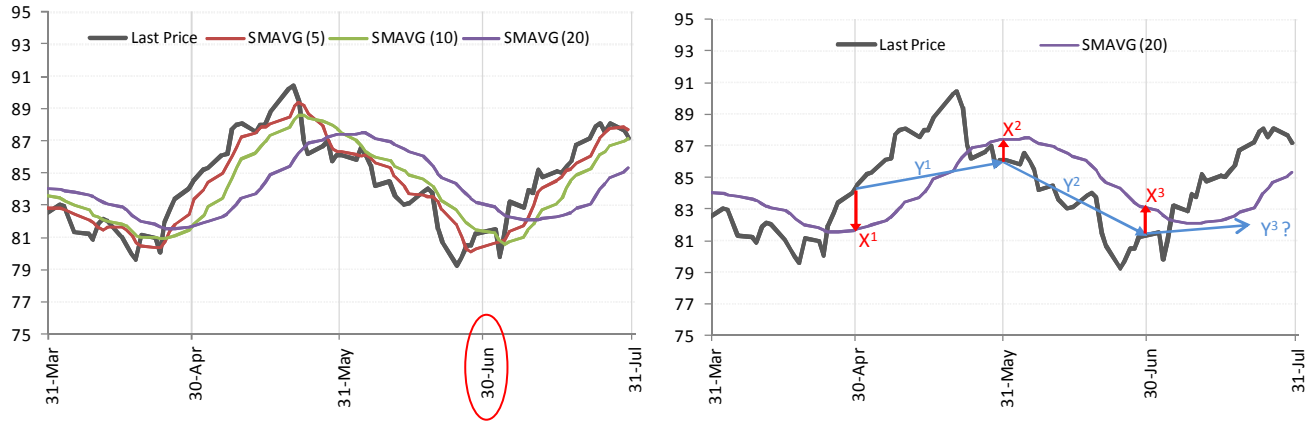
An example of the Factor calculation

Each month, the regression is trying to use the normalized average prices at the end of the last month in the best combination possible to explain the current returns.

Another way to think of the normalization is as calculating the deviation from trend, as shown by the red arrows in the right chart below. Each monthly return (Y) is regressed on the trend deviations at last month-end (X).

In the example below, let's **pretend we are as at 30 June**, so we don't have the price information for July. The chart on the left shows three moving price averages we might be tracking, and the chart on the right then focuses just the 20-day average and demonstrates how we can use its past trend deviations to contribute to an estimate of this stock's return for July.

Figure 2: Trend deviations – The left side shows only three sample rolling price averages; the right side focuses just on the trend deviations for the 20-day average, showing how it is used to contribute to the estimated return for this stock for the month of July



Source: Bloomberg, J.P. Morgan Quant

The trend deviation we will use in the estimation of Y^3 is X^3. The trend deviations (X^1 and X^2) take part in their respective regressions against the subsequent returns (Y^1 and Y^2). We can then either use just the coefficient of X^2 applied directly on X^3 to forecast Y^3 or, even better, we can take the past 12-month average of the coefficients (using X^2, X^1 and farther back) and apply that to X^3 instead.

The example is just for the 20-day moving average, but the regression is done across **many moving price averages** (3-, 5-, 10-, and 20-day) **for all stocks** in the universe to do the ***cross-sectional*** **multiple regression at each month-end** (and find coefficients for X^1 and X^2, etc).

Once again, the regression is trying to determine how much each trend deviation at the last month-end has influenced this month's returns (the coefficients). The 12-month average of those coefficients is to smooth out any noise. The average coefficients are then used on the current month-end to predict the next month's return.

It's the dynamic nature of this approach that gives it the flexibility to navigate turning points and changes in themes in the market.

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Our data and approach

In the all the universes we tested, we use the MSCI constituents, which for Asia ex Japan (the main universe we focus on) is approximately 600 stocks. Globally, our database has about 2,500 stocks across developed and emerging markets (we show the other region results in the Appendix).

As a result, we have a large-cap bias in our data set, as the index is dominated by mid- to large-caps, leaving out the smaller-cap names found in the broader exchanges. It certainly doesn't have the depth of the NYSE, AMEX and Nasdaq markets, which was the universe that the authors of the original paper used.

The large-cap bias is actually a drag on performance in our tests – the authors of the original paper show that performance is indeed better in smaller-caps.

The numbers of days we refer to in calculating the trend deviation inputs are **trading days**, per the original paper. Our testing data go back about 10 years starting January 2003 for the global tests, but for Asia we also tested back to 1995.

Our main testing approach is to use **quintile portfolio sorts** – where we assign portfolio 1 to be the long and portfolio 5 to be the short and calculate the long-short returns through the test period.

Trend Factor for Asia – Cutting to the chase

The TF10 factor for Asia…

Before we get into the details and the process that got us there – and, more importantly, for those of you that can't wait – the final factor and its backtest results are shown here. **The final TF for Asia uses 1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200- and 300- day trend deviations (we will refer to it as the TF10).**

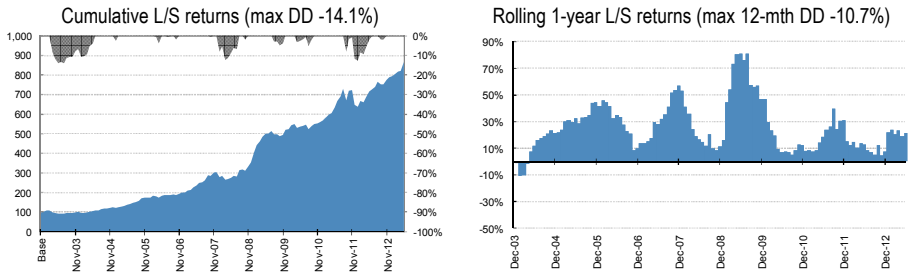
We have never seen performance numbers this strong before for a pure price-based/technical factor. Generating around 1.8% L/S per month, it is generally positive across any 12-month period with low drawdowns.

It has very good hit rates, t-stat and risk-adjusted returns

Figure 3: Trend factor in MSCI Asia ex Japan – Using 10 different trend deviations

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200-, 300-day	557	6.6%	5.45	77%	66%	1.8%	12.8%	1.78

For a pure price / technical factor, it is very consistent and robust



Source: J.P. Morgan, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

For a purely price-driven factor, the *results are very impressive*, *robust* to the parameters used, and *looks like it works in all of the regions we tested globally*.

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Backtesting in Asia

We approached our testing by breaking up the trend deviations into the short term (less than a month) and the long term (more than a month). Shorter trends worked best, but adding long trend deviations helps during the periods when continuation performs well in Asia (from 2004 to 2007).

Short-term trend deviations

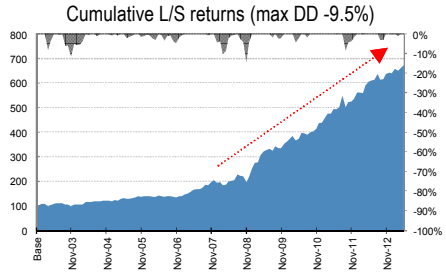
First we test the original Han & Zhou Trend factor – straight "out of the box"

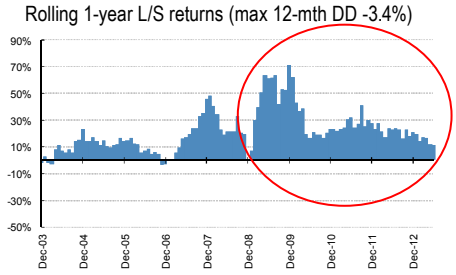
For the short-term trend deviations in Asia, we first test the exact same parameters used by Han & Zhou, i.e., the **1-, 3-, 5-, 10- and 20-day** price averages. The results clearly are strong after 2007, but not so much in the earlier test years, when long-term continuation was much more dominant in Asia.

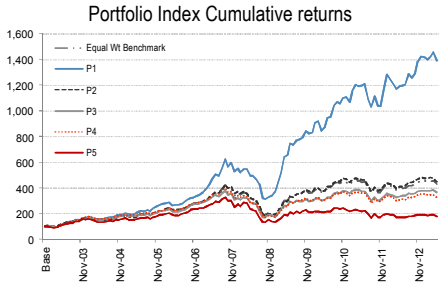
The short-term TF does remarkably well post-GFC, when continuation stops being the dominant trend and reversion is of much greater importance

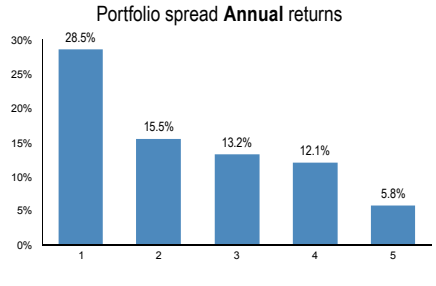
Figure 4: Performance charts for the SHORT-term trend factor in MSCI Asia ex Japan

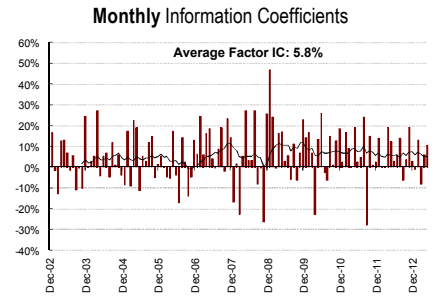
Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
Trend Factor: 1-, 3-, 5-, 10-, 20-day avgs	557	5.8%	4.54	71%	77%	1.6%	13.7%	1.45

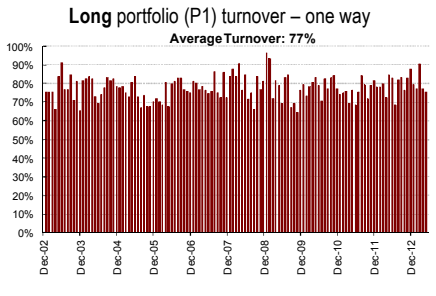












Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

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Static price momentum in GEM vs. GDM – Both very volatile

In Asia, we thought the TF would benefit from the inclusion of more longer-term trend deviations (100-, 200-, 250- day averages, etc.), thereby capturing a lot more of the continuation effect that has been stronger in emerging markets than it is in the U.S. and other developed markets.

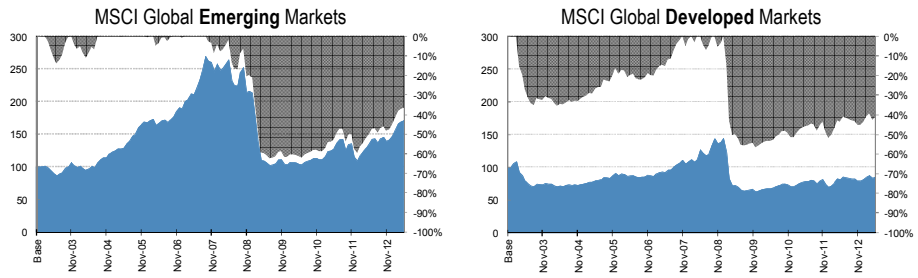
To demonstrate this, in the figures below, we contrast the performance of Price Momentum (12-months) in both EM and DM.

In the table, it is clear that price momentum does better in EM

Figure 5: Side-by-side price momentum (12-month) in GDM and GEM over the last 10 years

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
Price Momentum 12-mth, MSCI GEM	781	3.5%	1.22	65%	22%	0.6%	18.5%	0.28
Price Momentum 12-mth, MSCI GDM	1,695	1.3%	0.04	58%	24%	0.0%	17.9%	-0.09

It's still a volatile ride, with a massive drawdown in both regions, but at least the Sharpe is positive for EM



Source: J.P. Morgan, MSCI Barra, FactSet. Universe: as stated; Test period: Dec 2002 – June 2013; Monthly stats unless specified.

It's clear that the momentum is very strong in emerging markets prior to 2007 and again more recently – although it's a dangerous factor to have "on" all the time, and navigating those drawdowns is the key to making this factor viable. Some element of dynamic adjustment to the factor is the usual approach, and that is precisely what the TF does.

By including more long-term trend deviations, we are effectively giving the trend factor more sub-trend opportunities to exploit and switch between. Han & Zhou found that using longer-term trends added some alpha to their U.S. testing, but in Asia we expect a notable improvement.

The bottom line is that it makes sense to use a combination of both long- and short-term trend deviations in Asia so that the TF has an opportunity to exploit both when possible (see the next section).

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Long-term trend deviations

We tested some long-term trends as inputs, as well

For the long-term trend deviations in Asia we use the **50-, 100-, 150-, 200- and 300-day** price averages. The performance is a fair bit more volatile than the short-term TF, so the risk-adjusted returns suffer. But the long-term TF is still a far cry better than the 12-month static price momentum factor (shown in the previous section). Turnover is lower, as you would expect from using longer-term trend data.

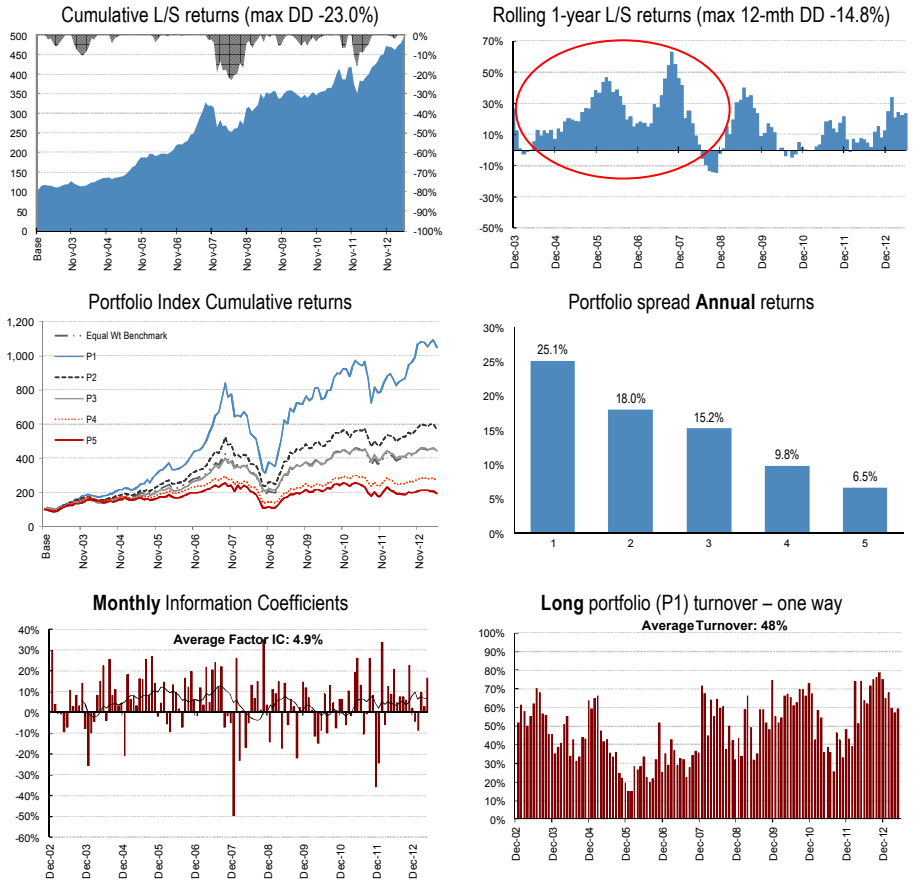
In the table and charts below, we show the return statistics of the TF factor only using long-term trend deviations in its calculation.

The TF using longer-term trend deviations is much stronger during the continuation-driven markets from 2003 to 2007. But it is not as nimble and fares much worse during the more volatile post-GFC period

Note the turnover is much lower than the TF using short term trend deviations.

Figure 6: LONG-term trend factor in MSCI Asia ex Japan over the last 10 years

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
50-, 100-, 150-, 200-, 300-day averages	557	4.9%	3.74	69%	48%	1.4%	14.1%	1.16



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

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All together now – Long AND short trend deviations

The Trend Factor in Asia (TF10) we settled on uses both long- *and* short-term trends (10 in all)

The final trend factor for Asia uses 10 periods (from here on we will call it the **TF10**): the **1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200- and 300-day** trend deviations.

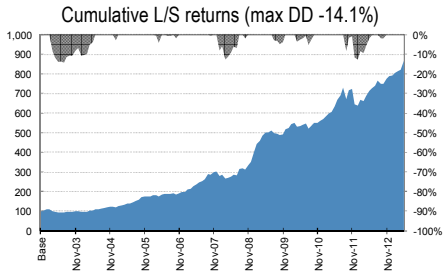
We tried to keep the number of longer-term inputs to the regression the same as the short, i.e., five inputs for 1 month and under, and five inputs for over 1 month. The idea was to keep the framework more balanced and not bias it towards the long- or short-term trends (if indeed one set had more trends to choose from than the other). The results are not that sensitive to which trend period inputs one chooses.

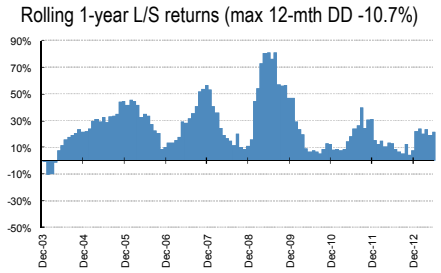
"Short-trend" periods + "Long-trend" periods…combined in the final TF10 factor

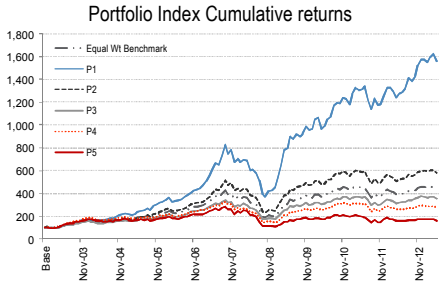
Figure 7: Trend factor in MSCI Asia ex Japan using long- AND short-term trend deviations

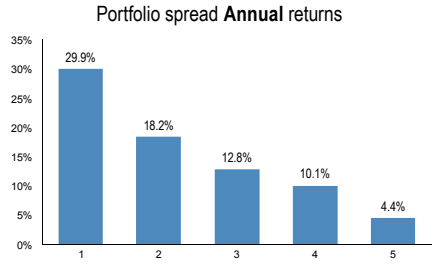
Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200-, 300-day	557	6.6%	5.45	77%	66%	1.8%	12.8%	1.78

The TF10 is much stronger again and consistent throughout the test period

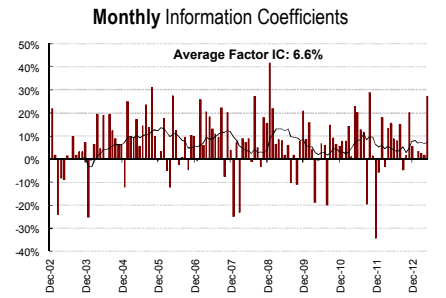


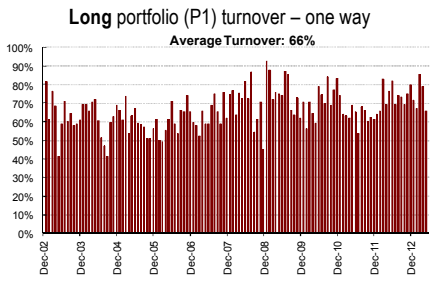






Turnover falls somewhere between that of the LONG and the SHORT TF turnover. It is rather high for a momentum factor, but not as high as RSI or 1-month price reversion factor





Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

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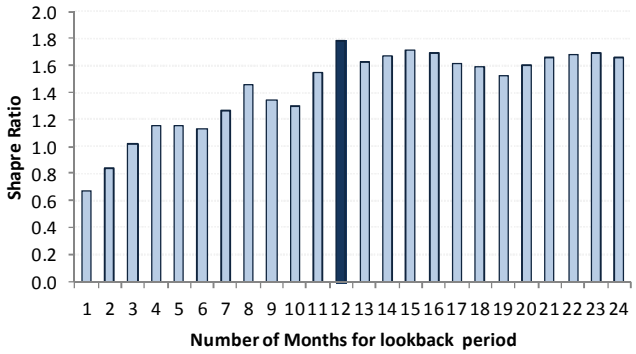
Parameter sensitivities

Below we take a quick look at the parameters used in the formation of the trend factor for Asia (TF10) and the sensitivity of the returns.

Look-back period for the coefficients

First, we vary the look-back period for the rolling average of the regression coefficients – remember, these are used as the weights on the end-of-month trend deviations in order to predict the *next* month's expected returns.

Figure 8: Risk-adjusted returns for different look-back periods on the TF10



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

Periods used for the trend deviations

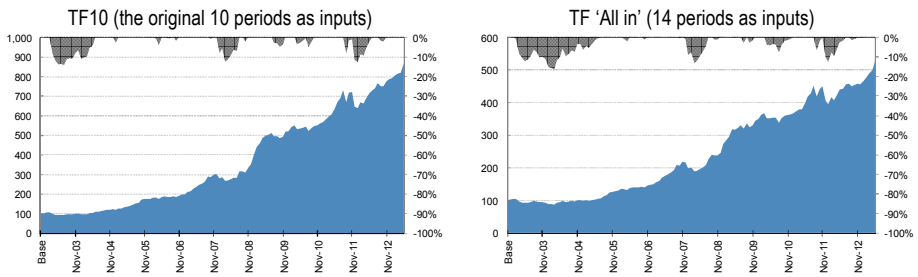
The TF10 is also robust to the choice of trend deviations we use as inputs. The version we are using has 10 inputs: 1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200- and 300-day trend deviations.

If we were to add some "missing" periods, such as 15-, 25-, 30- and 250-day terms, for example, the results are still very good.

Figure 9: Going "all in" with the periods used for trend deviations

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
TF10 (using just the 10 trend deviations)	557	6.6%	5.45	77%	66%	1.8%	12.8%	1.78
Periods 'ALL IN' for the trend deviations	557	5.6%	4.61	70%	68%	1.4%	11.7%	1.47

Throwing everything at the TF might not give the best result, but still it gives a very strong one, demonstrating the robustness of the factor to its inputs



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

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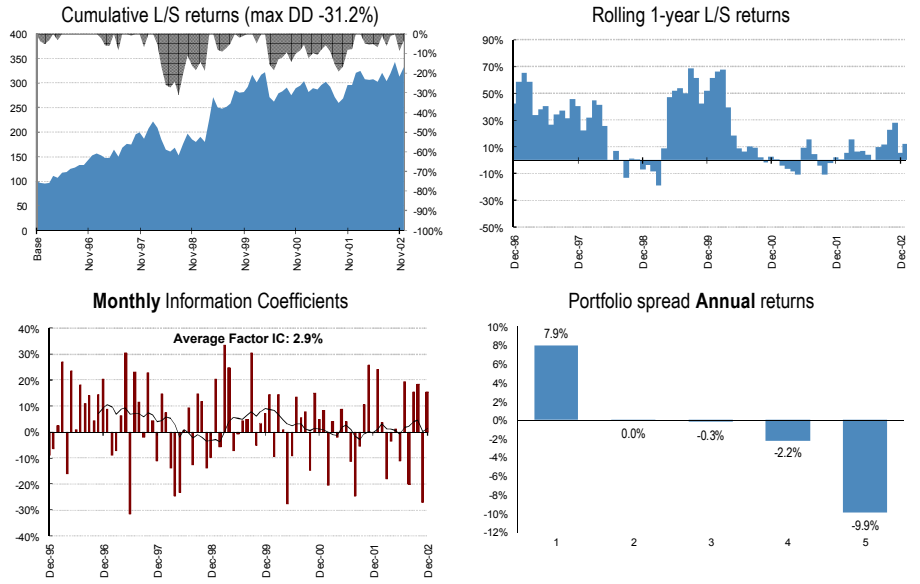
Testing prior to 2002

If we go back a little farther and start the test as early as we can, we see a couple of rough patches around the Asian Financial Crisis and the Tech collapse. Below we test the same TF10 factor from 1996 onwards (our database history starts in 1994, but we need two years of initial data to "initialize" the coefficients in the factor).

