December 8, 2014

US Quant Research

Exploring, Producing, and Refining a Crude Oil Playbook

Energy underperformance was big news in November, but it wasn't the only story. We have refined our analysis of crude oil sensitivity for energy and consumer equities. There was large dispersion in returns last month: high-beta underperformed in a rising market; value and small-cap lagged.

Refined Crude Oil Sensitivities

Given the large recent crude oil price declines and the high correlation of beta-adjusted energy sector returns with crude oil moves, we tested additional crude oil variables on equity cohort returns. These new factors – beyond contemporaneous crude oil percent changes from our macro playbook (see ***US Equity Strategy: Rates, Dollar, and Oil - What's the Playbook?***, October 6, 2014) – include: delayed impact of crude oil moves on equity cohort returns; asymmetric impact of up and down price moves; impact of large-magnitude crude oil changes; and the effect of supply- and demand-driven crude oil moves.

Main Results of Crude Oil Analysis

- After accounting for cohorts' equity market betas, few cohorts exhibit incremental crude oil sensitivity. Furthermore, we found only modest evidence of asymmetry in reactions to up versus down moves in crude oil, and few cases where lagged crude oil returns matter.

- Four sectors display crude oil sensitivity: lower oil is negative for energy and materials, and positive for staples and discretionary; in each sector, the crude oil sensitivity enters via contemporaneous oil price changes.

- Junk and cyclicals benefit by about 1% per month when crude oil has large price *increases*; cyclicals underperform by 80bp on average when crude oil has large price declines. Defensives outperform by an average of 60bp in months when crude oil has a large decline, something we saw in November despite the up tape.

- Metals & mining tends to overreact to crude oil price moves; about half the current month's move is reversed in the following month. Conversely, household durables has only about 60% of its crude-oil driven price move in the current month; the rest occurs in the next month.

- Airlines and multiline retail outperform in months identified as demand-driven crude oil declines: each percent crude oil decline adds an expected 35bp to airlines and 18bp to multiline. Metals & mining and industrial conglomerates deduct 30bp and 9bp, respectively, for each percent crude oil decline in these demand-driven months.

Microstructure Summary

November was another positive month for the US equity market, with the S&P 500 up 2.45%. Despite this benign headline return, there was large dispersion in the performance of many types of equity cohorts last month.

If not for the energy sell-off, we would be highlighting the dramatic underperformance of high-beta stocks. In a rising market, the top quintile by beta underperformed the bottom quintile by 5.14% in November. This not only marks the fifth straight month of high-beta underperformance, it is the third straight *up* month for equities that high-beta has lagged.

Other cohorts had performance consistent with that of high-beta, but not as severe. High quality stocks beat junk by 2.2% last month, marking the fourth straight win for quality (after lagging in 5 of 7 months to start 2014). Meanwhile, cyclical stocks trailed defensives by 1.2% in November; however, stocks from "neither cyclical nor defensive" industries outperformed both groups - as they have done over the last three and six months.

While small-cap stocks lagged again (-2.4% beta-adjusted), and have consistently trailed over the last 12 months, mega-cap relative performance was also slightly negative - and would have been meaningfully negative without the positive contribution from AAPL's 10.1% return.

The October value rally was more than reversed in November. Actually, all value rallies since the immediate post-Crisis period have been brief: 46 of the last 66 months have seen growth lead value on a beta and size-adjusted basis, and the average monthly spread since June 2009 has been 0.71%. Growth is still highly sought-after in a low-growth world. However, the sporadic value rallies have been sharp, with five months exceeding 4%. These sharp value reversals suggest that crowding and liquidity may be playing a role, with investors perhaps growing complacent about positioning during extended growth rallies.

Our industry alpha model, PRISM, is systematically positioned for an energy sector rebound. Last month, energy production and services jumped from Q3 to Q1 on the strength of better valuation and a 6-month mean reversion signal. Oil, gas and consumable fuel was already in Q1. Several technology and utilities industries are also favored. PRISM's defensive sub-model worked well in November, with a 2.38% Q1-Q5 spread; over the last 3, 6 and 12 months, both sub-models have had strong performance.

BEST, our long-term stock level alpha model, had a strong November, with 2.54% alpha in its Q1-Q5 spread. Meanwhile, the MOST/BEST synergy model had 1.55% alpha. Over the last 12 months, BEST has generated a cumulative 11.8% alpha, while synergy has produced 4.45% alpha.

Low capital spenders sharply outperformed high spenders in November, as energy stocks make up a significant fraction of the latter. It was more a case of high spenders lagging than low spenders gaining, however. Stocks with low estimate dispersion and high free cash flow also outperformed last month. Eight of the top 9 factors in November were also in

the top 9 for the last 3, 6 and 12 months. **This consistent factor efficacy should have helped the performance of quant equity funds that utilize free cash flow factors.**