The TF10 tested before 2000…

Figure 10: Trend factor in MSCI Asia ex Japan starting Dec 1995 to Dec 2002

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
TF10 (short and long term trend deviations)	552	2.9%	2.15	60%	57%	1.7%	24.8%	0.74



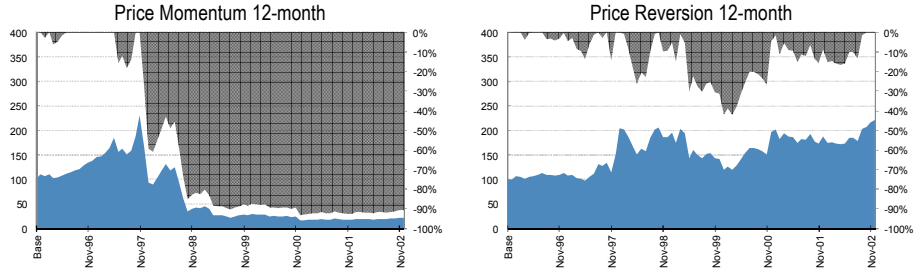
Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 1995 – Dec 2002.

In any case, the results are still statistically significant and the drawdowns are not as bad as that of static price momentum or reversion!

Figure 11: Price MOMENTUM and REVERSION in MSCI Asia ex Japan (January 1995 to Dec 2002)

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
Static Price Momentum 12-mth	552	2.1%	-0.63	60%	24%	-0.9%	43.3%	-0.45
Static Price Reversion 1-mth	552	1.7%	1.33	51%	77%	1.4%	32.5%	0.37

It was a disaster for price momentum during the Asian Financial Crisis



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 1995 – Dec 2002.

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Country and sector neutralization

We apply both country and sector neutralization to the original TF10 factor tested free across the region. Neutralization typically reduces volatility, but also L/S returns, and we find the same for this factor.

Country neutralization reduces volatility the most

Figure 12: NEUTRALIZATION on the TF10 in MSCI Asia ex Japan

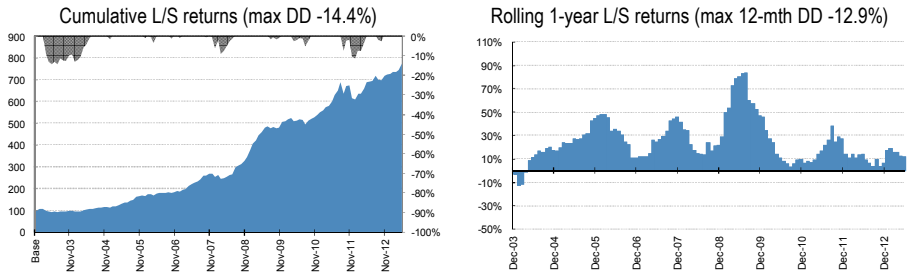
Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
TF10 - not neutralized	557	6.6%	5.45	77%	66%	1.8%	12.8%	1.78
COUNTRY neutralized	557	4.9%	5.52	73%	65%	1.4%	9.5%	1.78
SECTOR neturalized	557	6.3%	5.73	76%	65%	1.7%	11.5%	1.87

Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 1995 – Dec 2002.

The sector neutralization works the best, as it does the best job of removing the inherent beta biases that can build up inside trend and momentum factors. Country neutralization also reduces volatility, but at the expense of alpha, so it has about the same risk-adjusted returns as the un-neutralized version.

The TF for MSCI Asia ex Japan has the best risk-adjusted returns after SECTOR NEUTRALIZATION

Figure 13: Trend factor in MSCI Asia ex Japan – SECTOR NEUTRALIZED



Source: J.P. Morgan, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

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Exposures through time

In this section, we get a feeling for what was happening inside the TF10 during the test period. First, we look at what coefficients the regressions were finding, and then we show the cross-sectional correlations of the TF against other alpha factors.

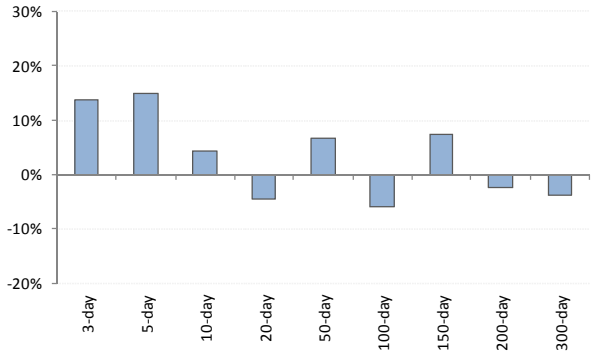
A look at the coefficients in the TF through time

In the TF10, we can track the coefficients used for each of the trend deviations every month. (Note that these are the *12-month rolling average* of the monthly coefficients.) We have omitted the 1-day "trend" coefficients, as they are practically zero throughout.

A look at what coefficients the TF was using…

… the 3- and 5-day had the most weight, but are also the smallest trend deviations. The longer trend deviations are the largest and hence tend to have lower average coefficients

Figure 14: AVERAGE of the coefficients of the trend deviations for the 10-year backtest period

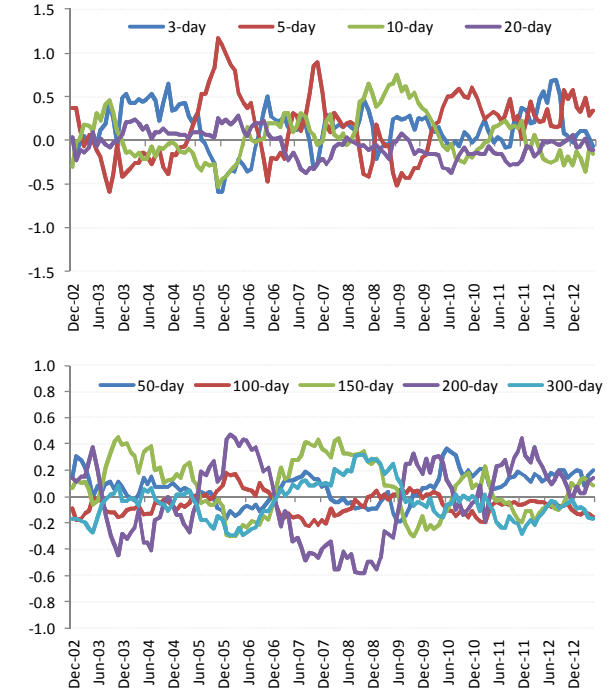


Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan

The shorter-term coefficients of the TF through time were quite rolling, with big spikes to the 5-day continuation and 10-day reversion at times

The longer-term coefficients of the TF tended to be dominated by the 150- and 200-day price averages

Figure 15: Monthly coefficients of the SHORT- and LONG-term trend deviations used in the TF10



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan

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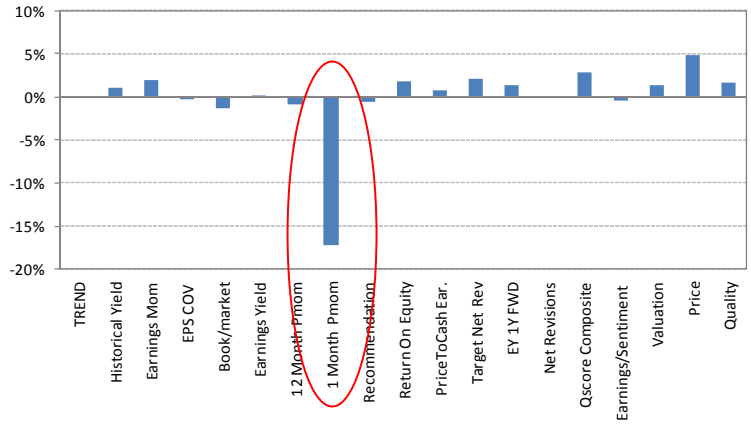
Pair-wise correlations with other factors

For a quick look at what the exposures the TF10 typically has against other factors in Asia, we have run cross-sectional correlations for each month and show the average of that over the last five years in the chart below.

Figure 16: Five-year average correlation of the TF10 factor against other factors

The TF10 factor has the highest exposure to the 1-month reversion (i.e., negative to 1-month momentum)



Source: J.P. Morgan Quant, MSCI Barra, Bloomberg, Thomson Reuters, FactSet. Universe: MSCI Asia ex Japan

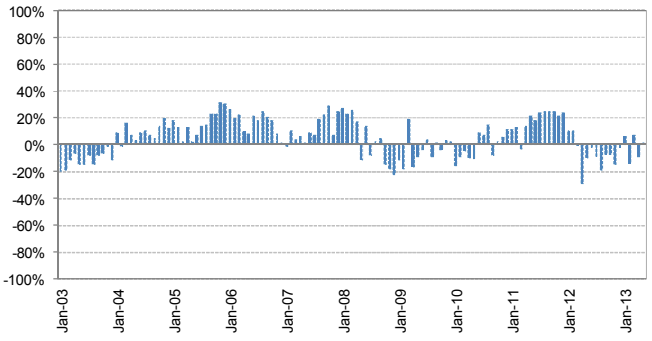
Cross-sectional correlations through time

There is very little correlation exposure with Size – the cross-sectional correlation rarely exceeds ±20%. If it has a true size bias, it is toward larger-caps on average, except during beta rallies, when it has shifted into smaller-caps.

Figure 17: Monthly cross-sectional correlation of the TF10 factor against SIZE

TF10 against SIZE:

There is a broad large-cap bias, but the factor has been more in small-caps recently



Source: J.P. Morgan Quant, MSCI Barra, Bloomberg, Thomson Reuters, FactSet. Universe: MSCI Asia ex Japan

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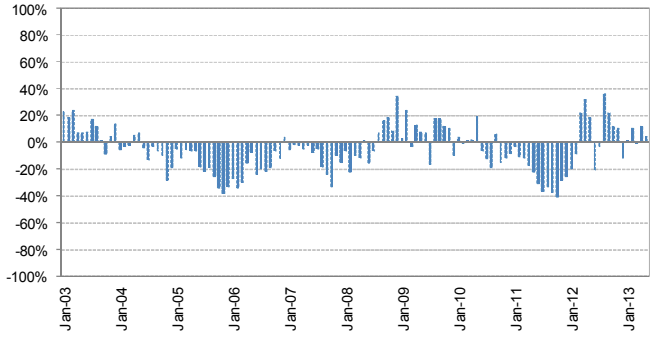
There are times when the TF10 becomes exposed to "expensive" stocks, i.e., low Book/Market. But it benefited from being exposed to "cheap" names during the beta rallies (see the chart over the page).

TF10 against BOOK/MARKET:

Tends to have a bias away from B/M, but at the moment it is slightly positive

Figure 18: Monthly cross-sectional correlation of the TF10 factor on BOOK/MARKET



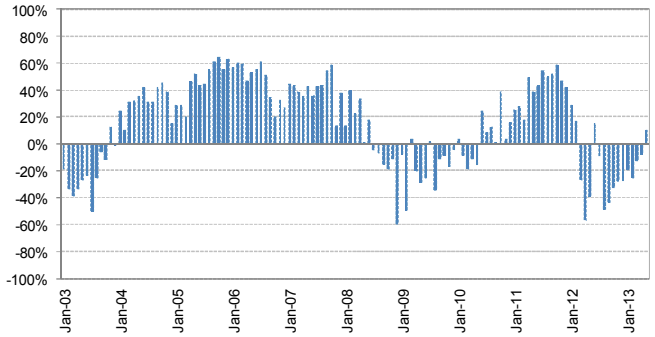
Source: J.P. Morgan Quant, MSCI Barra, Bloomberg, Thomson Reuters, FactSet. Universe: MSCI Asia ex Japan

The exposures the TF10 has to 12-month Price momentum are nicely "navigated." By that we mean that the worst exposures during March 2009 were avoided, or at lease minimized.

TF10 on PRICE MOM 12-month:

Nicely navigates the price momentum factor – positively exposed during the momentum markets pre-2007, then negatively exposed during the more volatile GFC period

Figure 19: Monthly cross-sectional correlation of TF10 factor on PRICE MOMENTUM 12-month



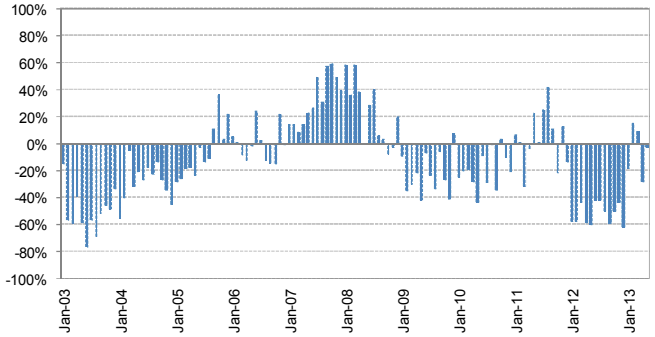
Source: J.P. Morgan Quant, MSCI Barra, Bloomberg, Thomson Reuters, FactSet. Universe: MSCI Asia ex Japan

The TF10 has its biggest exposures to Price Reversion 1-month. Positive correlations mean the factor is using more 1-month price CONTINUATION, while negative correlations mean it is using 1-month price REVERSION.

TF10 on PRICE MOM 1-month:

Typically, it will buy oversolds and short overboughts, except for periods in the past when even short-term momentum was acting as a continuation signal (2007), when the TF10 was able to position positively with 1-month momentum

Figure 20: Monthly cross-sectional correlation of the TF10 factor on PRICE MOMENTUM 1-month



Source: J.P. Morgan Quant, MSCI Barra, Bloomberg, Thomson Reuters, FactSet. Universe: MSCI Asia ex Japan

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Is it just Dynamic Momentum?

Price momentum is a classic candidate for style timing – and our U.S. colleagues indeed demonstrate this very clearly in their report on "*Enhanced Price Momentum: Viewing Price Momentum through the Lens of Market Breadth and Depth*," (Lakos-Bujas, September 2012). So, to be fair, we wanted to test different price momentum flavors blended dynamically in the same way as the trend deviations.

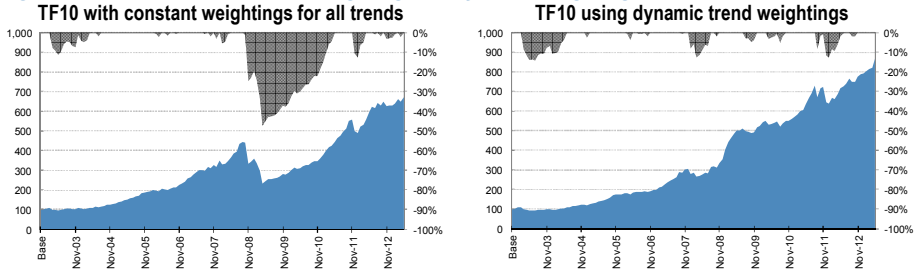
Dynamic weightings are the key to the trend factor

We confess that the comparisons we made earlier to price momentum were a little unfair. Price momentum in its static form has had some terrible drawdowns in the last 10 years. Yet a big part of the Trend Factor is its dynamic nature in blending the different trend deviations. If we take away its dynamic nature and use constant coefficients for the TF sub-factors (the **average coefficient weights** on page 14), it suffers massive drawdowns. The static coefficients *even have a look-ahead bias*.

The power of the TF largely comes from its dynamic nature. The same constant weighting of the trend deviations performs poorly

The cyclicality in the trends cannot be exploited using static weights

Figure 21: Trend Factor constant weightings vs. dynamic weightings



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

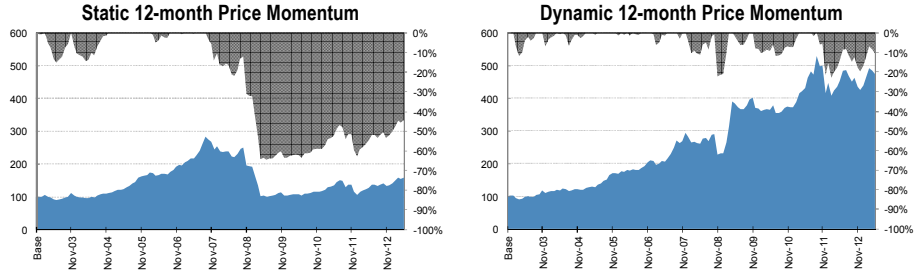
Static vs. Dynamic – One factor only

What if we give that same dynamic power to some of our classic momentum factors?

"Normal" momentum and price reversion just don't cut it – but it is not really a fair comparison when we apply them constantly and statically. What if we gave our typical momentum factors a dynamic nature – in a crude 2-speed test where we can use the factor either positively or negatively, depending on how it performed last month (a simple "go with the direction it is working" test)? We don't use a 12-month rolling average as for the normal TF calculation.

Figure 22: Cumulative L/S index of Price Momentum 12-month – static vs. dynamic

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
Static Z-Score 100% 12-month Price Momentum	557	3.5%	1.05	67%	22%	0.5%	19.7%	0.22
Dynamic Price 12-month only (last month's coeff.)	557	4.7%	2.83	65%	49%	1.4%	19.2%	0.83



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013. Note: This dynamic test for Pmom12-mth merely uses the **sign** of the regression coefficient *last* month as the direction for the *next* month.

We use the same regression framework that builds the TF, but feed in only a *single* momentum factor, in this case 12-month momentum

If momentum is working, it will get a positive coefficient, in which case we use it at 100% weighting for the next month

Otherwise, we use it at -100%, i.e., in the inverse

There is no "off" switch, i.e., 0%

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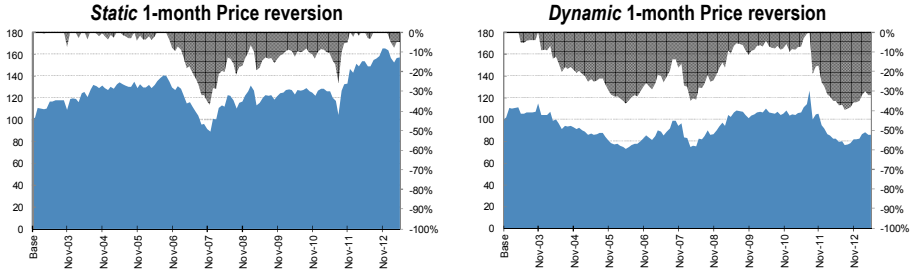
It is clear from the performance that adding a dynamic element to the application of 12-month price momentum improves the performance dramatically. It's still a bumpy ride, but much better than before, when it is used statically.

Similarly, we can try the dynamic approach on reversion factors in Asia. The charts below contrast a 1-month price *reversion* factor first used constantly and then run through the dynamic framework. It is interesting to see that making price *reversion* dynamic has no real benefit. Reversion, it seems, is a more constant phenomenon, and trying to "chase" it is not beneficial.

Again, we use the coefficient of the last month's regression to predict the returns of the following month (no 12-month rolling average)

Dynamic *reversion* is no better than the static kind – one lesson here is: Do not chase reversion as you might longer-term momentum

Figure 23: Cumulative L/S index of Price REVERSION 1-month – Static vs. dynamic



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

Clearly, the dynamic nature of the TF is crucial to its good performance – and not the use of the trend deviations themselves. In the next section, we show that you can get good results by applying dynamic blending across multiple price momentum factors.

Two momentum factors – Dynamically weighted

Two momentum factors dynamically weighted...

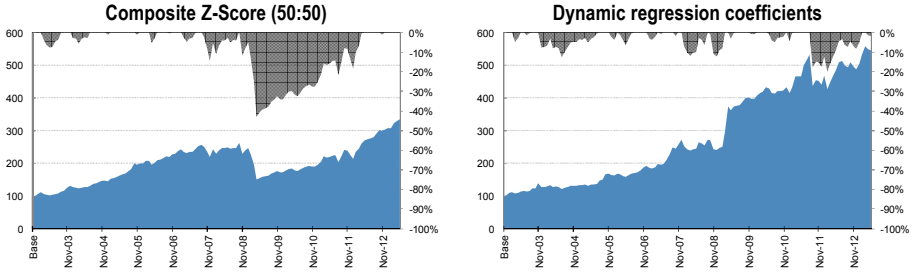
The dynamic tests in the previous section are on only a single momentum factor at a time. The problem with that is that the factor is being used either 100% positively or 100% negatively. So, it's either full steam ahead or full reverse! No matter if the coefficient is low or high from the regression; it makes no difference because *only the sign has an effect* on the factor. There needs to be another factor available as an alternative if the relative level of the coefficients is to matter. In the next tests, we show a blending of **12-month price momentum** with **1-month price reversion**; first, we use a static blend (50:50) and then the dynamic regression approach.

Figure 24: Cumulative L/S index of a combination of 1-mth reversion and 12-month momentum

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
Composite Z-score 50:50 1- & 12-month momentum	557	4.9%	2.68	70%	54%	1.1%	15.5%	0.79
Dynamic Price 1- & 12-month (last month's coeff.)	557	4.9%	3.38	67%	62%	1.5%	17.0%	1.04

The dynamic regression has the freedom of choice between 1- and 12-month momentum

Therefore, it does much better than the static Z-Score blend, which drove off that "momentum cliff" back in 2009



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013. Note: This dynamic test uses the **coefficient** of the regression *last* month as the weight for the *next* month (not a 12-month coefficient average).

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Using "price momentum" instead of "trend deviations"

ALL the momentum factors dynamically weighted...

Using two momentum factors in the previous section improved the results quite dramatically. Taking this to its natural conclusion, we now feed price momentum inputs into the regression framework to form a new "dynamic momentum factor."

But first, a quick comment on these choices of inputs. If we use *period average prices* (normalized by the current price), then the calculation is actually very similar to using the *price momentum* directly. The difference is if the price shot up very quickly in just the last few days of the period, the trend deviation will notice, but the momentum calculation will not. Momentum more explicitly targets the price change between start and finish; trend deviations contain information about the price moves through the midrange, too.

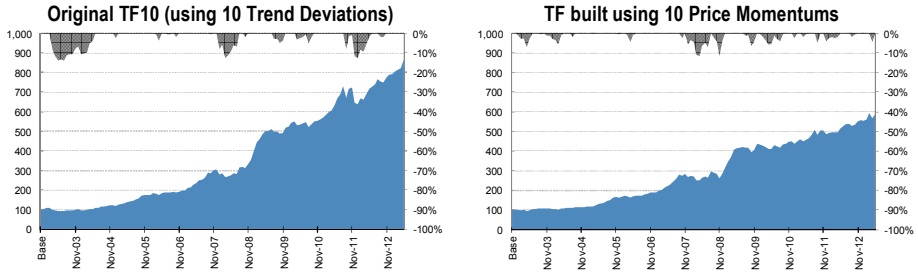
But both are still effectively capturing the recent trend, so our thinking was that momentum should also perform well as inputs to the framework (especially in light of the tests already done in this section on momentum). And indeed it does – but not as well.

To test this, we extended what we've been doing in this section to now use all 10 periods of price *momentum*, i.e., the 1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200- and 300-day period returns (lining up with the periods used to calculate the *trend deviations* in the TF10). We calculate dynamic weightings for these return inputs using the same regression framework as before.

Figure 25: Results using PERIOD MOMENTUM cf. with TREND DEVIATIONS

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
TF using **TREND DEVIATIONS** for each period	557	6.6%	5.45	77%	66%	1.8%	12.8%	1.78
TF using **PRICE MOMENTUM** for each period	557	5.3%	4.63	68%	58%	1.5%	12.4%	1.48

The performance profile is very similar, as indeed it should be…



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

… but trend deviations are a better input to the TF than period returns – largely because they contain more information

The performance profile of the factor using the *period momentum* is very similar to the TF using *trend deviations* – as we would expect. That said, the results are not as strong, and it's a little more volatile, hence the lower risk-adjusted returns. The key takeaway here is that the **trend deviations are a better choice than pure returns**. Trend deviations contain more information than pure momentum, and so provide a richer input to the TF.

To sum it all up: Even though most of the power of the TF is from its dynamic nature, the use of trend deviations is a novel way to increases its predictive power over a comparable dynamic momentum factor.

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Fundamental factors as inputs, too

Adding alternative fundamental alphas to the regressions should improve performance

In this section, we augment the trend deviations with some normalized alpha factors. Using fundamental alphas as inputs to the Trend Factor regression framework is not in the spirit of using only price-based inputs. However, if the regression framework is "choosing" between trends anyway, then why not let it have some fundamental factors like Size, Value, and Earnings to choose from, as well?

We agree with the point from the original paper that trend factors will dominate sometimes during the cycle, but that fundamentals will sometimes drive stocks. So, we will add these into the mix and see what happens.

The goodness of fit should be better

One thing we can expect is the R^2 of the multifactor regression each month to improve. So, using fundamentals as well as trends each month should explain more of the returns. This does not mean that the coefficients generated will be superior for the *next* month just because they better explain *this* month, but then again they probably will perform better, given that we know styles tend to persist from month to month, so "better" coefficients should deliver more returns.

Other factors we can inject into the Trend Factor

There are six additional alpha factors we will introduce:

- Fama-French factors (**Size**, and **Book/Market**); and
- the JPM alphas (**Value**, **Earnings**, **Price**, and **Quality**).

The JPM alphas are briefly detailed in the diagram below. These are combined to form our static composite model, the "Q-Score."

Figure 26: The JPM Q-Score alpha families

VALUATION *[30%]* COMPONENT FACTORS P/E Vs Market (12mth fwd EPS) *[34%]* P/E Vs Country Sector (12mth fwd EPS) *[33%]* EPS Growth (FY1 mean to FY2 mean) *[33%]*	**EARNINGS & SENTIMENT *[30%]*** COMPONENT FACTORS Earnings Momentum 3mth (Risk Adj.) *[34%]* 1Mth change in consensus recomms *[33%]* Net Revisions to mean FY2 EPS *[33%]*
PRICE & TECHNICAL *[20%]* COMPONENT FACTORS 12Mth Price Momentum *[75%]* 1Mth Price Reversion *[25%]*	**QUALITY *[20%]*** COMPONENT FACTORS Historical ROE *[50%]* Earnings Certainty (Var. in forecast EPS) *[50%]*

Source: J.P. Morgan

For a full description and overview of this model's performance in GEM and regions globally, please refer to "The JPM Q-Score for Emerging Market stock selection," Malin/Dion, February 2012.

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First, let's add a Size factor to the mix

Admittedly, by introducing Size, we are deviating from the mandate of using just price trends; we are shifting focus away from a single-factor idea and more toward a dynamic framework for managing various inputs

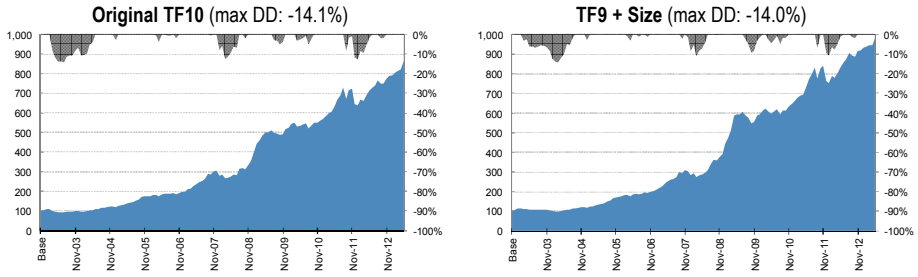
Even before we thought to use other fundamental alphas to augment the trend deviations, we were thinking of adding a Size factor to the mix. All because we were a little uncomfortable with one of the trends: the 1-day "average" price, which in the Han & Zhou paper is not normalized (as it would make this input just 1.0!). So, it is just the price at the close of the month and it seemed (in our minds, at least) to be a very rough proxy for size – with the big-ticket blue-chips at one end and the penny-stock small-caps at the other. Perhaps using a Size factor, or indeed other alpha factors, could even add more value to the blend? This was our first thought on adding fundamental factors to the TF10.

It was simple enough to test: We built the TF10 factor as before, but merely swapped out the 1-day "average" price and replaced it with a Size factor (the log of the investable market cap in USD). Let's call this the "TF9+Size" factor, i.e., nine trend deviation inputs, plus a Size factor.

Figure 27: Cumulative L/S index of TF10 vs. TF using Size instead of the 1-day "average" price

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
TF10 (using just the 10 trend deviations)	557	6.6%	5.45	77%	66%	1.8%	12.8%	1.78
TF10 using Size instead of 1-day 'average' price	557	7.1%	5.81	73%	64%	1.9%	12.7%	1.92

Size as the first sub-factor in the regression adds just a little more alpha



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

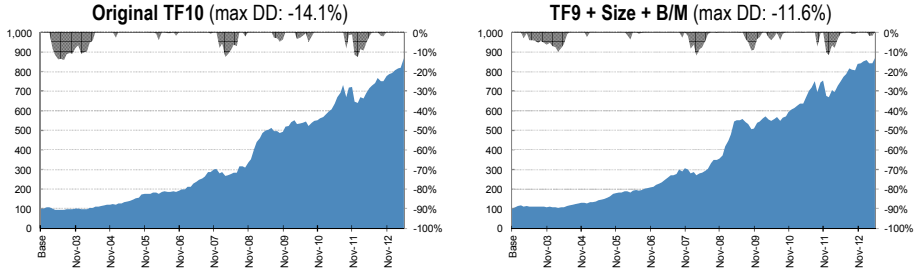
Next, we add both Fama-French factors

We extended the idea even further by adding Book/Market, the second Fama-French factor. The results improved a little over the TF10 with lower drawdowns.

Figure 28: Cumulative L/S index of TF10 vs. TF9+Size AND Book/Market

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
TF10 (using just the 10 trend deviations)	557	6.6%	5.45	77%	66%	1.8%	12.8%	1.78
TF9+Size+B/M	557	7.0%	5.69	74%	62%	1.8%	12.2%	1.87

We get improvement when we add Book/Market



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

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Last, we include the four JPM composite alphas

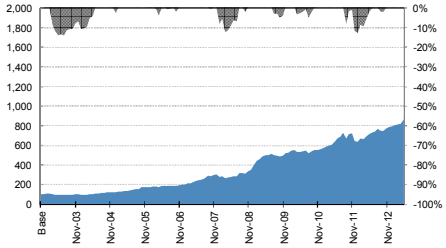
Going all in, we can also use all the family components of our Q-Score alpha model (Value, Earnings, Price and Quality). Effectively, we now add these factors to the mix and let the regression have its pick.

We add the JPM alpha family composites to the Fama-French factors we already injected (and call the new factor "TF9+Fama French+JPM VEPQ") and show these tests in the charts below.

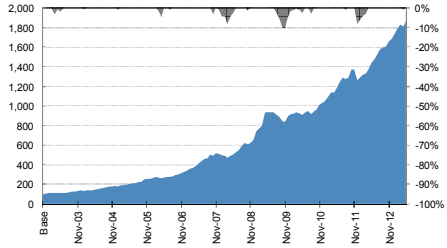
Figure 29: Cumulative L/S index of TF10 vs. TF9 plus Fama-French and JPM alpha factors

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
TF10 (using just the 10 trend deviations)	557	6.6%	5.45	77%	66%	1.8%	12.8%	1.78
TF9 + Fama French + JPM VEPQ	557	9.2%	7.95	79%	57%	2.4%	11.7%	2.73

Original TF10 (max DD: -14.1%)



TF9 + Fama French + JPM VEPQ (max DD: -10.5%)



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013. VEPQ are the JPM Value, Earnings, Price, and Quality family factors for Asia.

The fully augmented TF10 with the Fama-French AND JPM alpha factors is very impressive

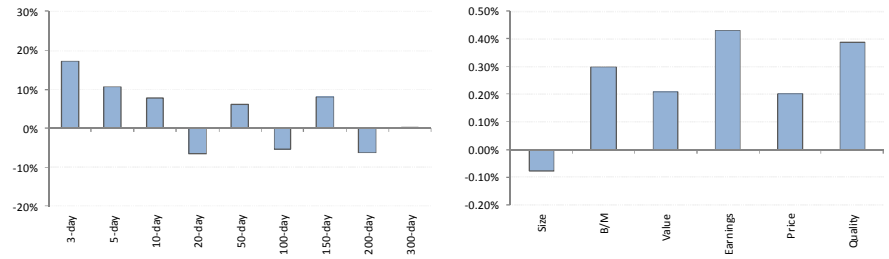
(Note the change in the scale on the y-axis!)

A nice side effect of introducing more low-turnover sub-factors is that the overall turnover of the new TF is reduced. That, along with a big improvement in returns, is an impressive result (*risk-adjusted returns increase to 2.73)*.

Coefficients in this last TF using FF and JPM alphas

We revisit the coefficients through time – now we are interested in moves between the trend deviations and the newly injected fundamental factors.

Figure 30: AVERAGE coefficients of the inputs to this new TF (using FF and JPM alphas)



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan

A look at what coefficients the TF was using…

… the coefficients of the trend deviations are very similar to before. The coefficients of the fundamental are as we would expect

It is worth commenting on the magnitude of the coefficients for each set of inputs. They are not comparable, as the first set of trend deviations is an average price normalized by closing month-end price, whereas the second set of fundamental alphas has been normalized using cross-sectional Z-scoring. As the inputs differ in scale, so will the coefficient magnitudes (unfortunately).

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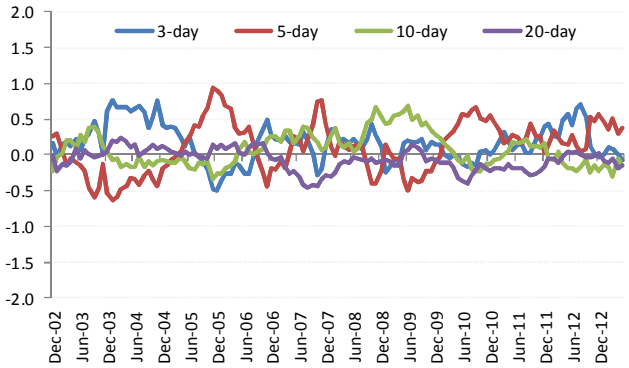
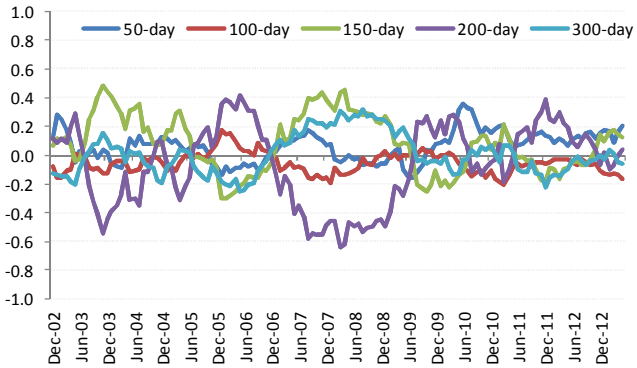
Figure 31: Monthly coefficients of the various inputs of this new TF (using FF and JPM alphas)

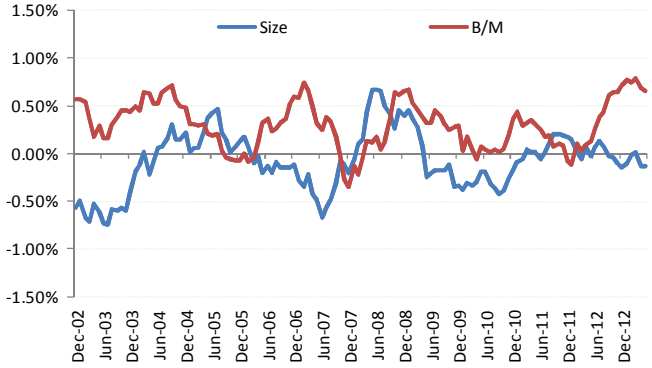
The shorter-term coefficients of the TF through time were very similarly positioned to those in the original TF10



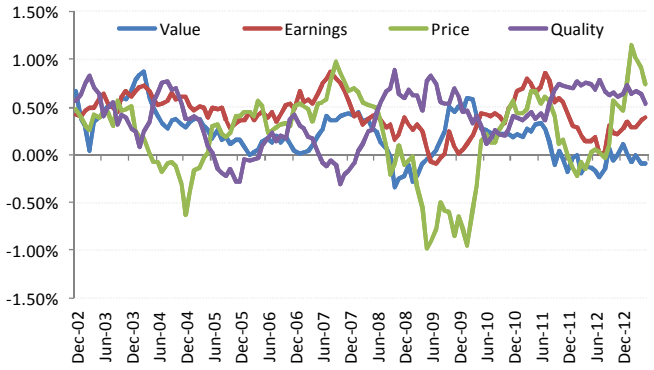
The longer-term coefficients of the TF tended to make more use of the 150-day trend deviation (above others) than in the original TF10



The coefficients to Size show the moves between large-caps (positive) and small-caps (negative). B/M names are currently in favor, as they were in 2009



For the JPM alpha inputs, we can clearly see when the price component was used inversely in 2009. Also, we can see the recent overweight on Quality



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan

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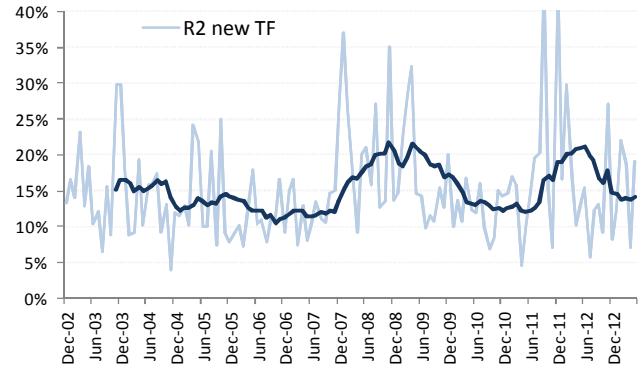
Improvements in the "goodness of fit"

So, there was a notable improvement of the new TF using Fama-French and JPM alphas over the original trend factor (TF10).

Note we are not using the market beta, so a lot of the explanatory power is missing from the regression. We can only use predictive factors to form the coefficients for use at each month-end – and the next month's market moves are unfortunately not available then!

Figure 32: Monthly R^2 of the regression of the last TF (using FF and JPM alphas)

The "goodness of fit" runs 10-30% each month, with an overall average of 15.2% throughout

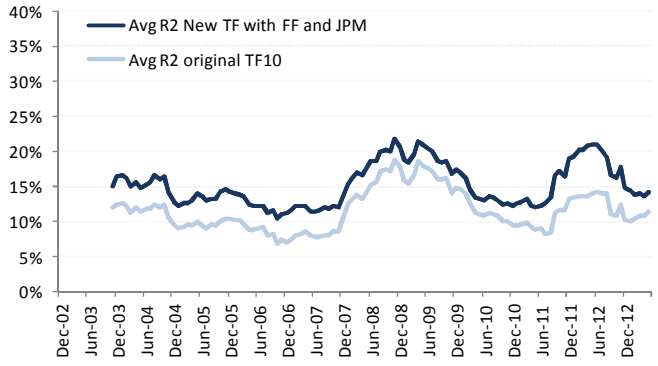


Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan

We see an improvement in the R^2 as we add more fundamental factors to the regression inputs – as we would expect since there are now more orthogonal factors available to explain the returns each month.

Figure 33: Improvement of R^2 of the regression of the last TF (using FF and JPM alphas) over and above the original TF10

The average improvement throughout is around 4%



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan

Note this is not a reflection on the performance of the strategy at all – as this is only the R^2 of the regression that forms the coefficients each month for use in the return forecasting of the next month. But what is interesting is that it's a reflection of how well the set of input factors to the regression are explaining returns at that time. Perhaps the R^2 increases when markets are not being driven so much by fundamentals, but rather by trend deviations.

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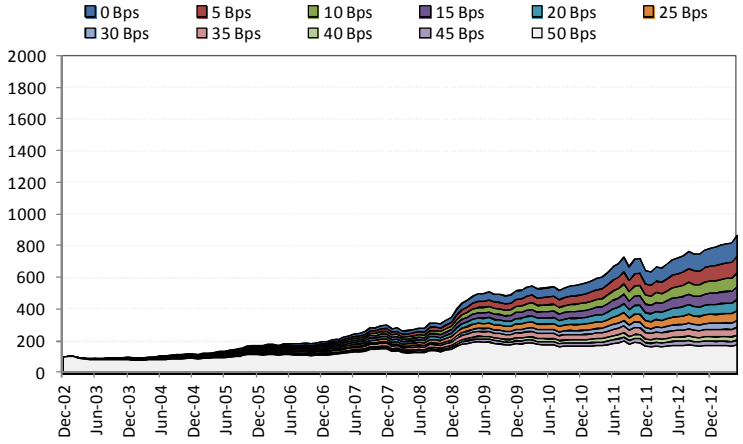
Trading cost sensitivities

For completeness, we had a look at the TF10 (see page 10) after trading costs at various sensitivities, as transaction costs in Asia can get quite high. Not that we would suggest this is a standalone strategy, but it's interesting to see how much alpha is left after some t-costs are applied.

The TF10 after trading costs

Figure 34: TF10 after t-costs at various levels

There is still alpha left even after 50bps of trading costs



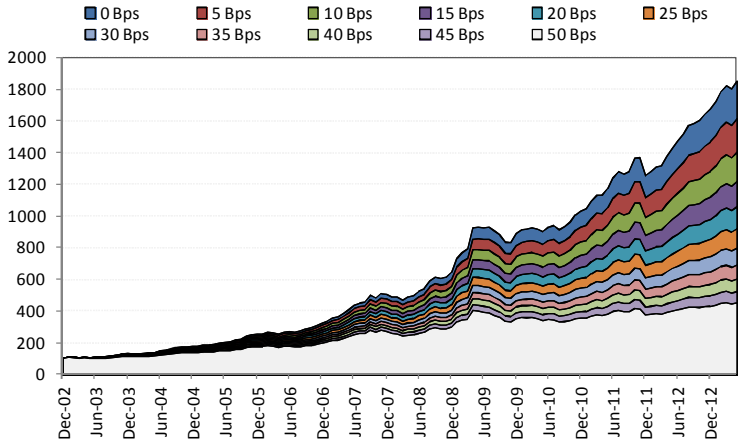
Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

The TF10 *with fundamentals* after trading costs

However, it's more likely that the TF10 would be mixed with fundamental factors as a standalone trading strategy. Below are the trading cost sensitivities on the TF10 with Fama-French and JPMQ alpha composites combined (see page 22).

Figure 35: TF10 with FF and JPMQ alphas after t-costs at various levels

With fundamental factors, the turnover is lower and alpha is higher – so, even better results after t-costs



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013.

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Further work

Here are some other ideas we had on building the factor – some broad ideas for future improvements or alternative approaches to the framework. These are still on our to-do list.

Rolling regression

Instead of a rolling average of the cross-sectional coefficients, what if we did a regression across the entire 12 months to form the current coefficient (and repeat this on a rolling basis)? The difference with this approach is we would be using coefficients of the trend deviations that best explained the entire prior 12 months of returns at once.

Disregarding coefficients that have a low significance

We wanted to remove coefficients from the 12-month rolling average when they had t-stats that were "too low." However, our first attempts at this were not able to improve the overall results.

Adjustment of the reliance on the TF

We also tried to remove the effects of coefficients in months when the R^2 was too low, but this also seemed to add no value. One other idea might be to run regressions separately on the Trend Factors and compare the R^2 of that against that of the regression on the fundamental factors and then shift the bias toward whichever set of factors was better explaining the current market returns.

Sequential average price periods

Using 3-, 5-, 10- and 20-day periods to the month-end means we construct the deviations on overlapping periods. This makes the interpretations of the coefficients difficult to understand, as sometimes the 5-day is positive and the 10-day is negative, making the net 5-day hard to decipher.

Instead of overlapping the trend deviation periods, we used sequential trend periods as inputs. For instance, instead of using a 3-day and a 5-day trend deviation, we use the deviations from the Day 1-3 average and the deviations from the Day 4-5 average. Indeed, we found similar results. The advantage was that the coefficients for each of the trend deviations had no overlap.

Sector coefficients for the trend deviations

The Trend Factor coefficients are from the cross-sectional coefficients done each month. The cross-section is across the entire universe, but we wondered if it would make sense to run the regressions intra-sector to try and exploit sector trends more directly. In fact, we would then be creating sector regression coefficients for each trend within the GICS level 1 sectors each month. We have left this for future work.

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Conclusions

Impressed with the U.S. study, we looked at the Han & Zhou Trend Factor from their July 2013 paper "*Trend Factor: A New Determinant of Cross-Section Stock Returns*" in Asia and found strong results here, as well. We present some of our final observations while investigating this factor.

Shorter-term trends work the best globally

See page 30 for global results

We conclude that the trend deviations formed on fewer than 20 trading days were usually better. The longer-term trend deviations (50-, 100-, 150-day, etc.) worked better in Asia and Emerging markets. In Developed markets, they added very little value.

Long-term trends deviations really worked well only in EM and Asia Pac

See pages 8-10 for short- and long-term tests in Asia

The short-term trends work well everywhere, but Asia, Australia and EM also benefitted from the longer-term trends out to a year. However, it was blending *both* long- and short-term trends that we found optimal for Asia and Emerging markets.

Use a Trend Factor instead of Reversion

See pages 18-19 for a comparison against reversion

A Trend Factor would be an ideal replacement for Reversion wherever it is used. The turnover is about the same, but the alpha is much higher.

Trend deviations have more information than momentum

See page 20

Trend *deviations* have more information than plain price momentum. This makes sense because we are using more data points in the calculation, i.e., hanging onto to more information. Price momentum only uses the prices at the start and finish dates, but trend deviations use the price on every day in between, as well.

Dynamic weights are crucial for exploiting trend deviations

See page 18

Dynamic weightings are crucial for managing long-term momentum trends. We demonstrated how price momentum 12-month is a classic candidate for timing and performs much better using dynamic weights. We also showed how much of the Trend Factor's power comes from the dynamic weighting scheme.

Dynamic weights are better for continuation than reversion

See pages 18-19 for a comparison of dynamic continuation vs. dynamic reversion

We found that using the dynamic weights improved continuation momentum (typically more than three months) by much more than it improved short-term reversion. Reversion is a factor that is better targeted using more constant weights.

Augmenting trends with fundamentals greatly boosts alpha

See pages 21-23

In the last part of this report, we demonstrate that we can enhance the performance even further by adding fundamental alphas into the regression framework using the trend deviations. Applying dynamic weights to allocate between trends and fundamentals, we get the best risk-adjusted returns.

The Han & Zhou trend factor works well "out of the box" in Asia. We extended the trend deviation inputs used to include more long-term periods, as well as fundamental factors for Asia, which greatly improved performance. In all, we were very impressed with the performance tests globally.

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Appendix I: Results summary tables

First, we tested the TF using different periods of "trend deviations"

Then, we added some fundamental factors – first Fama-French then our own JPM family composites

Figure 36: Trend factor tests in MSCI Asia (ex Japan) from Dec 2002 to June 2013

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
Trend Factor: 1-, 3-, 5-, 10-, 20-day avgs	557	5.8%	4.54	71%	77%	1.6%	13.7%	1.45
50-, 100-, 150-, 200-, 300-day averages	557	4.9%	3.74	69%	48%	1.4%	14.1%	1.16
1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200-, 300-day	557	6.6%	5.45	77%	66%	1.8%	12.8%	1.78
TF10 using Size instead of 1-day 'average' price	557	7.1%	5.81	73%	64%	1.9%	12.7%	1.92
TF9+Size+B/M	557	7.0%	5.69	74%	62%	1.8%	12.2%	1.87
TF9 + Fama French + JPM VEPQ	557	9.2%	7.95	79%	57%	2.4%	11.7%	2.73

Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013. VEPQ are the JPM Value, Earnings, Price, and Quality family factors for Asia.