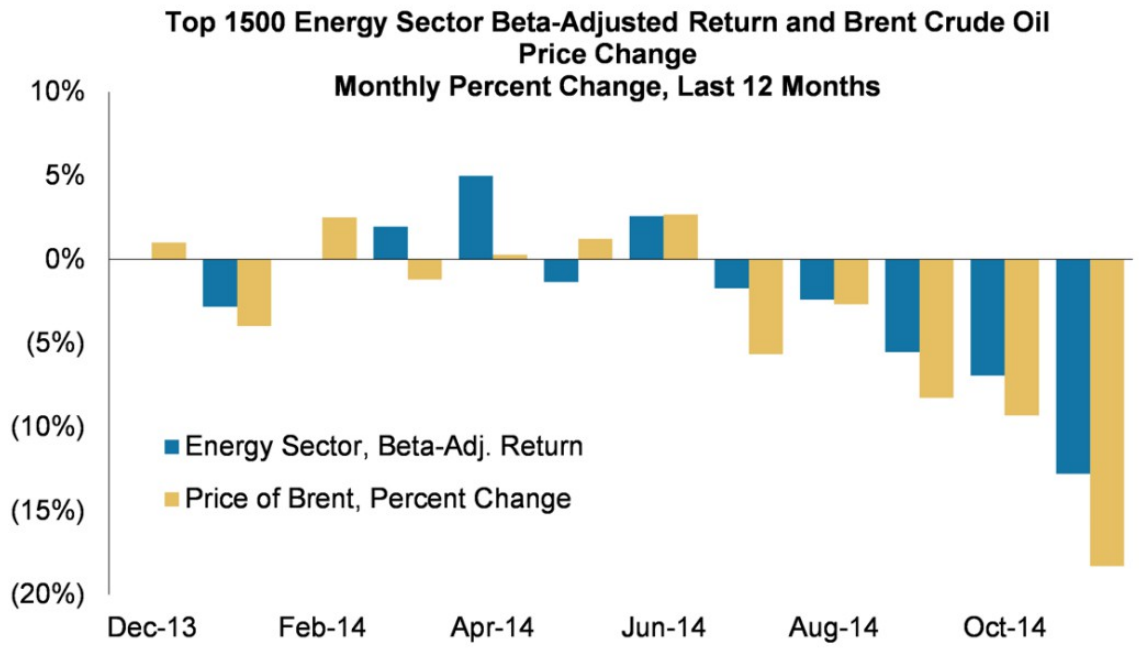
We estimate that November was a generally flat month for overall equity hedge fund alpha. The HFRX Equity Hedge Index produced +5bp of alpha, while the HFRX Equity Market Neutral Index gave back 16bp. There was no bounce back in alpha last month for the HFRX Event Driven Index, after its sharp declines in September and October. **Equity beta has been rising in the HFRX Equity Hedge Index, reaching 0.367 in November, after being at just 0.3 in August.** Momentum exposure for this Index returned to positive last month, and we have incorporated this change in our screens of stocks that are consistent with or opposite to hedge fund exposures.

Stock specific risk rebounded slightly in November, both over 252 and 63 day estimation periods, and remains above its year-ago levels - historically a positive for subsequent alpha generation.

Refining Our Crude Oil Analysis

The big story in US equities has been the dramatic moves in energy-sensitive sectors, industries and stocks. **In November, the Top 1500 Energy sector fell by 12.78% beta-adjusted,** as Brent crude oil prices declined by 18.3%. Earlier in 2014, energy sector beta-adjusted returns had a low correlation (0.28) with crude oil price moves, but over the past six months this correlation has been quite high (0.98) (**Exhibit 1**).

Exhibit 1: Beta-Adjusted Energy Sector Returns Have Been Highly Correlated with Crude Oil in the Last Six Months



Source: ClariFI, Bloomberg, Morgan Stanley Research

We included crude oil as a factor in our recent macro playbook (see ***US Equity Strategy: Rates, Dollar, and Oil - What's the Playbook?***, October 6, 2014), but **given the large recent price moves, we wanted to consider other ways in which crude oil might impact equity returns.** Specifically, we looked at four additional types of crude oil factors:

1. **Lagged crude oil returns:** do crude oil price moves from prior months influence equity returns?

2. **Asymmetric responses to crude oil moves:** do upward moves affect some equity cohorts differently than downward moves?

3. Do **big crude oil moves** (i.e. those over a certain magnitude) exert an incremental impact on some equity cohorts?

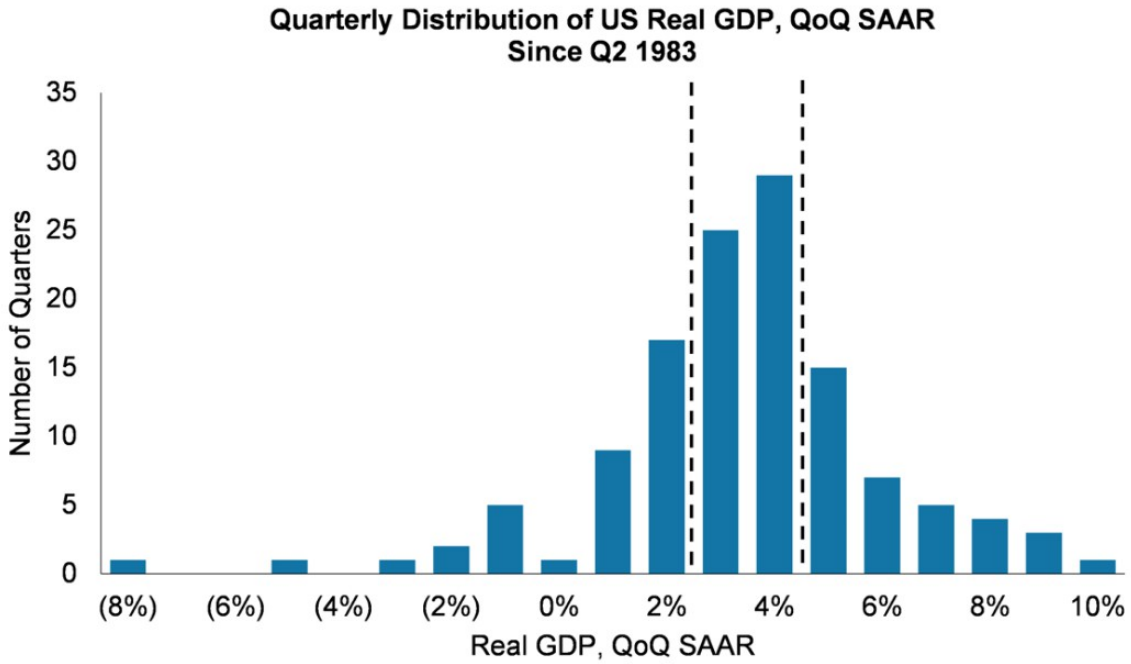
4. Are **supply-driven crude oil price moves** different from demand-driven moves, in terms of how they affect US equities?

Details of our methodology are found in the appendix, but we wanted to provide some color on the supply/demand proxy variables we constructed. Disentangling supply- and demand-related crude oil price

moves is challenging, and a number of approaches are possible. Here, **w e considered GDP growth as an indication for whether demand was robust or anemic. We then paired these GDP intervals with crude oil price changes (both the sign of the moves and the actual moves) to create our supply/demand variables.**

Since 1983, about 29% of quarters have had annualized GDP growth in the 2% range or below, and another 28% of quarters have had GDP growth of 5% or more (**Exhibit 2**); a similar distribution holds back to 1947. We take the quarter to the left of the left-hand vertical line as having anemic GDP growth, and crude oil declines during these quarters are more indicative of demand-driven declines than those in 71% of quarters with growth to the right of this line. Similarly, we take crude oil price increases to the right of the right-hand vertical line as more indicative of demand-driven crude oil price increases than those 72% of quarters to the left of this line. It is tempting to use more extreme cutoffs for anemic or robust economic growth, but these create statistical challenges due to small amounts of data.

Exhibit 2: We Split Quarters into those with Anemic, Moderate and Robust GDP Growth, then Pair the Anemic Growth Months with Crude Oil Price Declines to Obtain Demand-Driven Declines. Months with Robust Growth and Crude Oil Increases Are Demand Driven Increases



Source: ClariFI, Bloomberg, Morgan Stanley Research

Even including a number of variations in crude oil effects, few equity cohorts show significant exposure to crude beyond that embedded in their market betas (**Exhibit 3**). **Only four of ten sectors show crude oil sensitivity, and this comes exclusively through same-month changes in crude oil prices**. Staples and discretionary sectors tend to move opposite to crude, with the former having a larger sensitivity; energy and materials tend to move in the same direction as crude oil price changes. **None of the lagged, asymmetric, large-magnitude or supply/demand related effects matter at the sector level, once we include the overall market.**

Cyclicals and junk both outperform, by an average of 0.9% and 1.1%, respectively, in months with large increases in crude oil prices; cyclicals underperform (by 80bp) in months of demand-driven crude oil price declines. The threshold for junk outperformance is lower, at 5% crude oil price increases, than that of cyclicals. **Meanwhile, defensives outperform (by 60bp on average) in months when crude oil has large declines.** This long-term analysis is consistent with what we saw in November.

Mega- and large-cap cohorts have no significant crude oil exposure beyond that contained within

their market betas; however, mid- and small-cap groups tend to have slight (50bp) outperformance in months identified as supply-related crude oil price increases.

Exhibit 3: Relatively Few Equity Cohorts Exhibit Crude Oil Price Sensitivity, even when a Number of Variations in Crude Oil Exposure Are Considered

Crude Oil Sensitivity
Monthly Regression Coefficients: April 1983 - November 2014

Sector/Cohort	S&P 500	Crude MoM%	Crude MoM% >10%	Crude MoM% >5%	Crude MoM% <-5%	Demand Driven Decrease	Supply Driven Increase
Consumer Discretionary	1.147	(0.055)					
Consumer Staples	0.733	(0.087)					
Energy	0.726	0.278					
Materials	1.068	0.043					
Mid-Cap	1.077						0.005
Small-Cap	1.114						0.005
Neither Value/Growth	1.116						0.004
Junk	1.380			0.011			
Cyclicals	1.146		0.009			(0.008)	
Defensives	0.814				0.006		
Neither Cyclical/Defensive	1.086	(0.029)					

Source: ClariFI, Bloomberg, Morgan Stanley Research

At the more granular industry level, there is greater variation in the type of crude oil effects, although lags are still uncommon, and significant asymmetries are nonexistent (Exhibit 4).

Metals and mining tends to overreact to crude oil moves (in the direction of the crude oil price change), with about half the initial impact being reversed in the subsequent month. On the other hand, **household durables has only about 60% of its (opposite to) crude oil move in the current month, and the rest in the following month**. It may take time to gauge the impact of lower crude on big-ticket consumer spending.