Figure 37: Associated tests in MSCI Asia (ex Japan)

1995 to 2002

The TF10 works prior to 2002, as well

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
TF10 (short and long term trend deviations)	552	2.9%	2.15	60%	57%	1.7%	24.8%	0.74

1995 to 2002

And convincingly beats standard price momentum or reversion

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
Static Price Momentum 12-mth	552	2.1%	-0.63	60%	24%	-0.9%	43.3%	-0.45
Static Price Reversion 1-mth	552	1.7%	1.33	51%	77%	1.4%	32.5%	0.37

2002 to 2013

We also demonstrated that dynamic *trend deviations* are more potent than dynamic *price momentum*

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
TF using **TREND DEVIATIONS** for each period	557	6.6%	5.45	77%	66%	1.8%	12.8%	1.78
TF using **PRICE MOMENTUM** for each period	557	5.3%	4.63	68%	58%	1.5%	12.4%	1.48

Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test periods: Varies

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Appendix II: Global backtest results

Combining both long- and short-term trends depends on the market in question. Some markets respond better to reversion, and some respond better to continuation.

In the global testing, the Trend Factors did best in MSCI GEM…

…with strong performances also in U.S. and Europe…

… but not as consistent in Australia or Japan

Figure 38: Various Trend Factors tests tested globally from Dec 2002 to June 2013

MSCI GEM

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-day averages	779	3.4%	3.91	64%	78%	1.1%	11.4%	1.22
50-, 100-, 150-, 200-, 300-day averages	779	3.5%	2.81	62%	49%	0.9%	13.0%	0.84
1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200-, 300-day	779	4.7%	4.85	69%	66%	1.4%	11.1%	1.55
P/B, Size, Short & Long Trend deviations	779	5.4%	5.23	72%	60%	1.5%	11.2%	1.68
P/B, Size, VEPQ, Short & Long Trend deviations	779	7.6%	7.95	81%	55%	2.1%	10.1%	2.68

MSCI US

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-day averages	570	2.9%	2.06	58%	75%	0.7%	12.7%	0.59
50-, 100-, 150-, 200-, 300-day averages	570	0.2%	0.18	52%	49%	0.1%	16.7%	-0.03
1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200-, 300-day	570	2.3%	1.44	56%	64%	0.6%	15.3%	0.38
FF, VE, 1-, 3-, 5-, 10-, 20-day averages	570	4.3%	2.91	64%	57%	0.9%	11.7%	0.88

MSCI EUROPE

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-day averages	520	3.6%	3.41	60%	78%	1.0%	11.5%	1.05
50-, 100-, 150-, 200-, 300-day averages	520	2.5%	0.99	54%	45%	0.4%	16.1%	0.23
1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200-, 300-day	520	4.1%	2.78	58%	67%	0.9%	13.1%	0.83
FF, VEPQ, 1-, 3-, 5-, 10-, 20-day averages	520	5.5%	3.64	70%	51%	1.3%	13.8%	1.13

MSCI AUSTRALIA

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-day averages	75	2.6%	1.64	55%	71%	0.6%	13.6%	0.45
50-, 100-, 150-, 200-, 300-day averages	75	1.0%	0.52	50%	47%	0.2%	16.8%	0.08
1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200-, 300-day	75	3.6%	2.04	55%	63%	0.9%	16.8%	0.57
Size, Long + Short TF	75	3.1%	1.94	53%	62%	0.9%	17.4%	0.54
Size, VEP, Long + Short TF	75	3.6%	2.78	63%	60%	1.1%	15.5%	0.83

MSCI JP

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-day averages	345	-0.2%	0.10	52%	75%	0.0%	11.5%	-0.03
1-, 3-day averages	345	1.2%	1.45	52%	75%	0.4%	10.5%	0.40
FF, V, 1-, 3-day averages	345	4.9%	3.94	67%	37%	1.2%	12.2%	1.24

Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Asia ex Japan; Test period: Dec 2002 – June 2013. VEPQ are the JPM Value, Earnings, Price, and Quality family factors for Asia.

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Global Emerging Markets

The original Han & Zhou Trend Factor (using 12-month look-back) appears in the first row. The results for GEM are very similar to Asia ex Japan, perhaps a little better. We also combine these with the Fama-French and JPM alpha (VEPQ) factors.

In GEM the results are a little better than in MSCI AxJ

Figure 39: Trend factor in MSCI GEM (the circled results are shown in the charts below)

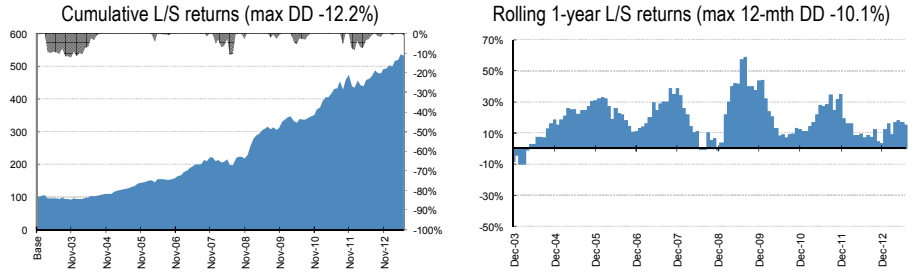
Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-day averages	779	3.4%	3.91	64%	78%	1.1%	11.4%	1.22
50-, 100-, 150-, 200-, 300-day averages	779	3.5%	2.81	62%	49%	0.9%	13.0%	0.84
1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200-, 300-day	779	4.7%	4.85	69%	66%	1.4%	11.1%	1.55
P/B, Size, Short & Long Trend deviations	779	5.4%	5.23	72%	60%	1.5%	11.2%	1.68
P/B, Size, VEPQ, Short & Long Trend deviations	779	7.6%	7.95	81%	55%	2.1%	10.1%	2.68

Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI GEM; Test period: Dec 2002 – June 2013. VEPQ are the JPM Value, Earnings, Price, and Quality family factors from our Q-Score.

In GEM, there is a very strong and consistent performance through the test period using both the original Han & Zhou shorter-term trend deviations and also adding the long-term periods (very similar to the Asia ex Japan experience).

The third test from the table above... Sharpe of 1.55

Figure 40: TF using both SHORT & LONG trend deviations in MSCI GEM

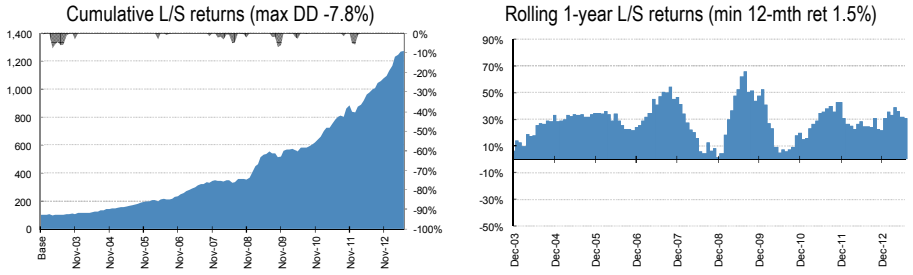


Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI GEM; Test period: Dec 2002 – June 2013.

When we add fundamental factors to the TF, the result is a very consistent alpha performance throughout.

The last test from the table above… Sharpe of 2.68

Figure 41: TF using SHORT & LONG term trend deviations AND Fama-French / VEPQ factors



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI GEM; Test period: Dec 2002 – June 2013. VEPQ are the JPM Value, Earnings, Price, and Quality family factors from our Q-Score.

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United States

The original Han & Zhou Trend Factor (using 12-month look-back) appears in the first row. The long-term trends are not are useful in the U.S., so we only use the short-term trends and go on to combine them with the Fama-French and JPM alpha factors (but for Value in the U.S., we use Free Cash Flow yield, and we omit our Price and Quality factors, which are not useful in large-cap U.S.).

In the U.S., the longer term trend deviations don't add as much alpha

For comparison, we show static blends of Price momentum and reversion

Figure 42: Trend factors in MSCI US (the circled results are shown in the charts below)

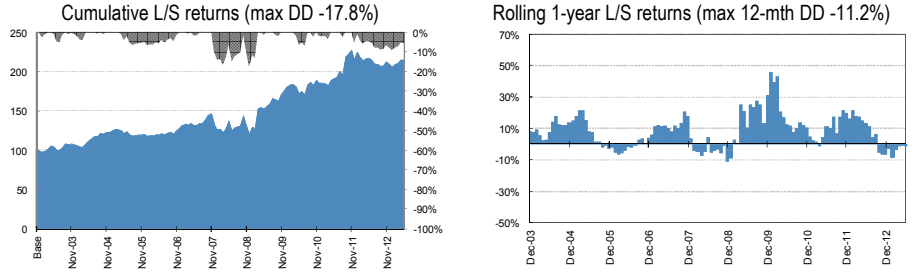
Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-day averages	570	2.9%	2.06	58%	75%	0.7%	12.7%	0.59
50-, 100-, 150-, 200-, 300-day averages	570	0.2%	0.18	52%	49%	0.1%	16.7%	-0.03
1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200-, 300-day	570	2.3%	1.44	56%	64%	0.6%	15.3%	0.38
FF, VE, 1-, 3-, 5-, 10-, 20-day averages	570	4.3%	2.91	64%	57%	0.9%	11.7%	0.88
For reference:								
Static Pmom 12-month & Preversion 1-month (75:25)	570	0.6%	-0.44	51%	26%	-0.2%	19.4%	-0.24

Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI US; Test period: Dec 2002 – June 2013. VE are the JPM Value and Earnings family factors for the US – as per the Q-Score, but Value for the US is **Free Cash flow yield**.

The results are not as good as those in the original paper by Han & Zhou, but we are testing in a predominantly large-cap universe (MSCI constituents) compared to their deeper U.S. universe, so we would expect the alpha to be less. Even still, for a purely price-based factor, the results in large-cap U.S. are impressive.

The first test from the table above… Sharpe of 0.59

Figure 43: TF using SHORT-term trend deviations (1-, 3-, 5-, 10-, 20-day) in MSCI US

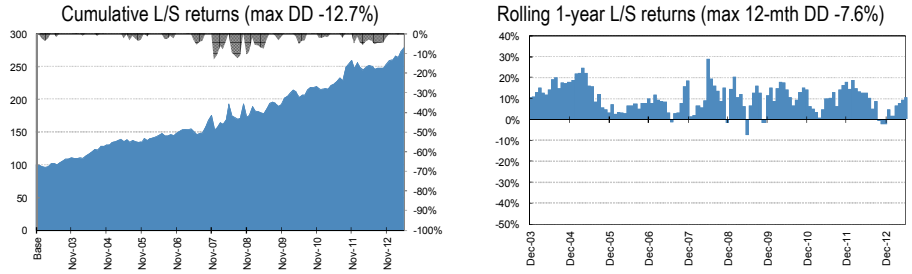


Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI US; Test period: Dec 2002 – June 2013.

The test when combining the Han & Zhou Trend Factor with Fama-French and our JPM Value and Earnings factor is below. It produces a very stable L/S index when compared to these factors combined statically.

The fourth test from the table above… Sharpe of 0.88

Figure 44: TF using the short-term trend deviations AND Fama-French / VE factors in MSCI US



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI US; Test period: Dec 2002 – June 2013. VEP are the JPM Value and Earnings family factors for the US – as per the Q-Score, but Value for the US is **Free Cash flow yield**.

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Europe

The original Han & Zhou Trend Factor (using 12-month look-back) appears in the first row. It turns out that the long-term trend deviations are also not useful in Europe, so we stick to the short-term ones in the original TF. We also go on to combine these with the Fama-French and JPM alpha factors.

Figure 45: Trend factor in MSCI Europe (the circled results are shown in the charts below)

Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-day averages	520	3.6%	3.41	60%	78%	1.0%	11.5%	1.05
50-, 100-, 150-, 200-, 300-day averages	520	2.5%	0.99	54%	45%	0.4%	16.1%	0.23
1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200-, 300-day	520	4.1%	2.78	58%	67%	0.9%	13.1%	0.83
FF, VEPQ, 1-, 3-, 5-, 10-, 20-day averages	520	5.5%	3.64	70%	51%	1.3%	13.8%	1.13
For reference:								
Static Pmom 12-month & Preversion 1-month (50:50)	520	1.9%	0.36	51%	56%	0.1%	14.4%	0.03
Static Pmom 12-month & Preversion 1-month (75:25)	520	3.5%	0.89	60%	26%	0.5%	20.2%	0.17
Static VEPQ model (Q-Score)	520	2.7%	0.81	63%	40%	0.3%	12.2%	0.19

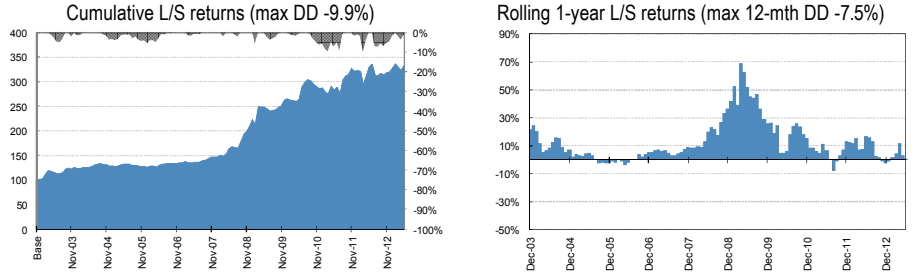
Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Europe; Test period: Dec 2002 – June 2013. VEPQ are the JPM Value, Earnings, Price, and Quality family factors for EU, but Value is simply historical **P/E**.

In Europe, the longer-term trend deviations don't add alpha – we stick with the original Han & Zhou Trend factor

For comparison, we show static blends of Price momentum and reversion, and our VEPQ model.

In Europe, there is a strong period of performance around 2008/09. As fundamentals in the region were breaking down and volatility was increasing, the trend deviation factor performed much better than fundamental factors.

Figure 46: TF using only SHORT trend deviations (1-, 3-, 5-, 10-, 20-day) in MSCI Europe

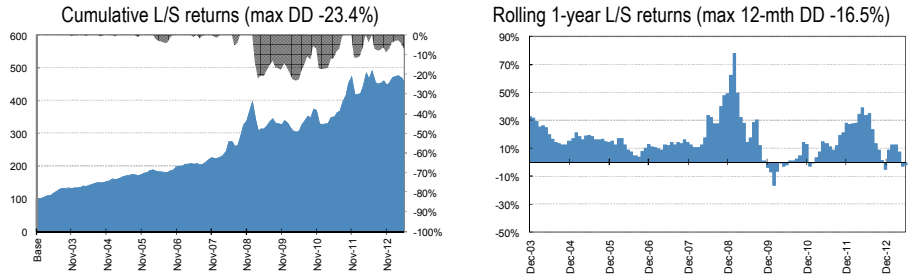


Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Europe; Test period: Dec 2002 – June 2013.

The first test from the table above… Sharpe of 1.05

When we add fundamental factors to the TF the result is a much more consistent alpha performance - prior to 2008, as well. However, the Price factor we use adds a bigger drawdown in March 2009.

Figure 47: TF using only SHORT-term trend deviations AND Fama-French / VEPQ factors



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Europe; Test period: Dec 2002 – June 2013. VEPQ are the JPM Value, Earnings, Price, and Quality family factors for EU, but for Value we simply use historical **P/E**.

The fourth test in the table above... Sharpe of 1.13

The increased volatility was due to drawdown to price momentum in March 2009

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Australia

The original Han & Zhou Trend Factor (using 12-month look-back) appears in the first row. In Australia, the results were broadly good, but there was a significant drawdown recently. We only have about 70-80 names in the MSCI Australia universe on average, and we think the factor might perform better if we tested it deeper into the S&P indices.

In Australia, only the short-term trends worked better than the long, but using them both worked best

Figure 48: Trend factors in MSCI Australia (the circled results are shown in the charts below)

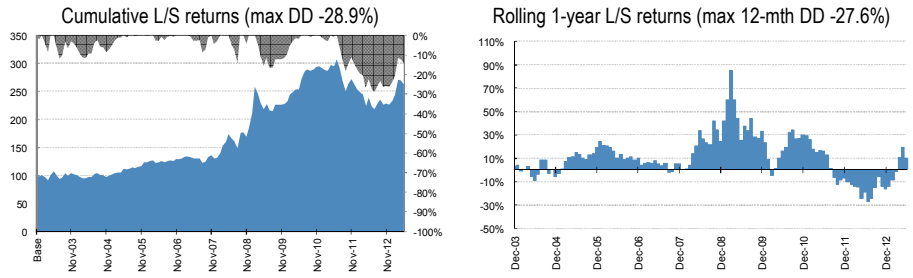
Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-day averages	75	2.6%	1.64	55%	71%	0.6%	13.6%	0.45
50-, 100-, 150-, 200-, 300-day averages	75	1.0%	0.52	50%	47%	0.2%	16.8%	0.08
1-, 3-, 5-, 10-, 20-, 50-, 100-, 150-, 200-, 300-day	75	3.6%	2.04	55%	63%	0.9%	16.8%	0.57
Size, Long + Short TF	75	3.1%	1.94	53%	62%	0.9%	17.4%	0.54
Size, VEP, Long + Short TF	75	3.6%	2.78	63%	60%	1.1%	15.5%	0.83

Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Australia; Test period: Dec 2002 – June 2013. V, E and P are the JPM Value, Earnings and Price family factors.

The longer-term trend factors did not work well on their own, but they did add alpha when combined with the short-term trends.

The third test in the table above… Sharpe of 0.57

Figure 49: TF using both LONG and SHORT term trends in MSCI Australia

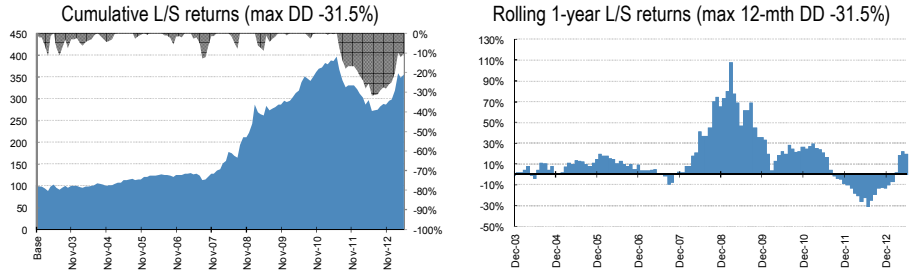


Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Australia; Test period: Dec 2002 – June 2013.

The test when combining the LONG- and SHORT-term trend deviations with only Size from Fama-French and only Value/Earnings/Price from our own alphas is below. We have noticed before that B/M and our Quality factor do not really work in Australia, and so were a drag on the performance of the Trend Factor tested with fundamentals.

The last test in the table above… Sharpe of 0.83

Figure 50: TF using both LONG and SHORT term trends AND Size / JPM VEP in MSCI Australia



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Australia; Test period: Dec 2002 – June 2013. V, E and P are the JPM Value, Earnings and Price family factors.

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Japan

The original Han & Zhou Trend Factor (using 12-month look-back) appears in the first row. Japan was the only region where this factor did not work "out of the box." We see no value added by any of the longer-term trend deviations and factor in only the 1- and 3- day averages. We then combine these with the Fama-French factors and only the JPM Value factor because there is no momentum effect in Japan, nor do our Earnings or Quality factors perform.

Figure 51: Trend factors in MSCI Japan (the circled results are shown in the charts below)

In Japan, only the very short-term trend deviation worked

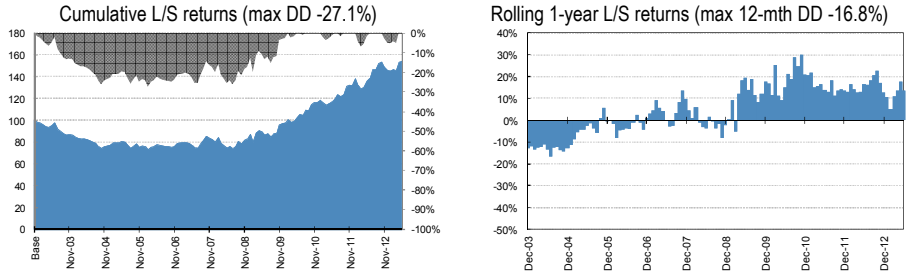
Description	Avg Stocks	Avg IC	T-Stat	Hit Rate	Turn Over	Mthly L/S	StdDev p.a.	Sharpe p.a.
1-, 3-, 5-, 10-, 20-day averages	345	-0.2%	0.10	52%	75%	0.0%	11.5%	-0.03
1-, 3-day averages	345	1.2%	1.45	52%	75%	0.4%	10.5%	0.40
FF, V, 1-, 3-day averages	345	4.9%	3.94	67%	37%	1.2%	12.2%	1.24

Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Japan; Test period: Dec 2002 – June 2013. V is the JPM Value family factor.

Only the 1- and 3-day trend deviations seemed to work at all in Japan, a market that is notoriously short-term mean-reverting (we weren't expecting any alpha at all in this market).

Figure 52: TF using short-term trend deviations (1-, 3-day) in MSCI Japan

The second test in the table above… Sharpe of 0.40

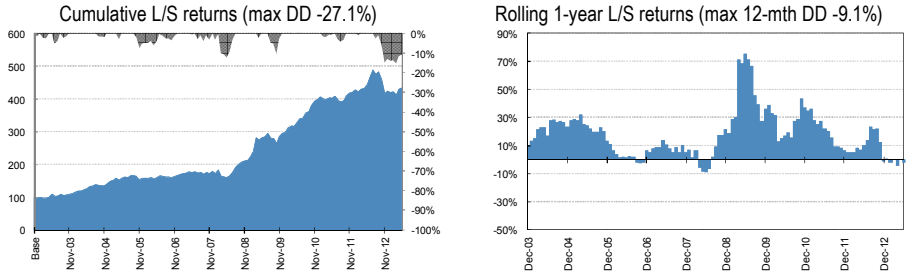


Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Japan; Test period: Dec 2002 – June 2013.

The test when combining the 1- and 3-day trend deviations with Fama-French and our JPM Value is below. (None of our other alpha factors work well in Japan.)

Figure 53: TF using the 1-, 3-day trend deviations AND Fama-French / JPM Value in MSCI Japan

The last test in the table above… Sharpe of 1.24



Source: J.P. Morgan Quant, MSCI Barra, FactSet. Universe: MSCI Japan; Test period: Dec 2002 – June 2013. V is the JPM Value family factor.

Disclosures

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Harnessing Geographic Revenue Exposure

Implications for Stock Selection

- The global revenue exposure of US firms has been receiving greater attention—we estimate nearly 40% of the market cap of the Russell 1000 can be tied to foreign revenue. US trade as a % share of GDP has tripled in the last 40 years, and the revenue growth of US multinationals and their affiliates is much faster than the growth in domestic revenues.
- Empirical analysis shows that the relationship of individual US stock returns and that of the World ex-US market is time-varying. Its strength is likely related to the economic cycle and post-recession recovery. Evidence suggests that stocks responsive to World ex-US markets in periods of stronger linkage are also likely to have higher global revenue exposure.
- US firms with higher foreign/global revenue exposure are concentrated, by order, in IT, Materials, Industrials, Healthcare, and Consumer Staples. Compared to their Local counterparts, Global firms have lower financial leverage and credit risk. They tend to be more efficient users of assets and to provide higher returns on assets and equity. Their earnings growth has been higher than that of their Local counterparts since 2005, though the earnings growth gap has shrunk lately, possibly due to US growth staying stable while the rest of the world has slowed.
- Additionally, earnings surprises tend to be bigger for Global companies compared to Locals—this holds for almost all sectors. We conjecture that their complexity makes earnings less predictable. This is an area of research we plan to explore further.
- Of all the forms of country/regional momentum—economic growth, equity strengthening, currency appreciation, yield curve steepening—we find that country/regional equity momentum has been most effective for alpha generation. We believe that the country/regional underlying equity momentum exhibits a "pass-through effect" via a stock's geographical revenue exposure onto its respective stock returns.
- Shorter term (one- to three-month) momentum strategies have yielded the strongest results, with information coefficients of ~2.0%, statistically significant IRs between 0.6 and 0.9, and hit rates of ~57%. The strategies have exhibited even greater effectiveness post financial crisis period.
- These momentum strategies may also be of interest to long-only managers. The long leg of the strategy yielded a Sharpe Ratio of 0.6 and 1.0 versus equal- and cap-weighted benchmarks, respectively.