Airlines and automobiles suffer incrementally (i.e., beyond market beta and ordinary crude oil sensitivity in the former case), when there are large spikes upward in crude: airlines decline by an average of 2.8%, while automobiles fall by an average of 3.5%. Food products and hotels have similar, but more modest average declines when crude oil prices increase by more than 5% in a month. Household products typically benefits modestly, at 1.5%, when crude oil experiences a large decline.

For several industries, demand-driven crude oil declines influence returns; however, unlike the case of cohorts, these effects are scaled by the size of the crude oil price declines. Airlines benefit by almost 35bp for each 1% decline in crude oil during these months, whereas multiline retail picks up 18bp for each 1% decline. Metals and mining and industrial conglomerates are negatively impacted by demand-driven crude oil declines; in the former case, each 1% crude oil decline exerts an average of 30bp negative expected return for the industry.

Exhibit 4: Metals & Mining Tends to Over-react to Crude Oil Price Moves, and Half the Move is Subsequently Reversed, while Consumer Durables Tends to Continue its Crude Driven Moves for another Month

Crude Oil Sensitivity
Monthly Regression Coefficients: April 1983 - November 2014

Industry	S&P 500	Crude MoM%	Crude MoM%, 1M Lag	Crude MoM% >10%	Crude MoM% >5%	Crude MoM% <-5%	Demand Driven Decrease * Crude
Airlines	1.105	(0.112)			(0.028)		(0.347)
Automobiles	1.152			(0.035)			
Beverages	0.669	(0.074)					
Building Products	1.159	(0.081)					
Energy Equipment & Services	1.152	0.391					
Food & Staples Retailing	0.688	(0.101)					
Food Products	0.632				(0.014)		
Gas Utilities	0.642	0.086					
Hotels, Restaurants & Leisure	1.112				(0.013)		
Household Durables	1.177	(0.058)	(0.040)				
Household Products	0.577					0.015	
Industrial Conglomerates	1.051						0.090
Metals & Mining	1.122	0.153	(0.075)				0.300
Multiline Retail	1.085	(0.081)					(0.180)
Oil, Gas & Consumable Fuels	0.670	0.251					
Specialty Retail	1.208	(0.126)					
Textiles, Apparel & Luxury Goods	1.103	(0.056)					

Source: ClariFI, Bloomberg, Morgan Stanley Research

November: A Good Month, Unless You Were in Energy, High Beta, Small Cap, Mega Cap (ex-AAPL), Low Quality, Value or Cyclical Names

November was another solid month for the US equity market, with the S&P 500 rising 2.45%. Equity performance was far from homogeneous last month, however, as there was large dispersion among cohorts in size, style, quality, beta and cyclical/defensive character. While recent energy sector underperformance garnered much of the attention, high-beta stocks have also underperformed - even as the market has risen.

Size: Small-caps Continue to Lag

After adjusting for their equity betas, mega-cap and large-cap cohorts had modest positive residuals, at 0.16% and 0.28%, respectively **(Exhibit 5). Small caps once again lagged, as their beta-adjusted return was -2.41% in November.**

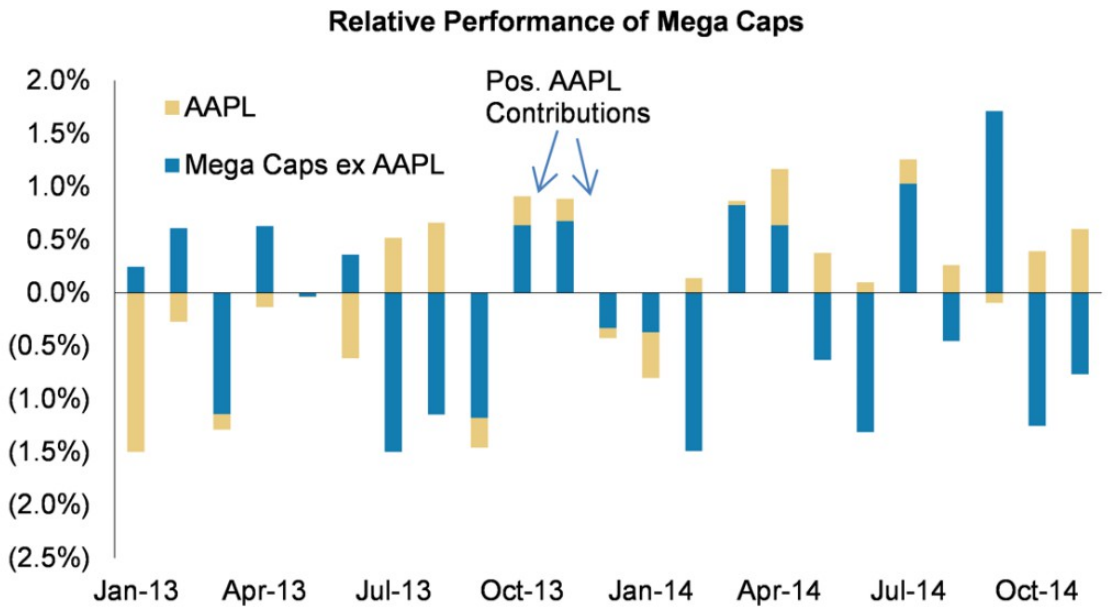
There is a consistent pattern to beta-adjusted returns over the last 3, 6 and 12 months: mega-caps are best, followed by large-caps, then mid-caps and finally small-caps. Over the last 12 months, small-caps have underperformed by 10.49%. This is a deterioration from October, but less severe than September's 13.98% underperformance. A lack of traditional activity in mid-cap and small-cap tender offers (see ***US Equity Strategy: Where Are We in the M&A Cycle?***, September 22, 2014) has been a potential drag on smaller-cap stocks' performance.

Exhibit 5: Small-caps Lagged by 2.4% Beta-Adjusted in November, and Have Underperformed by 10.5% during the Last 12 Months

Source: ClariFI, Morgan Stanley Research

The modest outperformance of mega-caps was mainly due to AAPL's 10.1% gain: AAPL contributed 0.6% to the cohort's relative return, while the remaining 49 mega-cap stocks combined to underperform the market by 0.77% on a relative basis. This is the fourth straight month in which AAPL has had opposite relative performance to the mega-cap cohort, highlighting the difficulty of hedging AAPL exposure with mega-cap stocks (**Exhibit 6**), see ***US Equity Strategy: AAPL: How Do You Do Risk Management***, May 21, 2012.

Exhibit 6: Net of AAPL's 10.1% November Gain, Mega-Caps Underperformed by 77bp Last Month



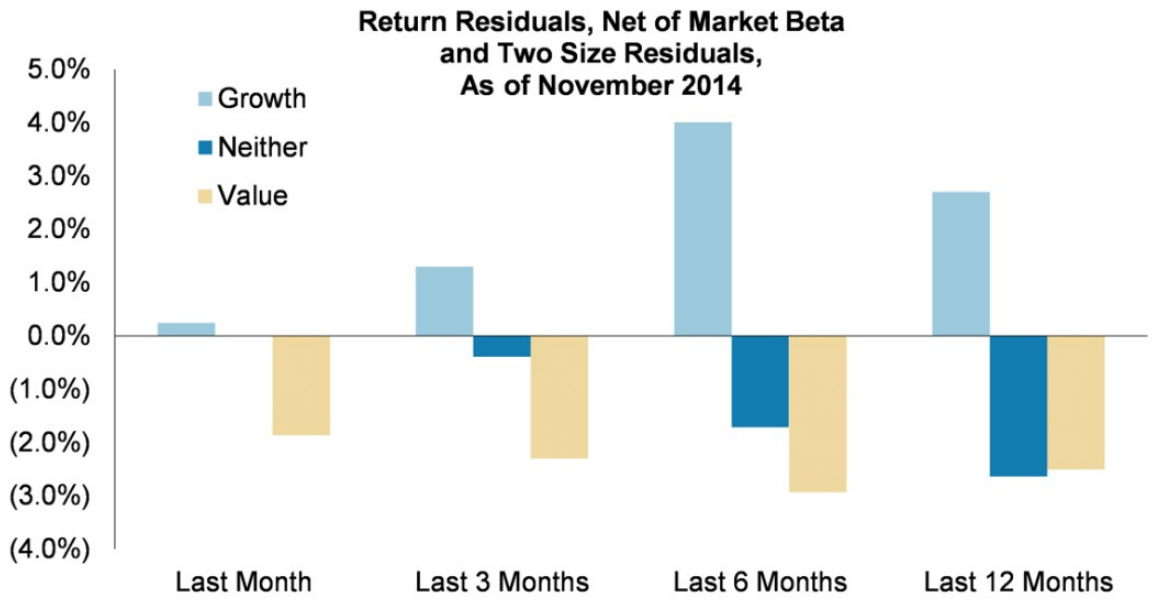
Source: ClariFI, Morgan Stanley Research

If You Blinked, You Missed the Latest Value Rally

October's value rally was more than reversed in November, when value underperformed by 1.87% beta and size adjusted, while growth gained 0.24% (Exhibit 7). Growth also leads value over the last 3, 6 and 12 months; in the latter time frame, risk-adjusted growth outperformance is 5.2%.

Over the last year, the worst performing style category has been neither value nor growth (the middle third of stocks in our style classification). This result is indicative of a "no man's land" – stocks that are not really cheap or fast growing – that is shunned by investors (see ***US Quant Research: Are You Caught in No-Man's Land?***, July 10, 2014). This also occurred in a scenario based on the 2004 "telegraphed" Fed tightening period (see ***US Equity Strategy: Rates, Dollar, and Oil - What's the Playbook?***, October 6, 2014) for both style and cyclicals/defensives. By contrast, the "neither value nor growth" cohort performed relatively well in an *unexpected* tightening scenario during the first six months of 1994.