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Background: Local, Global, and Complicated

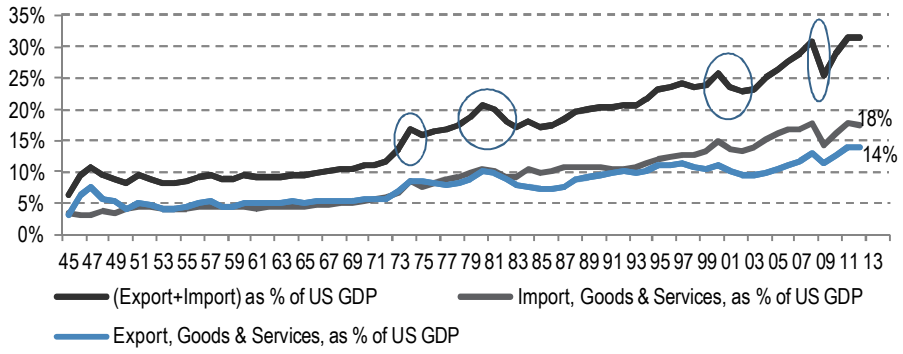
Exports plus imports were a relatively stable share of GDP at around 10% between 1945 and 1970. Since then their combined share has jumped to over 30% of GDP.

This report examines the importance of international exposure as a factor in explaining the cross-sectional performance of US stocks.[1] This topic has been receiving greater attention in recent years as the US economy has become increasingly global.

In the post-War period, the share of external trade in the economy has steadily increased from less than 10% of US GDP in 1945 to over 30% of GDP in 2012 (see Figure 1). The uptrend was fairly mild prior to 1970, but since then the globalization momentum has accelerated, outpacing the growth in the overall economy. The exceptions are the periods around recessions, particularly those of 1981-83, 2001, and 2008-2009, when external trade contracted more than net domestic activity. Because selling abroad is more complicated than selling at home, it is not surprising that US export sales are concentrated in a relatively small number of firms.

In fact, of the nearly $1,320 billion in exports by 302,260 US firms in 2011, $880 billion of the exports (67%) were accounted for by just 6,666 large firms (2% of the firms). Large firms are defined as those employing more than 500 or more workers.[2]

Figure 1: US Goes Global: Share of Foreign Trade in the Economy Up About 3-folds Since 1970



Source: Bureau of Economic Analysis (BEA), J.P. Morgan Quantitative and Derivatives Strategies.

Multinational sales have grown faster than the typical domestic firm between 1997 and 2010. Sales growth of majority-owned foreign affiliates has grown even faster than the parent multinational.

What are the investment implications of this trend? For one, economists have long suspected that firms with higher exposure to international markets are likely to be more productive than firms that are primarily domestic in nature, and recent empirical research seems to support this view (see for instance Mataloni Jr. (2011).[3]

Indeed, as we show in the next section, on average, asset turnover is higher for firms with international exposure compared to those that primarily cater to the domestic market. Secondly, it is reasonable to expect that US companies' international exposure will continue to intensify in the foreseeable future.

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[1] The authors wish to thank Narendra Singh and Chuanxin Li of J.P. Morgan Securities for their contributions to this report.
[2] "A Profile of U.S. Importing and Exporting Companies, 2010 – 2011," U.S. Census Bureau News, April 5, 2013.
[3] "The Productivity Advantage and Global Scope of U.S. Multinational Firms," Mataloni Jr., R.J., U.S. Bureau of Economic Analysis, BEA Working Paper WP2011-02, July 2011.

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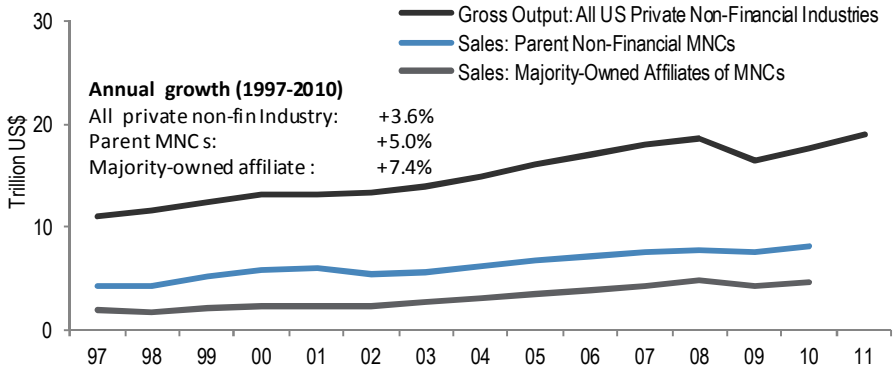
Figure 2 uses top-down data to show that the growth rate of parent multinationals' sales has outpaced the growth in overall corporate sales growth in the US. More importantly, despite the recent setback in Europe, the sales growth trend for foreign affiliates of the multinationals has been almost 50% faster than that of overall corporate sales growth, with a compound annual growth rate of 7.6% for foreign affiliates compared to a 5.0% CAGR for parent multinationals over the period 1997 to 2010. Thus, investors in Multinational Corporations (MNCs) have been indirect beneficiaries of faster top-line revenue growth outside the US.

Figure 2: Sales of MNCs and Majority-Owned Affiliates: Growing Faster Than Domestic Economy



Note: Non-financial industries are all private businesses in the US excluding finance (depositary & non-depositary institutions), insurance, real estate, rental, and leasing. It includes listed as well as private corporations and other types of business establishments. A U.S. Multinational Company (MNC) comprises a U.S. parent company and its foreign affiliates. The parent is any company that owns 10% or more of the voting securities, or the equivalent, of a foreign business enterprise. A US parent comprises the domestic operations of a US MNC. The majority owned affiliates are those for which combined ownership of all US parents exceeds 50%. In 2008, these affiliates accounted for 85.2% of employment of all foreign affiliates.
Source:Bureau of Economic Analysis (BEA), J.P. Morgan Quantitative and Derivatives Strategies.

One important caveat applies to our positive view of multinationals' revenue growth—a significant proportion of the profits of the affiliates of the MNCs is held as cash abroad. To get some sense of how much US foreign profits are retained abroad, Figure 3 shows foreign retained earnings as a fraction of all non-financial corporate profits before tax. Even as corporate profits reached record high, retained foreign earnings have kept pace with their ratio, hovering around 20% of total profits.

It is difficult to judge what the likely impact of retained foreign earnings (flow as well as accumulated undistributed earnings) is on valuations and stock prices of MNCs. A 2012 J.P. Morgan study (*Global Tax Rate Makers, Undistributed Foreign Earnings Top $1.7 Trillion; At Least 60% of Multinational Cash Is Abroad*, 16 May 2012) noted that the effectively lower taxes paid by MNCs in the US could benefit their stocks but went on to caution that there was a great deal of uncertainty about US federal tax policy that could have material impact on this hypothesis going forward. Quoting from the above mentioned report (see page 5 of the report):

"*Any material change to the status-quo U.S. federal tax policy regarding the taxation of domestic companies could have material consequences for these companies. Examples of potentially favorable events include any successful efforts by Congress and the President to reduce the federal corporate tax rate (various proposals have called for it to move from 35 percent to more favorable rates in the range of 23 percent to 29 percent). Potentially negative events for these companies might include any efforts by the U.S. Federal Government to increase the corporate tax rate or wide-scale increases in state and local taxes.*"

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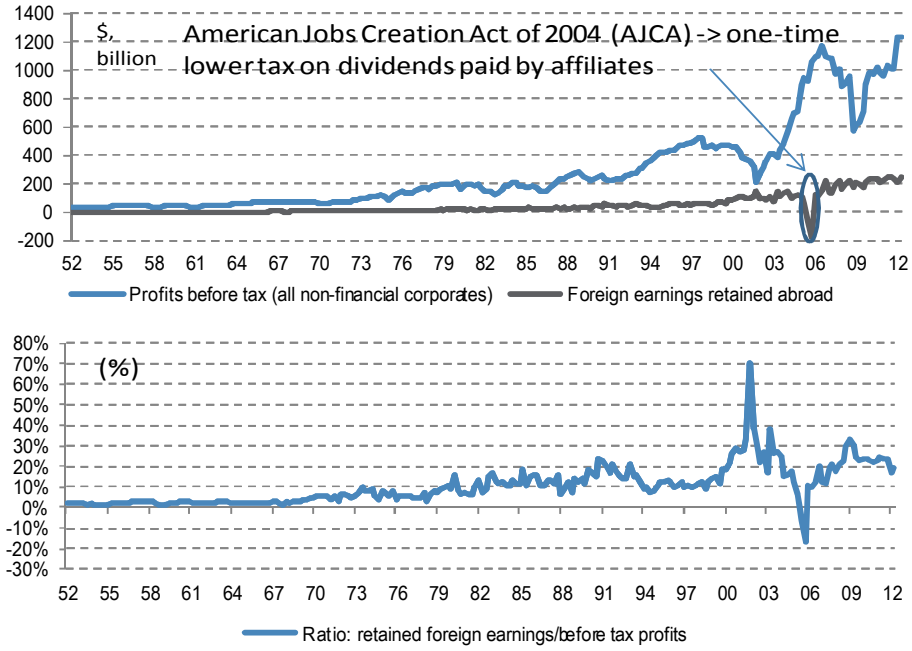
Figure 3: Foreign Retained Earnings: Tax Rates Matter



Source:Bureau of Economic Analysis (BEA), J.P. Morgan Quantitative and Derivatives Strategies.

The discussion so far suggests that a portfolio of global US companies is likely to have a *long-term strategic* relative return advantage over a portfolio of local counterparts. However, we have said little on the *tactical* performance of such a global portfolio. A reasonable hypothesis is that the tactical short-term to medium-term performance will be linked to a) the size and the regional composition of the foreign exposures of the companies and b) the profitability of foreign operations relative to local US operations. The second factor can possibly be captured by the momentum of the foreign stock market index.

From an investment perspective there also remains the question of alpha decay. For instance, will an investor be able to take advantage of the opportunity before the information about the global exposure is fully reflected in the stock prices? These are empirically testable hypotheses that are examined in the remaining sections.

The remainder of the report is in three sections. In the first section, we present empirical analysis to show the relationship among a stock's geographic sales exposure, the stock's return, the US stock market's return, and the World ex US stock market's return. In the second section we characterize global companies in our universe using various factors such as valuations, quality, profitability, and earnings growth to see what makes them interesting as a group. Finally, in the third section we present a global market momentum-based strategy for stock selection relying on the stocks' geographic sales exposure.

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Data Description

In order to balance the need of investors for as much detailed information as possible and the need to keep the regulatory burden reasonable, FASB Statement 131 gives companies wide latitude on the organization and depth of data on geographic segments they need to report. The result is a very heterogeneous classification of geographic segments and the details of data reported.

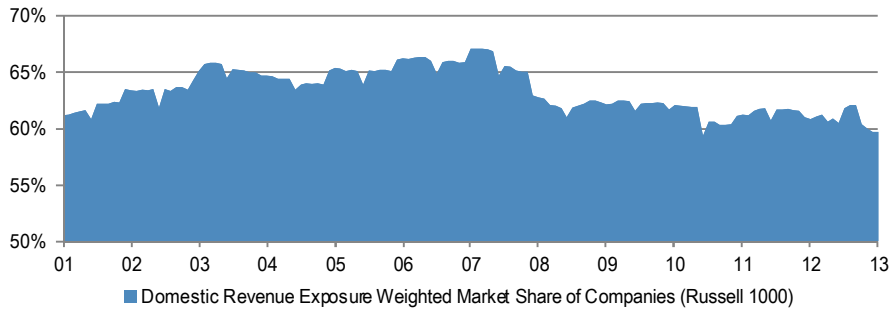
Long-term data on geographic segments is relatively short. From an accounting perspective FASB Statement 14, put in effect 12/1976, required firms to report "*revenues, profitability, identifiable assets, and other related disclosures*" by geographic basis for "*companies having foreign operations and export sales.*" FASB 14 was superseded by FASB Statement 131 (12/1997), which was more specific on the geographic segment reporting requirements. In particular, "*all public business enterprises report information about the revenues derived from the enterprise's products or services (or groups of similar products and services), about the countries in which the enterprise earns revenues and holds assets, and about major customers regardless of whether that information is used in making operating decisions. However, this Statement does not require an enterprise to report information that is not prepared for internal use if reporting it would be impracticable.*" Please see Appendix for summaries of the FASB Statements.

The Statement tries to balance the need for information by investors versus the regulatory burden on the company. A quick scan of the actual data reported by companies (either in 10-K reports or on vendor platforms like Bloomberg or S&P Capital IQ, the two sources we tapped into) shows that there is huge variation in the organization as well as the depth of data reported. For this study we went through the time series data of geographic segmentation company by company in the Russell 1000 universe. We mapped reported geographic distribution of sales into various regions whenever information was provided by the vendor or the company. While we are confident that the data is accurate at an aggregate level (US versus non-US), the level of approximation increases at the more disaggregated levels. For instance, a company may only report sales to Asia without splitting it into Japan and Asia ex Japan. In such situations, we used relative market capitalization of Japan and Asia ex Japan to share out the Japan revenue of the company. In our analysis we have mostly used data at the most aggregated level as was possible. Nonetheless, occasionally we have used regional data, and the reader should be aware that the revenue data is approximate and may add noise to the estimates.

Investors will pay increasing attention to analyzing a firm's geographic exposure. We estimate that nearly 40% of the market capitalization of the Russell 1000 and S&P 500 can be mapped to foreign revenues.

In any case we believe that there will be increasing clamor for good geographic decomposition as the globalization trend continues. Indeed, by our estimate, nearly 40% of market capitalization of the Russell 1000 and S&P 500 is attributable to foreign sales. Figure 4 shows the domestic revenue exposure weight market share of Russell 1000 companies. The domestic share has dropped from over 65% before the financial crisis to less than 60% at the beginning of this year, in part also driven by the large fall in the value of the financials sector, which has a high local revenue concentration

Figure 4: Market Cap Attributable to Domestic Sales Has Declined



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

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Geographic Exposure Matters, but When?

Geographic exposure is just one of the many factors driving stock returns, and its importance is likely to be time varying.

However, stocks with returns that are more responsive to World ex US index returns should likely have high foreign exposure.

When does geographic exposure matter for US stock returns? Two hypotheses come to mind.

One, we should not expect investors to focus on the geographic exposure factor all the time. Their interest in Global stocks (companies with high non-US revenue exposure) could wax and wane due to many reasons. For instance, if the US stock market is doing well, they may not pay much attention to Global stocks even if World ex US has also done well. On the other hand, if the US economy has slowed and the stock market has not done well, they may be keen to get global exposure for diversification reasons even if rest of the World has also contracted with the US. At any point in time many other factors are vying for attention (valuation and growth to name two) as drivers of returns, and it may be difficult to even identify the importance of geographic exposure as an important factor.

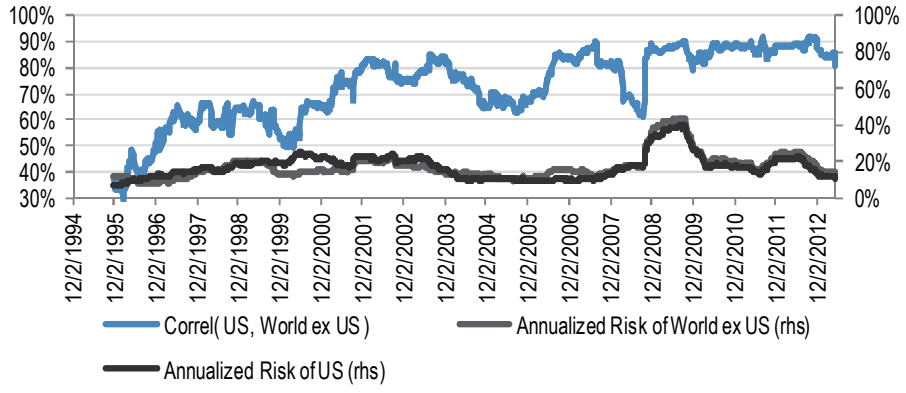
Two, within the cross-section of the market, with all other factors equal, stocks that are more responsive to developments in the World ex US are more likely to be from Global companies.

Time-Varying Effect of Geographic Exposure

One way to start addressing these hypotheses is to examine the rolling return correlation between the US and World ex US markets. While stock markets are less than perfect substitutes for the real economy (including real growth and real exchange rate) they do serve as the most timely (albeit noisy) indicator of expectations about future growth in the US and rest of the world.

Figure 5 shows that over the last 20 years or so, the overall correlation trend has been an upward one. It also shows that the rolling correlation between the US and rest of the world tends to drop during bull markets (1998-2000, 2003-2006) and rise during bear markets (2001-2002, 2007-2009). This is not surprising since equity markets get correlated when flows are synchronized, which happens more frequently in bear or risk-off markets. In a sense, during these episodes the markets are signaling "all of us are trouble." Interestingly, the recent period (2010-2012) appears anomalous in that we see little drop in correlation despite a resilient bull market since early 2009.

Figure 5: On the Rise: Correlation Between US and World ex US Equity Markets



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

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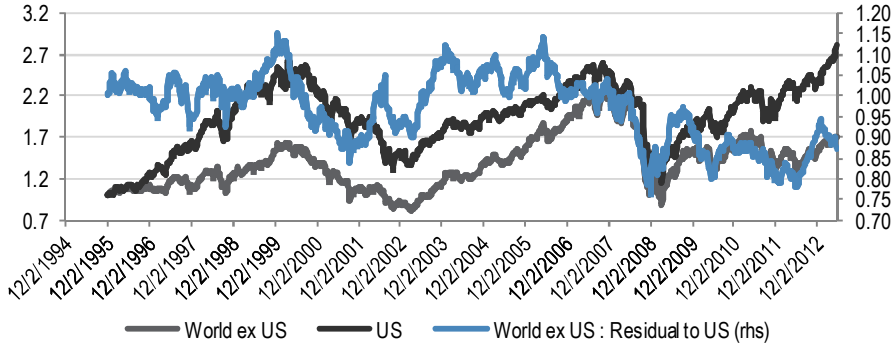
The rising correlation between the markets is consistent with the increasing globalization of the world trade and capital flows. As mentioned in the last section, multinationals, particularly those in the technology sector, have experienced a steady rise in the share of overseas sales and profits as a percentage of their total sales and profits respectively. The increasing integration of the US corporate sector into the global economy can be interpreted as a by-product as well as a necessary driver of globalization.

Given the relatively high correlation between US market returns and World ex US market returns we cannot ignore the fact that multi-collinearity will make interpreting the responsiveness of individual US stock returns to these two difficult. In order to isolate the effect solely attributable to the World ex US market without the US influence, we employed a simple two-step regression framework where World ex US returns were first projected on the US returns. The residual returns are, by construction, orthogonal to those of the US market returns. In the second step, each stock's return is explained by the US market return and the World ex US residual return. Figure 6 displays the residual returns from the first regression.

Figure 6: Cumulative Returns: World ex US Residuals (Orthogonal to US), US, World ex US



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

The following equations were estimated. The base case is the regression of individual equities' stock returns to the overall domestic market. Please note that all returns are monthly returns and the regression was done over the history of the previous three years on a rolling basis.

Base: $r(i,t) = \alpha_i + \beta_{US,i} r_{US}(t) + \epsilon(i,t)$ i = stocks in Russell 1000

Second, we expand the base model with an additional variable, which is the component of World ex US returns that is orthogonal to US returns. The reason we forced it to be orthogonal is that, as shown previously, World ex US returns and US returns tend to co-move.

$$\text{Extended: } r(i,t) = \alpha_i + \beta_{US,i} r_{US}(t) + \beta_{WorldexUS_i} \hat{r}_{WorldexUS}(t-1) + \eta(i,t)$$

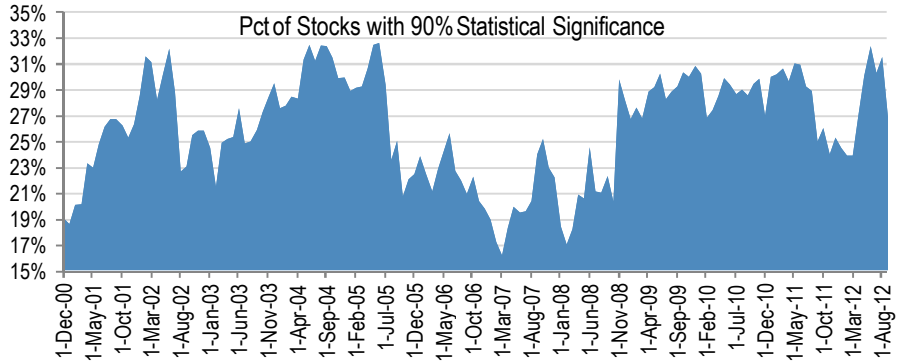
where $\hat{r}_{worldExUS}(t)$ is the residual derived from a second regression

$$\hat{r}_{worldExUS}(t) = r_{worldExUS}(t) - \mu - \theta_{US} r_{US}(t)$$

A comparison of Base equation and Extended equation was done to evaluate the significance of the increase in explanatory power when the addition of World ex US

residual is added. We carried out an F test with 90% statistical significance for each security and identified which equities are responsive to the addition of the World ex US returns (the extended case) and which equities are not. Figure 7 shows the percentage of equities for which the null hypothesis $\beta_{WorldexUS_i} = 0$ is rejected with 90% level of significance.

Figure 7: % of Russell 1000 Equities for which Null Hypothesis (i.e., World ex US Returns Does Not Explain the Equity's Returns) Is Rejected with 90% Level of Significance



Note: The regressions underlying the hypothesis test are done on a rolling 3-year basis.
Source:Bloomberg, FactSet, J.P. Morgan Quantitative and Derivatives Strategies.

Figure 7 shows the *percentage* of Russell 1000 companies whose return could be explained statistically better with World ex US return and the US return included in the (extended) equation rather than the (base) equation with only the US return included. The proportion of such companies varies from 15% in early 2007 to over 32% in early 2005 and second half of 2012.

Furthermore, Figure 7 confirms our hypothesis that the responsiveness of US stock returns to World ex US is time varying. Note that the responsiveness of the individual US stock returns to World ex US rose from Dec 2000 to mid 2002 as the US went into a tech-led recession and the US and the global stock markets tanked. This was followed by a short period of waning importance of World ex US as an explanatory variable. During the bull market of 2003 to 2005, World ex US gained increasing traction. However, from 2005 to 2008 World ex US was less important as a driver. It is interesting that compared to the period after the tech recession of 2001, the effect of World ex US remains enduring in the current post financial crisis period. One possible explanation is that the global markets have been more disjointed during the latest US market recovery period.

What are the revenue exposure characteristics of stocks whose returns are responsive to World ex US returns? Our second hypothesis was that such stocks are likely to have higher revenue exposure to global markets. To test our hypothesis we created two portfolios: one based on stocks for which the null hypothesis that the World ex US return is not important as an explanatory variable was rejected with 90% statistical significance; the second consisting of stocks that do not reject this hypothesis, i.e. only the US return was a significant in explaining the stock return. Then we took median values of global revenue exposures of these two portfolios and plotted it over time. Figure 8 displays these two lines and the time series of the difference in these values.

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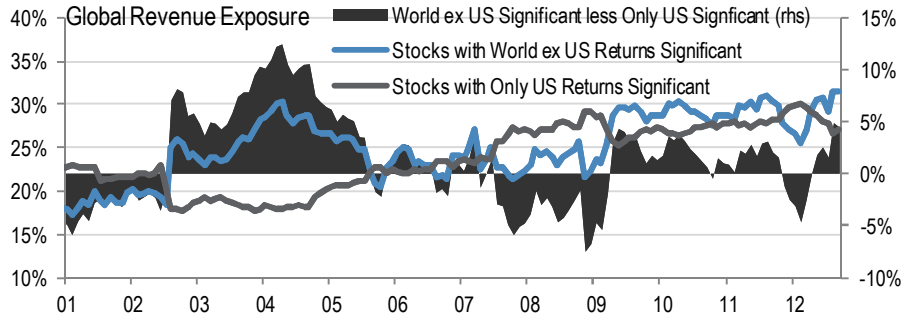
Figure 8: Stocks More Responsive to World ex US Returns Have Higher Global Revenue Exposure in Periods when World ex US Returns Matter More



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

The global revenue spread reveals a dynamic relationship between the exogenous market influence shown in Figure 8 and the revenue exposure of the two portfolios. Two distinct patterns emerge. As the bull market unfolded after the 2001 tech recession, the stocks that were more closely associated with the global market show higher global revenue exposure. Recall from Figure 7 that from 2005 to 2008 (beginning of the financial crisis) the importance of World ex US had faded, and in Figure 8 we also find that the importance of global sales exposure became less significant. However, as the market entered another recession, which was followed by the strong recovery, the global portfolio again showed a similar pattern seen earlier as the gap rose to +5% spread. Although the spread was not as drastic as what could have been expected based on the earlier period, this gap has been sustained until recently.

Empirically we can assert that stocks that have higher global exposures are more likely to be influenced by the global markets. However, this relationship is time-varying and becomes more meaningful during and after a market crisis. We explore this equity linkage through revenue exposure as a trading strategy in the last section of this report.

Characteristics of Global Companies: A Strategic View

We begin by contrasting some long-term characteristics of global (high level of foreign sales) and local (less geographically exposed) firms. The measures reported here may be of interest to investors exploring the possibility of long-term or strategic overweighting or underweighting of global companies compared to local companies. In the medium to short term, using more of a tactical approach would be of greater interest—it is a topic we cover in the next section.

What do global firms look like? As expected, their sector membership is quite skewed. Figure 9 shows the distribution by sector of Russell 1000 companies that report their geographic segments (total of 911 companies in our universe). For purposes of this report, "Global" firms are considered the top one-third of companies when ranked by non-US sales; "Blended" are the middle third by exposure; and "Locals" are the third with the least exposure. There are many ways one can slice and dice the information in this figure. If we just look at the most Global companies, the top five list is dominated by the *Information Technology* (IT) sector, which accounts

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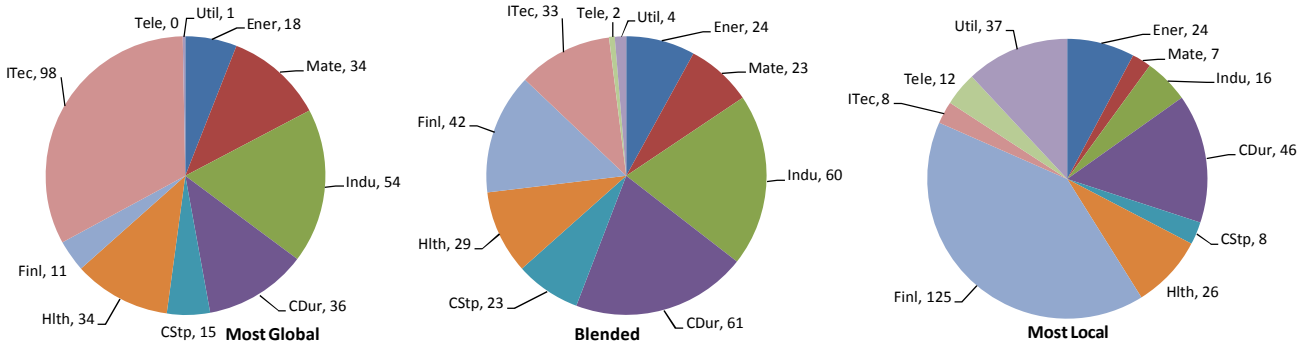
The most globally exposed sectors are Information Technology, Materials, Industrials, Healthcare, and Consumer Staples.

The least globally exposed are Utilities, Telecoms, and Financials. Energy and Consumer Durables are somewhere in between.

for 33% of the Global companies (98 out of 301), the *Industrial* sector accounting for18% of the companies (54 out of 301), followed by *Consumer Durables* (12%), *Materials* (11%) and *Healthcare* (11%). Sectors least represented in the Most Global basket are *Utilities* (0%), *Telecoms* (0%), and *Financials* (4%).

The other way of interpreting the data is to look across the three pies and calculate the percentage of each sector that is most Global. *Information Technology* is still the leader with an amazing 71% of the sector's companies (98 out of 139) qualifying as Global. *Materials* take the second spot with 53% of the sector's companies (34 out of 64) among the Global. Others making the top five by this criterion are *Industrials* (42%), *Healthcare* (38%), and *Consumer Staples* (33%, 15 out of 46). *Telecom* (0%), *Utilities* (2%), and *Financials* (6%) again make up the bottom three sectors. *Energy* (27%) and *Consumer Durables* (25%), while not in the top five, also have considerable global exposure.

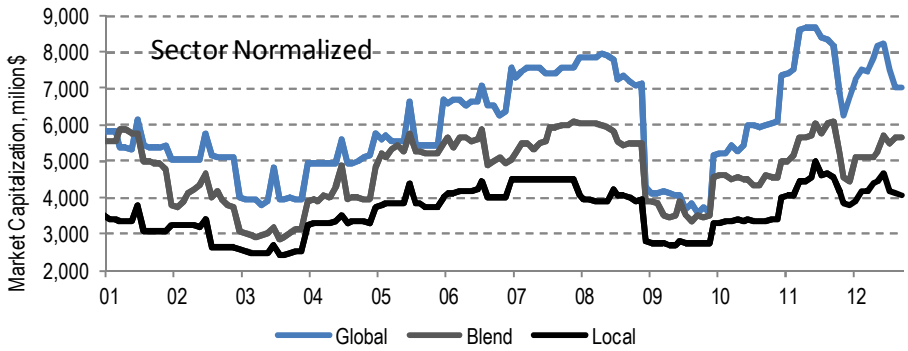
Figure 9: Sector Composition of Companies with High-to-Low Level of Foreign Exposure:by Number of Stocks in Each Sector



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

The median company in the Global basket has a market capitalization approximately 40% higher than the median capitalization of the Blend basket and 60% higher than that of Local basket (see Figure 10). It is a little bit surprising that the size advantage has been fairly persistent over our sample period. As Figure 10 illustrates, except for a brief period in 2005 and 2006 when global median size was briefly edged out by Blended median size, Global firms have consistently enjoyed size advantage. This does not mean there aren't small-cap exporters. However, given the complex logistics and management expertise required to sell abroad, smaller companies are likely to focus on a few markets and their foreign sales are likely to be a small share of their total sales.

Figure 10: Global Companies Have on Average Higher Market Capitalization



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

So far we have observed that globally oriented companies are, on average, larger than their domestic peers and likely to reside in sectors such as IT, Materials, Industrials, Healthcare, and Consumer Staples. How else are they different, if at all? Are they usually expensive or cheap compared to Local counterparts? Are they more or less leveraged? Are they more or less profitable?

To address these questions, we examined 20 selected metrics. Since many of the measures examined can be affected by the sector membership of the firm (for example, price to book is usually higher for IT and consumer staples companies compared to firms in other sectors), we compared the metrics with and without adjustment for sector membership. Figure 11 shows the selected 20 metrics. The top block covers six valuation metrics, followed by three quality factors, four efficiency and profitability factors, three earnings-related factors, and four miscellaneous factors including market cap and market beta.

Figure 11: Average Selected Financial Ratios and Other Metrics:Global versus the Rest

	Sector Normalized Factors			Normalized:	Non-Normalized	Non-Normalized Sector Factors		
	Global	Blend	Local	Global vs Rest	Global vs Rest	Global	Blend	Local
Sales Yield	0.59	0.71	0.61	Expensive	Expensive	0.54	0.75	0.60
Book-to-Price	0.32	0.42	0.41	Expensive	Expensive	0.30	0.37	0.47
Free Cash Flow Yield	3.39%	3.27%	3.65%	Middling	Middling	3.49%	3.78%	3.01%
Forward Earnings Yield	6.24%	6.63%	6.19%	Middling	Expensive	5.93%	6.43%	6.64%
Trailing Earnings Yield	4.60%	5.04%	4.70%	Expensive	Expensive	4.19%	4.79%	5.31%
Dividend Yield	1.56%	2.46%	1.88%	Expensive	Expensive	1.48%	1.59%	2.73%
Accruals/Average Assets	2.99%	3.09%	3.59%	Higher Quality	Middling	3.17%	3.08%	3.29%
Leverage	53	76	68	Lowest	Lowest	49	59	92
Altman Z	2.25	1.73	1.59	Lowest Risk	Lowest Risk	2.32	2.08	1.07
Asset Turnover	0.80	0.61	0.59	Most Efficient	Most Efficient	0.83	0.82	0.37
Return on Assets	6.23	4.45	4.01	Highest Return	Highest Return	6.69	5.31	3.09
Return on Equity	15.60	12.82	12.82	Highest Return	Highest Return	15.24	14.44	12.12
Capex/Depreciation	0.99	1.12	1.06	Low	Low	0.95	1.01	1.25
Earnings Growth	11.55	9.15	11.41	Highest Growth	Middling	11.73	12.08	9.17
Longterm Growth	13.11	11.83	12.46	Highest Growth	Highest Growth	13.86	12.75	11.02
Earnings Surprise	1.11	0.96	0.79	Large Surprises	Large Surprises	1.20	0.96	0.68
Invested Capital	3237	3697	2906	Middling	Low	2817	3091	3634
Total Asset Growth (YoY)	7.63%	6.77%	7.23%	Highest	Highest	8.02%	7.47%	6.71%
Market Capitalization	6003	4685	3590	Largest Cap	Largest Cap	5681	4674	3613
Beta	1.07	0.94	0.95	Highest beta	Highest beta	1.13	1.00	0.88

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

Valuations

Global firms are generally more expensive compared to Local firms, but . . .

On the whole, using sector normalized valuations, global companies appear more expensive than their less adventurous local siblings. For four of the trailing valuations measures the verdict is clear: median Sales Yield, Book-to-Price Ratio, Trailing Earnings Yield, and Dividend Yield are lower (i.e., expensive) for the Global basket whether one uses a raw (non-normalized) or sector normalized approach. We also find that the trailing valuations gap between the expensive Global basket and cheaper Local basket is persistent (see Figure 12 using Book-to-Price as an example; other valuation charts are found in the Appendix).

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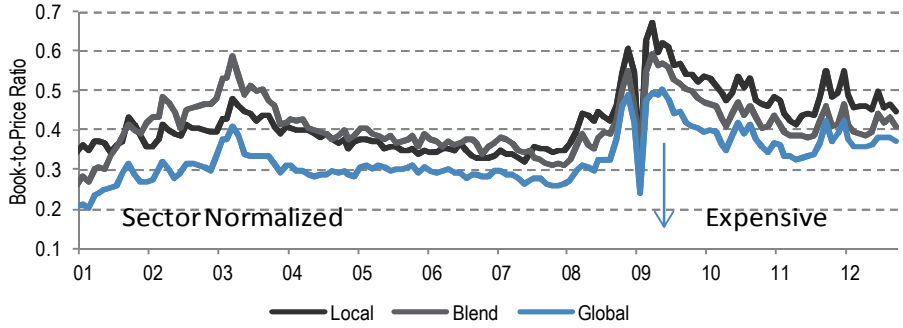
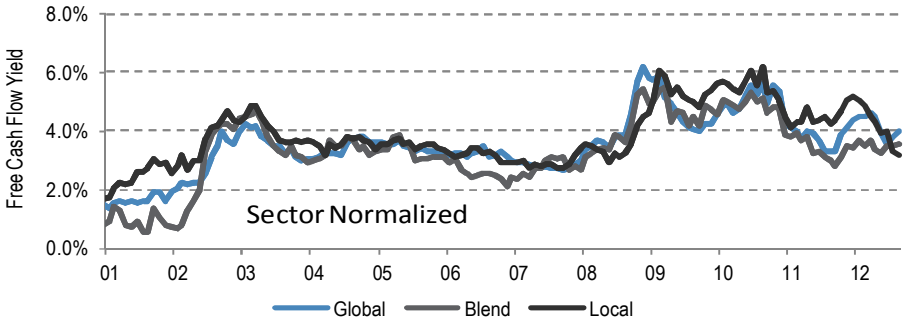
Figure 12: Global Companies Are on persistently Expensive Based on Trailing Valuations



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

However, for the Free Cash Flow Yield and Forward Earnings Yield the valuation gap is not stable. Neither the Global nor the Local basket is consistently cheap or expensive over time based on these two valuation measures (see Figure 13 for Free Cash Flow; Forward Earnings Yield chart is in the Appendix).

Figure 13: Free Cash Flow Yield: Neither Global nor Local Is Consistently Cheap or Expensive



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

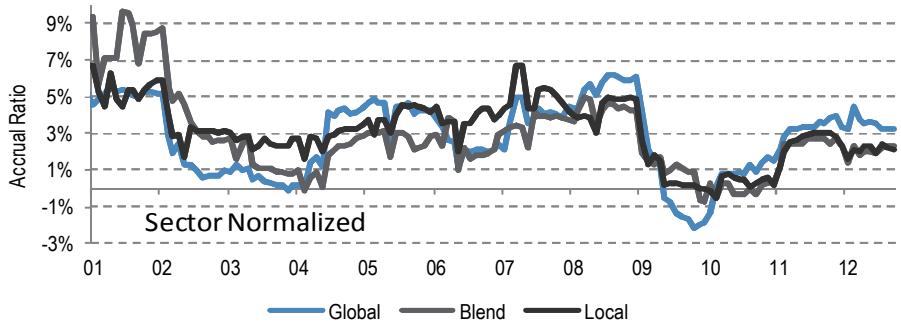
There can be several reasons why valuations for Global basket, irrespective of sector normalization and taking all valuation metrics into account, appear more expensive. In terms of quality, efficiency, and profitability (discussed next), the Global basket appears to be more attractive. So the market might just be assigning a lower risk premium to these stocks. In the case of Sales Yield (please see Appendix) we find that the Global basket became more expensive compared to the Local basket after the 2007 crisis—the Sales Yield premium has become smaller since mid 2011 as the housing crisis began to fade. Another reason could be that investors are pricing in the intangible assets like Intellectual Property (IP) held by a multinational as its most valuable asset. This reason is often cited by academic studies to explain the valuation gap between multinationals and domestic corporations.

Quality, Financial Strength

. . . Global firms are also stronger financially and . . .

Accruals ratio is a commonly used measure of quality—the lower the accruals ratio, the lower the likelihood of a company's revenue and expense recognition being manipulated to massage earnings. In back-tests we have found the accruals ratio to be an efficacious factor for stock selection. Over the entire period, the average accruals ratio for the Global basket is lower than the Blend and the Local baskets. However, as Figure 14 shows the quality advantage is not consistent for the Global basket.

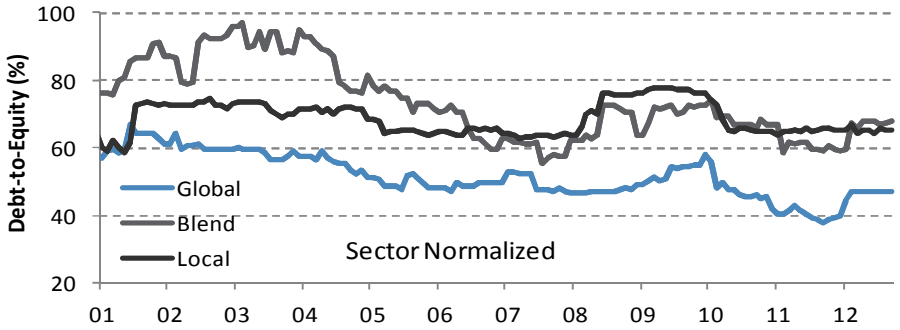
Figure 14: Global Basket Has Slightly Lower Accrual Ratio on Average, but Not Consistently



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

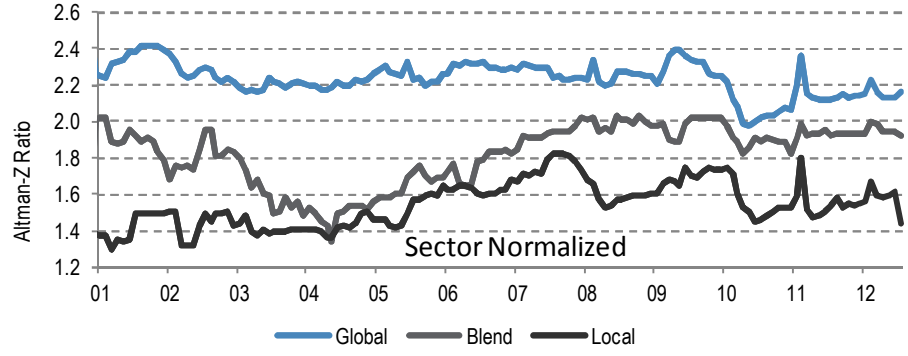
However, two other measures of financial soundness are strongly in favor of the Global basket. Global stocks generally have lower financial leverage (Debt-to-Equity ratio, Figure 15) and higher Altman-Z ratio (Figure 16), both signs of more resilient balance sheets. The lower financial leverage ratio of multinationals could reflect capital structure choices stemming from MNCs' competitive advantage arising from intangible assets (organizational efficiency, knowledge of global markets, access to global capital markets, financial flexibility etc.).[4]

Figure 15: Global Basket Has Consistently Lower Leverage



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

Figure 16: Global Basket Has Higher Altman-Z Ratio – Less Vulnerable to Financial Stress



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

[4] This point is made in a recent paper. See Park S.H., Suh J., Yeung B., "Do multinational and domestic corporations differ in their leverage policies?" *Journal of Corporate Finance,* Volume 20, April 2013, Pages 115-139.

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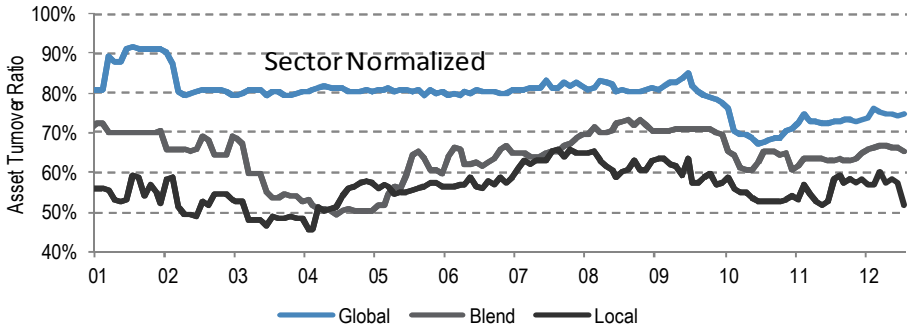
Efficiency, Profitability

. . . Global firms are more operationally efficient and profitable.

Multinationals are more efficient compared to firms that are primarily domestically oriented. For instance, Greene et. al.[5] show that multinationals' capital budgeting is more value enhancing compared to domestic firms based on Tobin's marginal Q (a valuation-type measure defined as the marginal increase in the market value of a firm due to an unexpected marginal increase in assets). Superior managerial talent and stronger corporate governance are cited by the authors as possible reasons for more optimal investment choices made by multinationals. In our investigation we have used Asset Turnover (Sales/Average Assets) to compare Global and Local baskets; Asset Turnover is a measure of efficiency purely based on income and balance sheet items instead of market capitalization and balance sheet items.

Figure 17: Asset Turnover: Global Has Been More Efficient and Resilient, Especially Recently



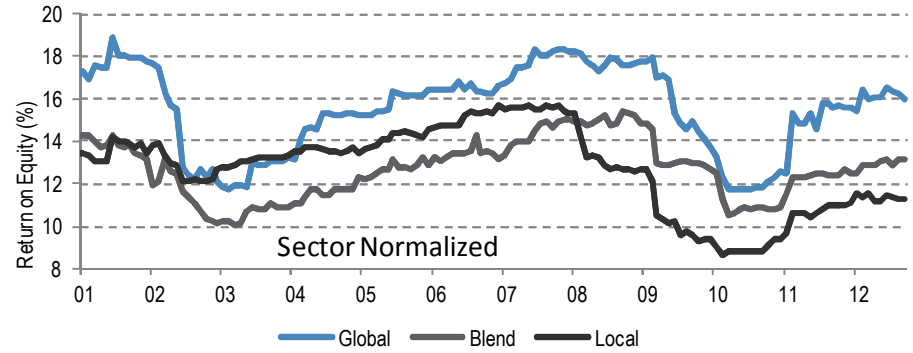
Source:Bloomberg, S&P Capital IQ, J.P. Morgan Quantitative and Derivatives Strategies.

Asset turnover has been consistently stronger for the Global basket. After the financial crisis, the Local basket's turnover recovery remains less robust compared to the Global basket. Exposure to international markets has been a buffer so far for the Global firms, although continued recession in Europe and a slowdown in China are sources of uncertainty going forward for Global firms.

Similarly, as illustrated in Figure 18, Global firms have exhibited higher profitability ratios, such as return on equity.

Profitability ratios are higher for Globally exposed US companies.

Figure 18: Return on Equity: Global Is More Profitable and Robust Compared to Local



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

[5] Greene, William H., Abigail S.Hornstein, and Lawrence J. White, 2009, "Multinationals Do It Better: Evidence on the Efficiency of Corporations' Capital Budgeting," *Journal of Empirical Finance,* 16, 703-720.

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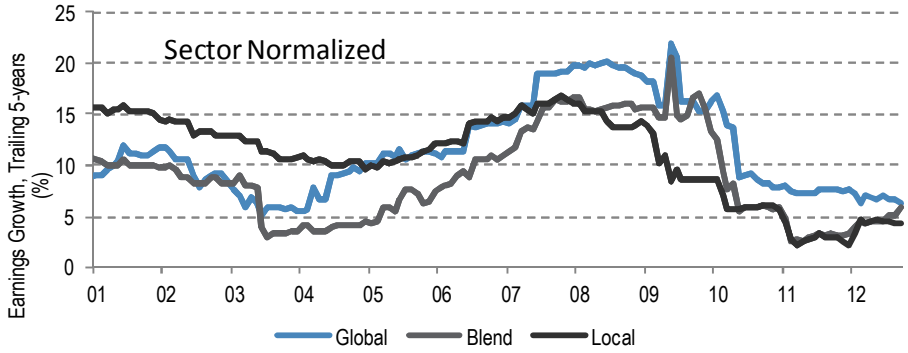
Earnings Growth, Projections, Surprise

Earnings growth has been faster for the Global basket since 2005, but the growth gap between Blend, Local, and Global has closed sharply recently.

Trailing earnings growth (we use rolling five-year growth to smooth out noisy year-on-year components) for the Global basket lagged the Local basket until 2005. Presumably coming out of the 2001 recession, domestic companies (particularly the non-TMT sector) held up better than the globally exposed companies. However, going into the financial crisis and in the recovery phase, earnings of the Global basket companies has been higher. However, the Blend basket has collapsed even faster than the Local one. We suspect the Blend basket was more exposed to recessionary Europe than the more diversified Global basket. Interestingly, the earnings growth gap has closed recently as the US, helped by super easy monetary policy, remains one of the few bright spots on the global growth map.

Figure 19: Trailing Earnings Growth for Global Basket Higher, but the Gap Has Closed Recently



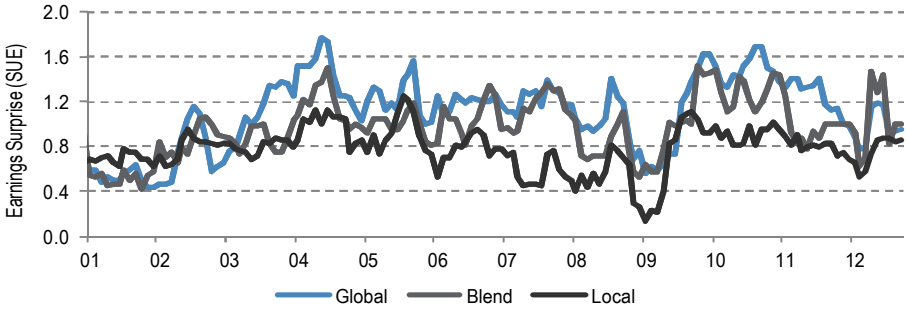
Source:Bloomberg, S&P Capital IQ, J.P. Morgan Quantitative and Derivatives Strategies.