Exhibit 7: Growth Resumed its Outperformance in November and Leads Value over the Last 3, 6 and 12 Months

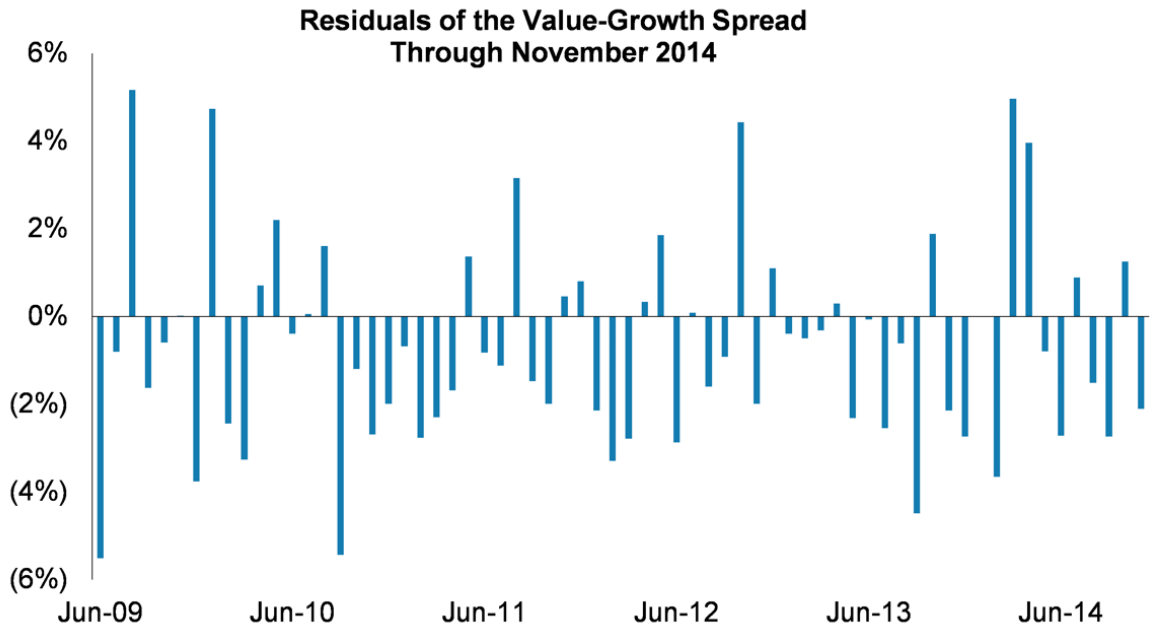


Source: ClariFI, Morgan Stanley Research

Growth has beaten value in 46 of 66 months, and by an average of 71bp per month net of beta and size, since the post-Crisis relief rally ended in June 2009 (Exhibit 8). In the few months where value outperformed, it often did so by a lot (e.g., five months over 4%), resulting in significant positive skewness of 0.6 for the value-growth residuals. The March/April 2014 style rotation, where value led by nearly 9%, is clearly visible, but growth has dominated since that episode; for more details, see ***US Quant Research: The Hyper-Rotation Out of Hyper-Growth***, April 7, 2014.

Revenue growth continues to command a premium in an environment of scarce global growth. This has led to a general upward march in growth stocks, occasionally punctuated by large snap-backs in value. The brief, sharp value moves have been quickly reversed, suggesting a liquidation component to them (perhaps investors get complacent with their positioning during the extended growth rallies).

Exhibit 8: Since the Post-Crisis Relief Rally Ended in June 2009, Growth Has Beaten Value in 46 of 66 Months, by and Average of 71bp Risk-Adjusted



Source: ClariFI, Morgan Stanley Research

Quality Beats Junk Again in November

In November, risk-adjusted performance improved monotonically with quality, as high-quality stocks beat junk by 2.21% (Exhibit 9). This was the fourth consecutive month of quality outperformance, after junk led in five of the first seven months of 2014. The cumulative quality outperformance, net of the three Fama-French factor contributions (market, size and style), has grown to 6.91% over the last three months, and quality now leads junk by 2.38% over the last year. **Quality even leads junk on raw quartile returns over the last 12 months - the first time since February 2013 this has occurred.**

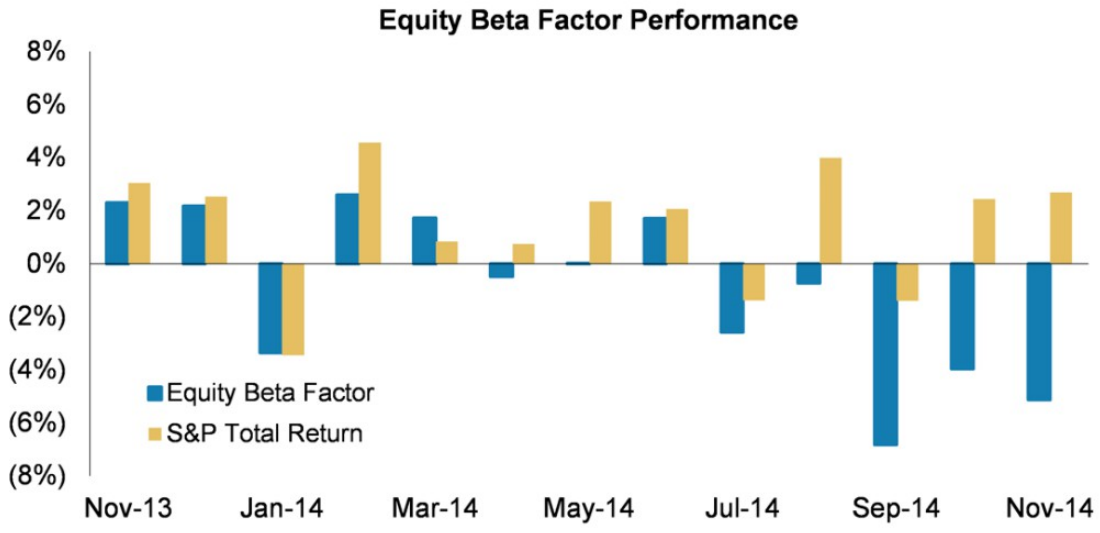
Exhibit 9: High Quality Stocks Have the Best Risk Adjusted Returns in the Last 1, 3, 6 and 12 Months

Source: ClariFI, Morgan Stanley Research

High Beta: Low Performance

If not for energy sector underperformance, high versus low beta would be our November microstructure headline: in an up market, high-beta stocks underperformed low-beta stocks by 5.14%. This marks the fifth straight month of high-beta underperformance, with three of those months having large, positive equity market returns (**Exhibit 10**). Why are investors punishing high-beta stocks (or seeking low-beta stocks)? Bond yields are low globally, with the US 10-year yield around 2.3%, Germany's yield below 1% and Japanese yields around 0.4%. Consequently, investors may be seeking yield through equities. Yet equity market performance has been solid in 2014, and with growing confidence in the US economy and equity earnings, it would be understandable if some investors sought higher equity market exposure.

Exhibit 10: High Beta Lagged Low Beta by 5.14% in November's Up-Market, Marking the Fifth Consecutive Month of High-Beta Underperformance - a Period that Includes Three Market Rallies

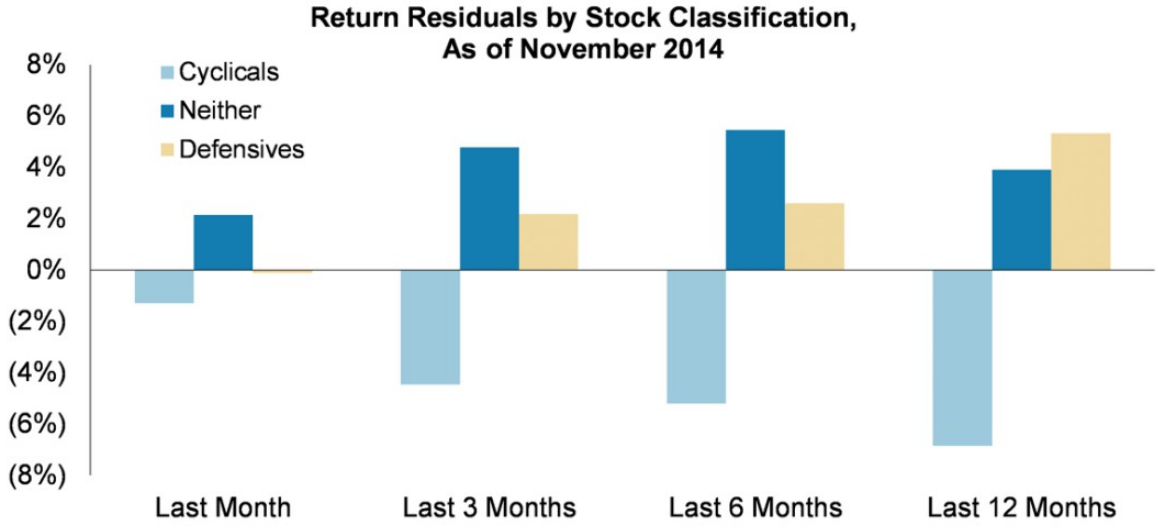


Source: ClariFI, Morgan Stanley Research

Defensives? Cyclicals? None of the Above

While defensives beat cyclicals in November on a risk-adjusted basis, the best-performing group was composed of industries that are neither cyclical nor defensive (Exhibit 11). This "neither" group, which has a large financials component, outperformed by 2.15% last month, and by 4.78% over the last quarter. Over the last 1, 3, 6 and 12 months, cyclicals have consistently been the laggards of the group, with defensives and neither alternating leadership. Declining 10-year yields have made dividend-paying defensive stocks more attractive to investors.

Exhibit 11: While Defensives Have Continued to Outperform Cyclicals, "Neither" Has Been the Best Industry Category over the Last 1, 3 and 6 Months