On a more prospective basis, consensus long-term earnings expectations have similarly favored Global firms since 2004 (see Appendix for the chart). Similar to the trailing earnings growth shown above, the expected long-term earnings of Global, Blend, and Local have converged recently.

Global firms usually have bigger earnings surprises.

Several clients have asked us to investigate if the size of earnings surprises is different for multinationals compared to domestic firms. The answer is yes—earnings surprises are usually higher for multinationals. Figure 20 shows SUE (standardized unexpected earnings), which is the difference between consensus expected EPS and the actual EPS on the day of announcement, scaled by the degree of uncertainty among the analysts. Figure 20 suggests that the earnings surprise is indeed consistently higher for the Global basket compared to the Local basket with the Blend basket somewhere in between.

Figure 20: Global Firms Deliver Bigger Earnings Surprise



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

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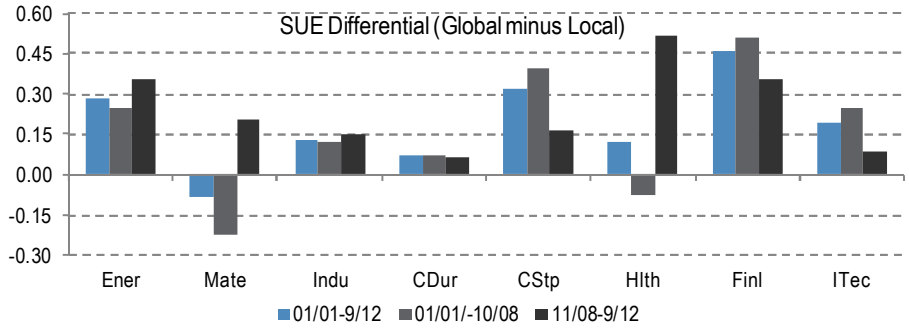
Is the larger earnings surprise for Global relative to Local dependent on the sector membership of a company? Not really. With the exception of Materials, the earnings surprise for Global is larger than for the Local basket. Figure 21 shows the *difference* in the Global minus Local SUE for eight of the 10 sectors. We skip Telecom and Utilities because there are very few companies in those sectors with meaningful global exposures. As figure 20 reveals, excess earnings surprise for the Global basket is fairly consistent across sectors, though Materials and Healthcare are the exceptions for at least one time period. The post-crisis period is remarkable in that, without exception, earnings surprises, on average, for Global companies has been higher than that of Local companies.

Figure 21: Earnings Surprises of Global Firms Is Dispersed, Not Concentrated in a Few Sectors



Source:Bureau of Economic Analysis SpreadWithinSectorBasedOnRevGrouping.xlsx

Global = usually large cap, mostly expensive valuations, lower financial leverage, lower credit risk, higher earnings growth, bigger earnings surprise, and higher beta

In summary, companies with high global sales exposure are generally large cap, found mostly in IT, Industrials, Materials, Healthcare, Consumer Staples, and Consumer Durable sectors. Compared to their domestically oriented counterparts they have lower financial leverage and credit risk. Global firms tend to be more efficient in using their assets and provide higher returns on assets and equity. Their earnings growth has been higher than their Local counterparts since 2005, though the earnings growth gap has shrunk lately, possibly due to US growth staying stable while the rest of the world has slowed. Global companies also tend to have bigger earnings surprises, and their market beta is higher than average.

Geographic Revenue Exposure Based Strategies

As shown in previous sections of this report, a stock's geographical revenue exposures can have significant implications for its characteristics and returns. With this in mind, in this section of the report we take the exercise a step further and examine whether stocks with different geographical revenue exposures should be differentiated from a performance point of view.

A core question we ask ourselves is whether having exposure to a country/region that is exhibiting stronger relative *momentum* has a positive impact on the stock's future returns. In other words, if we take a practical example of two stocks with similar characteristics but different geographical revenue exposures, will the stock that has greater exposure to the country/region with strong *momentum* outperform on a relative basis, and vice versa.

The underlying country/regional *momentum* exhibits a "pass-through effect" via a stock's geographical revenue exposure onto its respective future stock returns.

While we have examined different forms of country/regional *momentum*—economic growth, equity strengthening, currency appreciation, yield curve steepening—our analysis suggests that country/regional equity *momentum* exhibits the most significant impact on stock returns, via the stock's revenue exposure. Basically, the underlying country/regional *momentum* exhibits a "pass-through effect" via a stock's geographical revenue exposure onto its respective future stock returns.

Long/Short Country Momentum Based Strategy

With the above in mind, we examined whether one can systematically exploit differences among companies' geographical revenue exposures in order to enhance one's stock selection process.

Figure 22 illustrates test results of revenue exposure stock selection strategies based on varying equity momentum time horizons. Overall, shorter term (namely one- to three-month) country momentum based strategies exhibited stronger performance results, with two-month and three-month momentum showing the highest strategy information ratios (IR), information coefficients (IC), and statistical significance. Medium to longer term (six- to 12-month) country momentum based strategies exhibited weak performance results on a long/short basis. However, from a long-only point of view, even the medium to longer term momentum strategies showed effectiveness and outperformed the equity market on a relative basis.

Figure 22: Country Equity Momentum-Based Geographical Revenue Exposure Stock Selection Strategies

Factor Description	Start Date	End Date	Universe	Coverage (# Stocks)	Ann IR	Avg M L/S Ret	Avg M Stdev	T-Stat	Hit Rate	Turn over	Ann Long Return	Ann Short Return	Since Inc IC	Last 5 Yr IC
Geo Revenue Exposure - 1M Country Momentum	Dec-00	Mar-13	Russell 1000	860	0.55	0.3%	1.7%	1.9	58%	61%	10.9%	7.2%	1.5%	2.6%
Geo Revenue Exposure - 2M Country Momentum	Dec-00	Mar-13	Russell 1000	860	0.85	0.4%	1.8%	2.9	57%	43%	12.4%	6.5%	2.2%	3.7%
Geo Revenue Exposure - 3M Country Momentum	Dec-00	Mar-13	Russell 1000	860	0.62	0.3%	1.9%	2.1	57%	35%	11.4%	6.8%	1.8%	2.8%
Geo Revenue Exposure - 6M Country Momentum	Dec-00	Mar-13	Russell 1000	860	0.30	0.2%	2.0%	1.0	56%	24%	11.1%	8.7%	1.5%	2.3%
Geo Revenue Exposure - 9M Country Momentum	Dec-00	Mar-13	Russell 1000	860	0.32	0.2%	1.8%	1.1	55%	18%	10.4%	8.1%	1.1%	1.4%
Geo Revenue Exposure - 12M Country Momentum	Dec-00	Mar-13	Russell 1000	860	0.24	0.1%	2.0%	0.8	55%	18%	10.2%	8.3%	0.6%	0.5%

Source: Bloomberg, Capital IQ, FactSet, J.P. Morgan Quantitative and Derivative Strategies Group.

From the various country momentum time horizons, the 3-month momentum strategy exhibited the most balanced results over the last 12 years that were examined in this analysis. The strategy yielded an IC of 1.8%, an IR of 0.6, a hit rate of 57%, and a t-stat of 2.1. It exhibited the strongest effectiveness during more recent years, potentially as companies have continued to increase the geographical diversification of their revenue streams.

In fact, as illustrated in Figure 23, this strategy yielded fairly impressive results during the last one-, three-, and five-year periods. For instance, during the last five years, which have generally presented a challenging period for many common stock selection strategies, this strategy yielded an IC of 2.8%, an IR of 1.2, a hit rate of 67%, and a t-stat of 2.7. Also, it is interesting to note that while this is a relatively fast-moving momentum strategy, it incurred a monthly turnover that we believe is reasonable when compared to other traditional short-term momentum strategies.

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Figure 23: Geo Revenue Exposure 3M Country Momentum - Test Statistics

1 Year: 4/30/2012 to 4/30/2013 Portfolio Statistics				
Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.8%	23.2%	4%	75%
2	1.8%	23.8%	3%	67%
3	1.6%	19.8%	3%	58%
4	1.4%	17.5%	4%	42%
5	0.9%	9.8%	4%	8%
Total Test				
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.5%	4.3%	4.1%	917

Long Short Strategy Statistics Portfolio 1 less Portfolio 5				
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.0%	12.1%	1%	**75%**
Benchmark	0.3%	3.8%	1%	**75%**
	T-Stat	IR	Assets	
Long/Short	**3.67**	**3.9**	368	

3 Year(s): 4/30/2010 to 4/30/2013 Portfolio Statistics				
Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	16.3%	5%	64%
2	1.4%	17.0%	5%	56%
3	1.2%	14.3%	5%	56%
4	1.1%	12.1%	5%	44%
5	0.9%	9.1%	6%	39%
Total Test				
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.2%	2.6%	2.5%	905

Long Short Strategy Statistics Portfolio 1 less Portfolio 5				
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.5%	6.0%	2%	**64%**
Benchmark	0.2%	2.3%	1%	**64%**
	T-Stat	IR	Assets	
Long/Short	**1.81**	**1.04**	363	

5 Year(s): 4/30/2008 to 4/30/2013 Portfolio Statistics				
Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.3%	12.6%	7%	65%
2	1.4%	15.2%	7%	60%
3	0.8%	6.4%	7%	47%
4	0.9%	8.0%	7%	43%
5	0.7%	4.7%	8%	38%
Total Test				
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	2.6%	2.8%	901

Long Short Strategy Statistics Portfolio 1 less Portfolio 5				
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.6%	7.0%	2%	**67%**
Benchmark	0.2%	2.9%	1%	**65%**
	T-Stat	IR	Assets	
Long/Short	**2.67**	**1.2**	361	

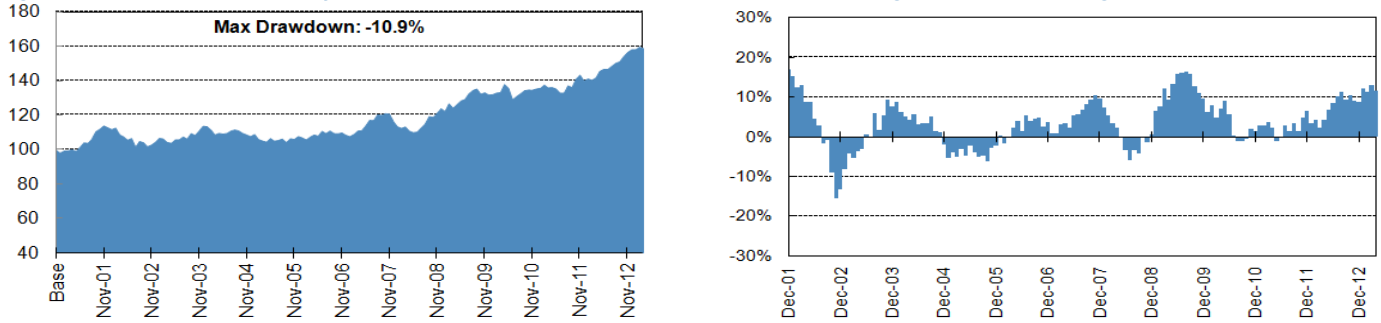
Total Period: 12/31/2000 to 4/30/2013 Portfolio Statistics				
Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.1%	11.4%	6%	61%
2	1.0%	10.3%	6%	54%
3	0.7%	7.1%	6%	45%
4	0.8%	7.7%	6%	47%
5	0.8%	6.8%	6%	46%
Total Test				
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.9%	1.5%	1.8%	860

Long Short Strategy Statistics Portfolio 1 less Portfolio 5				
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.3%	3.84%	1.9%	**57%**
Benchmark	0.2%	2.44%	1.2%	**61%**
	T-Stat	IR	Assets	
Long/Short	**2.14**	**0.62**	345	

Source: Bloomberg, Capital IQ, FactSet, J.P. Morgan Quantitative and Derivative Strategies Group.

From a historical time-series point of view, the three-month momentum strategy exhibited relatively persistent L/S performance over the last 12 years. While the strategy did incur some draw-downs late in 2001 and 2007, since the financial crisis in 2008 it has been on a strong and persistent upward run (see Figure 24).

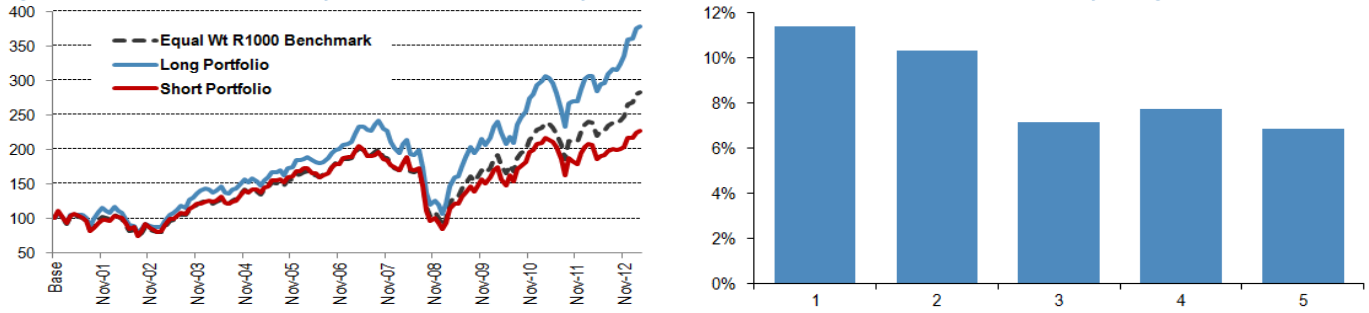
Figure 24: Geo Rev Exp 3M Country Momentum—L/S Portfolio Cum Rets (left chart); 12M Rolling L/S Portfolio Rets (right chart)



Source: Bloomberg, Capital IQ, FactSet, J.P. Morgan Quantitative and Derivative Strategies Group.

Furthermore, the strategy yielded close to a monotonic payoff structure. However, the long portfolio, as illustrated on the left side of Figure 25, yielded greater effectiveness, having outperformed the benchmark on a relatively consistent basis. The short portfolio has exhibited effectiveness only since the financial crisis.

Figure 25: Geo Rev Exp 3M Country Momentum – L- and S-only Portfolio Cum Rets (left chart); Ann Rets Portfolio Payoff (right chart)



Source: Bloomberg, Capital IQ, FactSet, J.P. Morgan Quantitative and Derivative Strategies Group.

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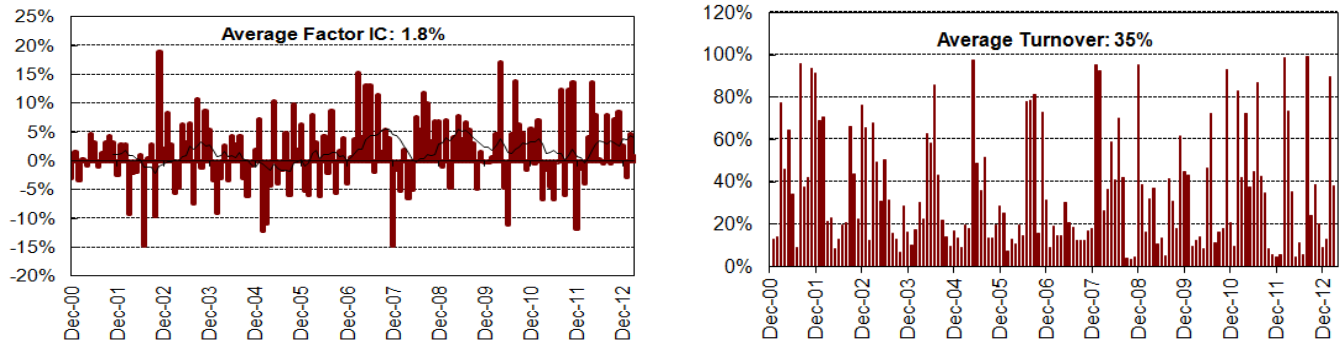
As mentioned earlier, the three-month momentum strategy yielded an IC of 1.8% over the back-test period, showing greater effectiveness and persistence in the IC since 2005. From an implementation point of view, while the strategy can incur a substantial turnover at times, throughout the entire history its turnover averaged around 35% on a monthly basis (see Figure 26).

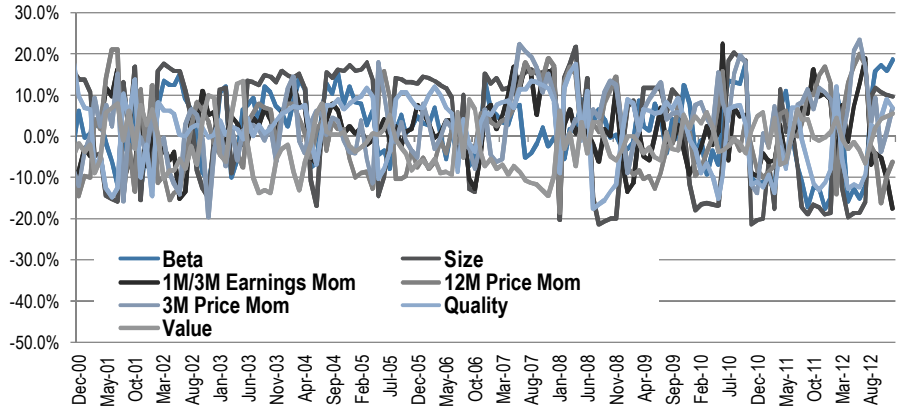
Figure 26: Geo Rev Exp 3M Country Momentum – Information Coefficients (left chart); Turnover Within Long Portfolio (right chart)



Source: Bloomberg, Capital IQ, FactSet, J.P. Morgan Quantitative and Derivative Strategies Group.

Also, as a final and important check, we examined the degree of correlation of the three-month country momentum factor against a group of common equity factors. The correlation was computed as the cross-sectional rolling rank correlation between factor stock scores. As illustrated in Figure 27, the rank correlations have remained relatively muted within a range of +/20% over the last 12 years. This implies that the country momentum-based revenue exposure strategy should add diversification within an equity investment process.

Figure 27: Rank Correlations Indicate Potential Diversification Benefit



Source: Bloomberg, Capital IQ, FactSet, J.P. Morgan Quantitative and Derivative Strategies Group.

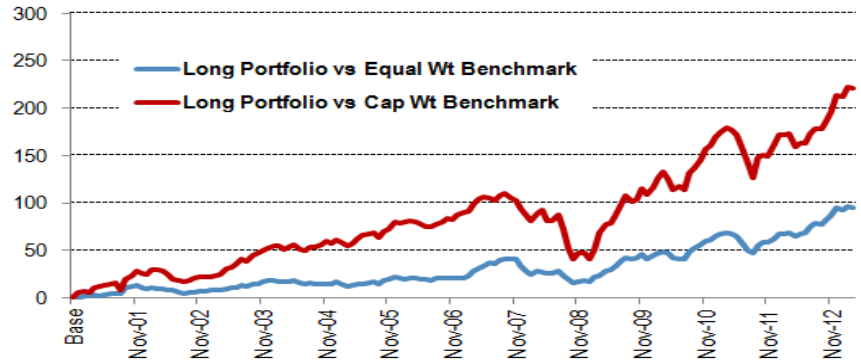
Long-Only Country Momentum Based Strategy

Lastly, as illustrated in Figure 28, it is interesting to note that this strategy exhibited quite an impressive long-only payoff curve when compared to an equal-weighted benchmark (yielding an excess IR of 0.6), and even more so when compared against a cap-weighted benchmark (yielding an excess IR of 1.0).

This suggests that the country momentum-based revenue exposure strategy could not only be effective from a long/short stock selection point of view, but even more so to

a long-only investment process. Perhaps the long-only strategy captures some of the positive characteristics—such as low leverage, high efficiency, and high profitability—of the Global stocks.

Figure 28: Geo Rev Exp 3M Country Momentum—L-only Portfolio Excess Cumulative Returns



Source: Bloomberg, Capital IQ, FactSet, J.P. Morgan Quantitative and Derivative Strategies Group.

Appendix

Summary of FASB 131

Below are the summary of FASB Statement 14 (issued 12/76) and the summary of FASB Statement 131 (issued 6/97), which supersedes FASB 14. Statement 131 addresses the standards to be followed by public business enterprises in reporting their operating segments, major customers, and geographic segments. The full statements can be found at the FASB website http://www.fasb.org.

Summary of FASB Statement 14 (retrieved from http://www.fasb.org/summary/stsum14.shtml, on June 3, 2013

"Financial Reporting for Segments of a Business Enterprise (Issued 12/76)
This Statement requires a publicly held business company to present, for each segment of its operations qualifying as a reportable segment, information on revenues, profitability, identifiable assets, and other related disclosures (such as the aggregate amount of a segment's depreciation, depletion, and amortization expense). Similar information is required to be reported on a geographic basis for those companies having foreign operations and export sales. If 10 percent or more of the revenue of a company is derived from sales to any single customer, that fact and the amount of revenue from each customer must also be disclosed. Finally, this Statement requires that a company operating predominately or exclusively in a single industry identify that industry."

Summary of FASB Statement 131 (retrieved from http://www.fasb.org/summary/stsum131.shtml, June 3, 2013)

"Disclosures about Segments of an Enterprise and Related Information (Issued 6/97)
This Statement establishes standards for the way that public business enterprises report information about operating segments in annual financial statements and requires that those enterprises report selected information about operating segments in interim financial reports issued to shareholders. It also establishes standards for related disclosures about products and services, geographic areas, and major customers. This Statement supersedes FASB Statement No. 14, Financial Reporting for Segments of a Business Enterprise, but retains the requirement to report information about major customers. It amends FASB Statement No. 94, Consolidation of All Majority-Owned Subsidiaries, to remove the special disclosure requirements for previously unconsolidated subsidiaries. This Statement does not apply to nonpublic business enterprises or to not-for-profit organizations.

"This Statement requires that a public business enterprise report financial and descriptive information about its reportable operating segments. Operating segments are components of an enterprise about which separate financial information is available that is evaluated regularly by the chief operating decision maker in deciding how to allocate resources and in assessing performance. Generally, financial information is required to be reported on the basis that it is used internally for evaluating segment performance and deciding how to allocate resources to segments.

"This Statement requires that a public business enterprise report a measure of segment profit or loss, certain specific revenue and expense items, and segment assets. It requires reconciliations of total segment revenues, total segment profit or

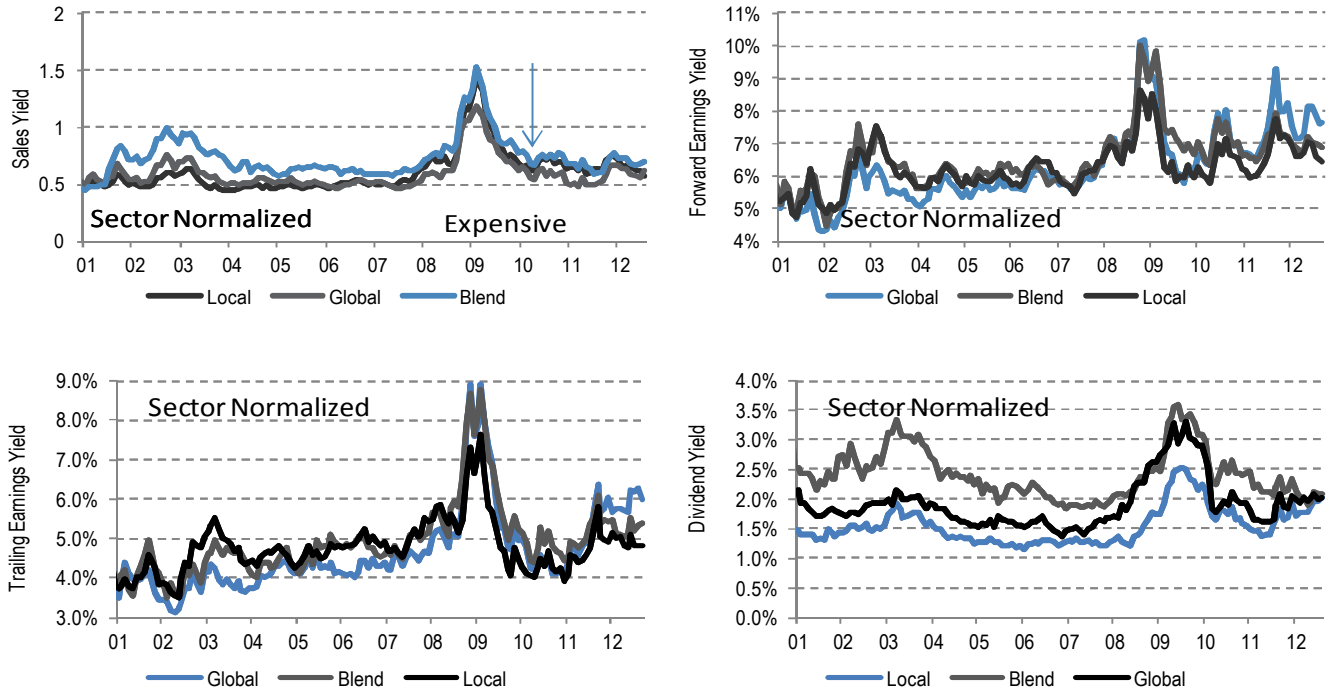
loss, total segment assets, and other amounts disclosed for segments to corresponding amounts in the enterprise's general-purpose financial statements. It requires that all public business enterprises report information about the revenues derived from the enterprise's products or services (or groups of similar products and services), about the countries in which the enterprise earns revenues and holds assets, and about major customers regardless of whether that information is used in making operating decisions. However, this Statement does not require an enterprise to report information that is not prepared for internal use if reporting it would be impracticable.

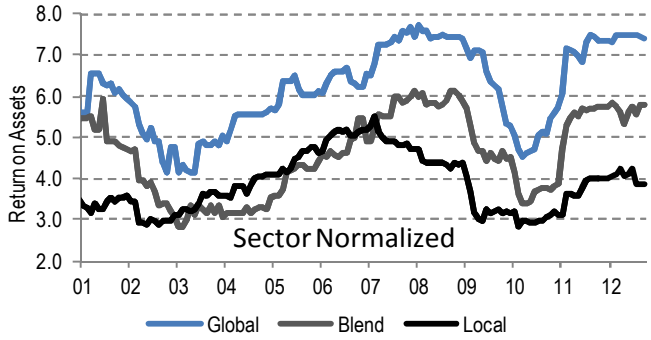
"This Statement also requires that a public business enterprise report descriptive information about the way that the operating segments were determined, the products and services provided by the operating segments, differences between the measurements used in reporting segment information and those used in the enterprise's general-purpose financial statements, and changes in the measurement of segment amounts from period to period.

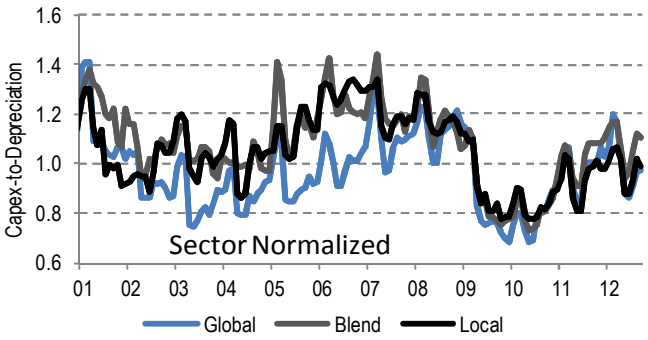
"This Statement is effective for financial statements for periods beginning after December 15, 1997. In the initial year of application, comparative information for earlier years is to be restated. This Statement need not be applied to interim financial statements in the initial year of its application, but comparative information for interim periods in the initial year of application is to be reported in financial statements for interim periods in the second year of application."

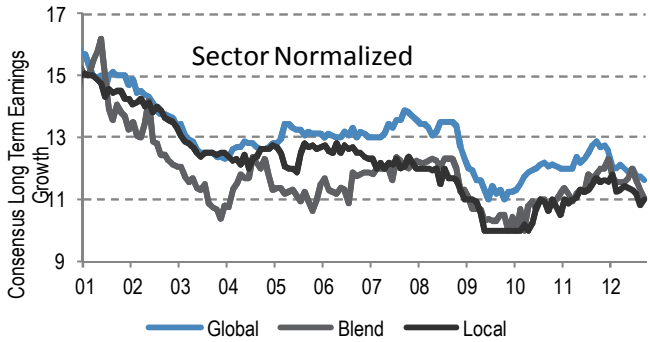
Sector Normalized Factor Exposures of Local and Global Companies

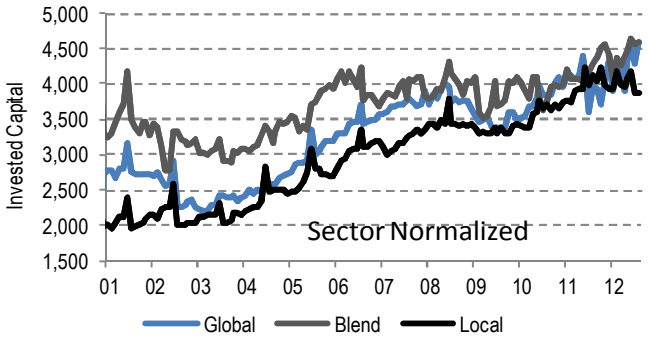
Figure 29: Factor Performance - Comparison of Global, Blend, and Local Baskets

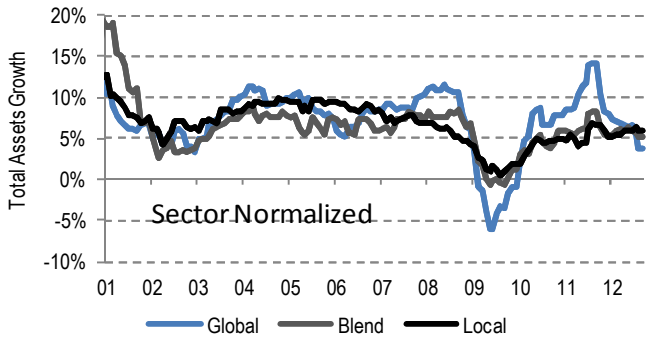


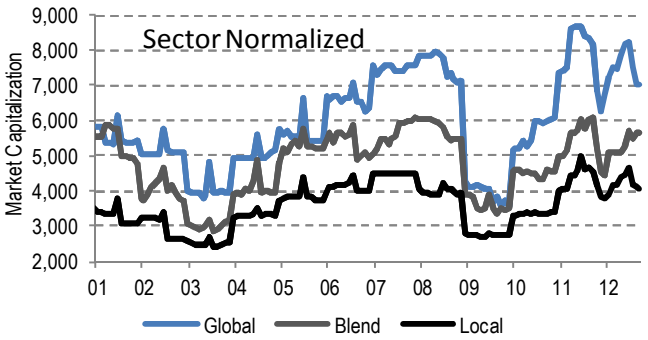


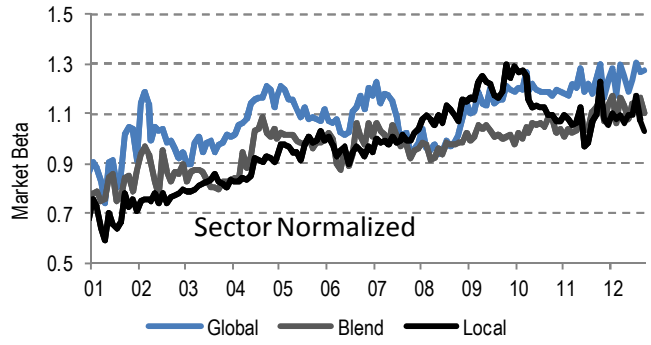












Source:Bloomberg, S&P Capital IQ, J.P. Morgan Quantitative and Derivatives Strategies.

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Factor Characteristics Summary of Local and Global Companies

Figure 30: Sector Normalized – Characteristics of Global, Blend, and Local Baskets, Averages by Time Periods

Sector Normalized	12/31/1999-9/31/2008			10/31/2008-9/30/2012			12/31/1999-9/30/2012		
	Global	Blend	Local	Global	Blend	Local	Global	Blend	Local
Sales Yield	0.55	0.67	0.54	0.68	0.83	0.77	0.59	0.71	0.61
Book-to-Price	0.29	0.40	0.37	0.39	0.45	0.50	0.32	0.42	0.41
Free Cash Flow Yield	2.88%	2.85%	3.09%	4.54%	4.23%	4.90%	3.39%	3.27%	3.65%
Forward Earnings Yield	5.72%	6.32%	5.96%	7.40%	7.31%	6.70%	6.24%	6.63%	6.19%
Trailing Earnings Yield	4.16%	4.79%	4.59%	5.59%	5.60%	4.97%	4.60%	5.04%	4.70%
Dividend Yield	1.42%	2.43%	1.72%	1.86%	2.53%	2.25%	1.56%	2.46%	1.88%
Accruals/Average Assets	3.44%	3.81%	4.48%	2.01%	1.49%	1.61%	2.99%	3.09%	3.59%
Leverage	55	80	68	47	67	69	53	76	68
Altman Z	2.28	1.64	1.59	2.18	1.94	1.60	2.25	1.73	1.59
Asset Turnover	0.83	0.58	0.60	0.75	0.66	0.57	0.80	0.61	0.59
Return on Assets	6.10	4.23	4.22	6.50	4.93	3.55	6.23	4.45	4.01
Return on Equity	15.93	12.97	13.92	14.86	12.50	10.39	15.60	12.82	12.82
Capex/Depreciation	1.02	1.19	1.13	0.92	0.95	0.93	0.99	1.12	1.06
Earnings Growth	11.66	9.51	13.68	11.30	8.35	6.41	11.55	9.15	11.41
Longterm Growth	13.63	12.16	13.19	11.97	11.08	10.84	13.11	11.83	12.46
Earnings Surprise	1.08	0.92	0.79	1.18	1.05	0.78	1.11	0.96	0.79
Invested Capital	2961	3534	2557	3858	4064	3692	3237	3697	2906
Total Asset Growth (YoY)	8.71%	7.84%	8.59%	5.27%	4.41%	4.23%	7.63%	6.77%	7.23%
Market Capitalization	5900	4662	3560	6229	4736	3657	6003	4685	3590
Beta	1.01	0.89	0.86	1.20	1.06	1.13	1.07	0.94	0.95

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

Figure 31: Sector Non-Normalized – Characteristics of Global, Blend, and Local Baskets, Averages by Time Periods

Non-Normalized Sector Factors	12/31/1999-9/31/2008			10/31/2008-9/30/2012			12/31/1999-9/30/2012		
	Global	Blend	Local	Global	Blend	Local	Global	Blend	Local
Sales Yield	0.50	0.69	0.54	0.63	0.89	0.75	0.54	0.75	0.60
Book-to-Price	0.28	0.35	0.43	0.36	0.44	0.58	0.30	0.37	0.47
Free Cash Flow Yield	2.93%	3.22%	2.75%	4.74%	4.99%	3.59%	3.49%	3.78%	3.01%
Forward Earnings Yield	5.33%	5.97%	6.61%	7.26%	7.42%	6.73%	5.93%	6.43%	6.64%
Trailing Earnings Yield	3.68%	4.44%	5.34%	5.32%	5.56%	5.24%	4.19%	4.79%	5.31%
Dividend Yield	1.36%	1.47%	2.53%	1.77%	1.86%	3.18%	1.48%	1.59%	2.73%
Accruals/Average Assets	3.57%	3.99%	3.95%	2.30%	1.14%	1.82%	3.17%	3.08%	3.29%
Leverage	52	59	92	43	59	91	49	59	92
Altman Z	2.34	2.05	1.08	2.30	2.16	1.05	2.32	2.08	1.07
Asset Turnover	0.85	0.84	0.38	0.78	0.80	0.37	0.83	0.82	0.37
Return on Assets	6.51	5.22	3.26	7.09	5.51	2.71	6.69	5.31	3.09
Return on Equity	15.22	14.82	13.29	15.29	13.63	9.54	15.24	14.44	12.12
Capex/Depreciation	0.98	1.08	1.31	0.88	0.86	1.14	0.95	1.01	1.25
Earnings Growth	11.50	13.40	11.36	12.24	9.26	4.35	11.73	12.08	9.17
Longterm Growth	14.57	13.27	11.67	12.30	11.64	9.58	13.86	12.75	11.02
Earnings Surprise	1.13	0.93	0.71	1.36	1.01	0.61	1.20	0.96	0.68
Invested Capital	2648	2881	3184	3196	3553	4650	2817	3091	3634
Total Asset Growth (YoY)	9.01%	9.15%	7.83%	5.84%	3.85%	4.24%	8.02%	7.47%	6.71%
Market Capitalization	5580	4725	3510	5904	4564	3839	5681	4674	3613
Beta	1.11	0.94	0.78	1.17	1.13	1.08	1.13	1.00	0.88

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

Stocks Screens Based on Company Geographical Revenue Exposures

Figure 32: List of US Stocks with Highest Revenue Exposures to Europe and Emerging Markets

Europe

Ticker	Name	Price (6/5/2013)	Market Cap (million $)	Sector	Main Revenue Exposure
CCE	Coca-Cola Enter	$36.73	$10,066	Consumer Staples	Europe
PCLN	Priceline.Com	$805.90	$41,568	Consumer Discretionary	Netherlands,United Kingdom
LBTYA	Liberty Global-A	$73.41	$18,362	Consumer Discretionary	Europe
NEM	Newmont Mining	$34.95	$17,437	Materials	Europe
ROC	Rockwood Holding	$64.05	$4,975	Materials	Germany,Rest of Europe
WBC	Wabco Holdings	$74.74	$4,667	Industrials	Germany,Europe-Other,Sweden
PDLI	Pdl Biopharma In	$7.88	$1,103	Health Care	Europe
KRO	Kronos Worldwide	$15.64	$1,813	Materials	Europe
PWER	Power-One Inc	$6.31	$773	Information Technology	Italy,Germany,European Countries,
HAR	Harman Intl	$52.18	$3,545	Consumer Discretionary	Germany,Other Europe
TECD	Tech Data Corp	$49.52	$1,870	Information Technology	Europe
OEH	Orient Express-A	$11.61	$1,405	Consumer Discretionary	Europe
SLH	Solera Holdings	$54.90	$3,782	Information Technology	Europe,United Kingdom,Germany,Netherlands
VHI	Valhi Inc	$15.64	$5,304	Materials	Europe
OMG	Om Group Inc	$30.69	$981	Materials	Germany,Finland
BWA	Borgwarner Inc	$80.19	$9,267	Consumer Discretionary	Germany,Other Europe,Hungary,France

Emerging Markets

Ticker	Name	Price (6/5/2013)	Market Cap (million $)	Sector	Main Revenue Exposure
ASIA	Asiainfo-Linkage	$11.65	$848	Information Technology	China
SOHU	Sohu.Com Inc	$63.43	$2,425	Information Technology	China
CTCM	Ctc Media Inc	$11.97	$1,893	Consumer Discretionary	Russia
KOS	Kosmos Energy Lt	$10.55	$4,100	Energy	Africa
NIHD	Nii Holding Inc	$7.40	$1,273	Telecommunication Services	Brazil,Mexico,Argentina,Peru
MRVL	Marvell Tech Grp	$10.76	$5,347	Information Technology	China,Thailand,Malaysia,Philippines
SWKS	Skyworks Solutio	$22.66	$4,332	Information Technology	China,Taiwan,Other Asia-Pacific,South Korea
QCOM	Qualcomm Inc	$62.97	$108,802	Information Technology	China ,South Korea,Other Global,Taiwan
CETV	Central Euro M-A	$3.30	$434	Consumer Discretionary	Czech Republic,Romania,Slovak Republic,Bulgaria,Slovenia,Croatia
WYNN	Wynn Resorts Ltd	$134.94	$13,630	Consumer Discretionary	Macau
LVS	Las Vegas Sands	$57.03	$47,042	Consumer Discretionary	Macao
G	Genpact Ltd	$19.40	$4,437	Information Technology	Taiwan,Malaysia,Philippines,China
SUP	Superior Inds	$18.29	$500	Consumer Discretionary	Mexico
YUM	Yum! Brands Inc	$71.12	$31,992	Consumer Discretionary	China,International Division,
SLAB	Silicon Labs	$42.50	$1,804	Information Technology	China,Taiwan,South Korea,Japan
NE	Noble Corp	$38.97	$9,870	Energy	South America

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

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Back-Test Results

Figure 33: Geographical Revenue Exposure Based on 3-Month Country Equity Momentum

Geo Revenue Exposure - 3 Month Country Momentum — Rebalance every 1 month(s)

1 Year: 4/30/2012 to 4/30/2013 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.8%	23.2%	4%	75%
2	1.8%	23.8%	3%	67%
3	1.6%	19.8%	3%	58%
4	1.4%	17.5%	4%	42%
5	0.9%	9.8%	4%	8%
Total Test				
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.5%	4.3%	4.1%	917

Long Short Strategy Statistics Portfolio 1 less Portfolio 5

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	1.0%	12.1%	1%	75%
Benchmark	0.3%	3.8%	1%	75%
	T-Stat	IR	Assets	
Long/Short	3.67	3.9	368	

3 Year(s): 4/30/2010 to 4/30/2013 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.4%	16.3%	5%	64%
2	1.4%	17.0%	5%	56%
3	1.2%	14.3%	5%	56%
4	1.1%	12.1%	5%	44%
5	0.9%	9.1%	6%	39%
Total Test				
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.2%	2.6%	2.5%	905

Long Short Strategy Statistics Portfolio 1 less Portfolio 5

	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.5%	6.0%	2%	64%
Benchmark	0.2%	2.3%	1%	64%
	T-Stat	IR	Assets	
Long/Short	1.81	1.04	363	

5 Year(s): 4/30/2008 to 4/30/2013 Portfolio Statistics

Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.3%	12.6%	7%	65%
2	1.4%	15.2%	7%	60%
3	0.8%	6.4%	7%	47%
4	0.9%	8.0%	7%	43%
5	0.7%	4.7%	8%	38%
Total Test				
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	1.0%	2.6%	2.8%	901

Long Short Strategy Statistics Portfolio 1 less Portfolio 5

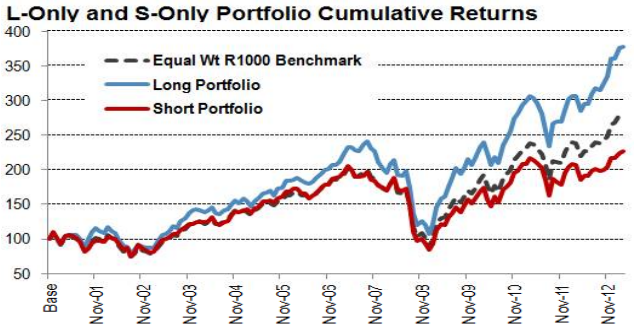
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.6%	7.0%	2%	67%
Benchmark	0.2%	2.9%	1%	65%
	T-Stat	IR	Assets	
Long/Short	2.67	1.2	361	

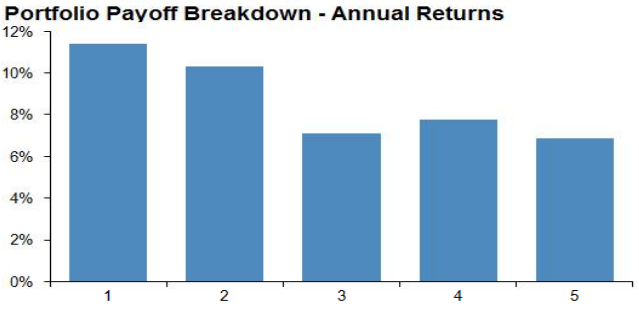
Total Period: 12/31/2000 to 4/30/2013 Portfolio Statistics

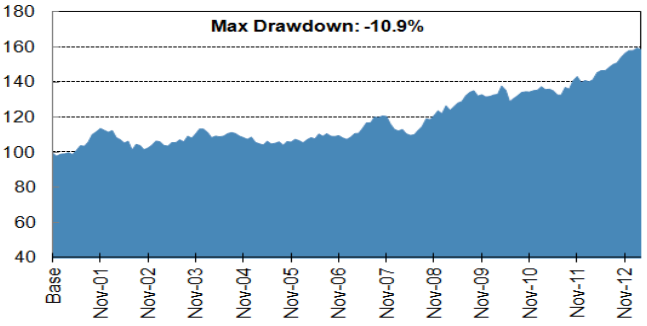
Port	Avg Ret	Ann Ret	St Dev	% Out Perf.
1	1.1%	11.4%	6%	61%
2	1.0%	10.3%	6%	54%
3	0.7%	7.1%	6%	45%
4	0.8%	7.7%	6%	47%
5	0.8%	6.8%	6%	46%
Total Test				
	Avg Ret	Rank IC	Avg IC	Avg Assets
Universe	0.9%	1.5%	1.7%	860

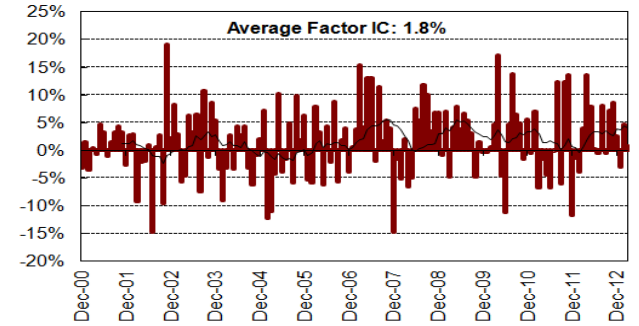
Long Short Strategy Statistics Portfolio 1 less Portfolio 5

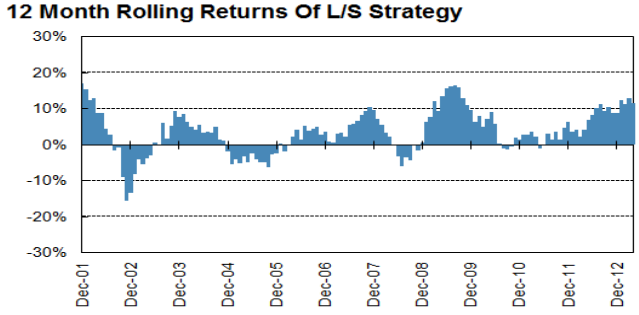
	Avg Ret	Ann Ret	Avg S.D.	% Out Perf.
Long/Short	0.3%	3.84%	1.9%	57%
Benchmark	0.2%	2.44%	1.2%	61%
	T-Stat	IR	Assets	
Long/Short	2.14	0.62	345	

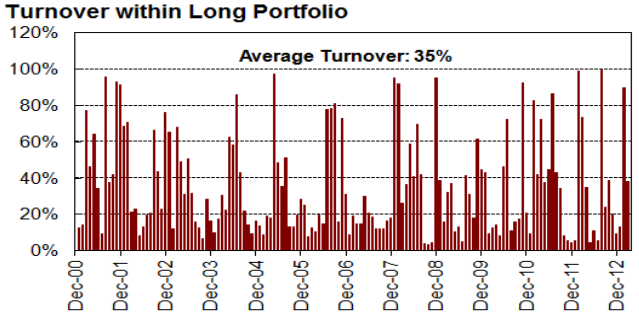












Source:Bloomberg, J.P. Morgan Quantitative and Derivatives Strategies.

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