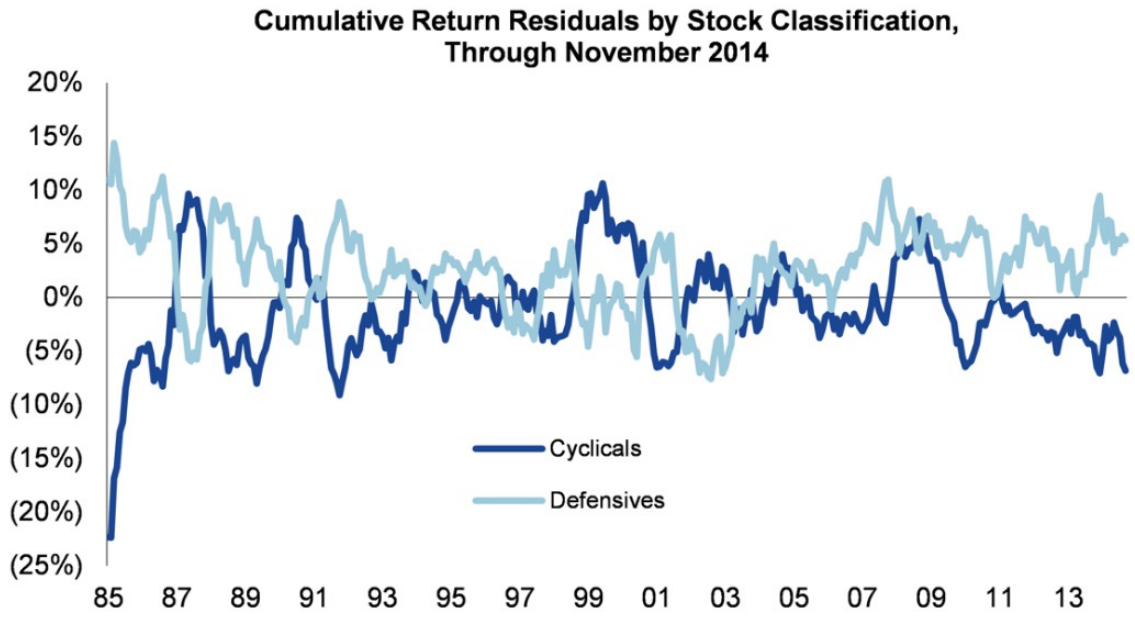


Source: ClariFI, Morgan Stanley Research

The rolling 12-month defensive-cyclicals spread widened to 12.2% in November, the largest since February 2014 (Exhibit 12). Since the peak of the Financial Crisis in 2008, defensives have outperformed

cyclicals over every 12-month period. Our analysis indicates that momentum and earnings revisions are key drivers of cyclical versus defensive returns (see ***US Equity Strategy: Are Expensive Defensives Offensive?***, July 16, 2012).

Exhibit 12: The 12-Month Defensive-Cyclical Spread Widened to 12.2% in November, the Largest since February 2014



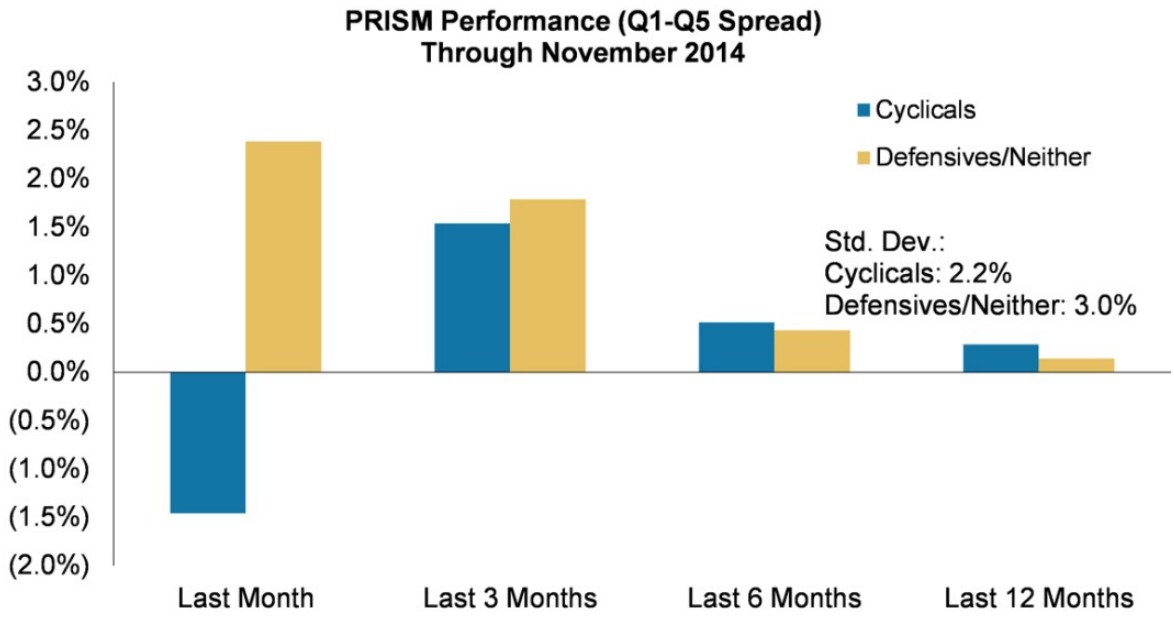
Source: ClariFI, Morgan Stanley Research

PRISM (Industry Alpha Model) Continues its Solid Performance

We developed an industry alpha model (PRISM) that ranks industries in two groups (cyclicals and defensive/neither) by expected risk-adjusted quarter-ahead return (see ***US Equity Strategy: Seeing Industries in a New Light with PRISM***, Sept. 3, 2013). Alpha forecasts for around 65 cap-weighted GICS industries are based on valuation, momentum, capital use and balance sheet metrics, profitability, and dispersion of returns and valuation within industries. Industries are classified into cyclicals, defensive or neither according to our dynamic model (see ***US Equity Strategy: Cyclicals or Defensives***, Feb. 26, 2012), with different factors in PRISM, depending on their classification. Investors can use PRISM to select industries within defensives/neither and cyclicals, and to decompose expected alpha into 8-10 factor drivers. Historically, the turnover of PRISM has been limited, with 2-3 industries out of 13 in each of the top and bottom quintiles expected to be replaced each month.

The defensive sub-model of PRISM worked well in November, with the top quintile leading the bottom quintile by 2.38%. Recently, the cyclicals sub-model had been the better performer, but it gave back 1.46% in its Q1-Q5 spread last month (**Exhibit 13**). Both models have positive average Q1-Q5 spreads over the last 3, 6 and 12 months. **Based on our backtest results, the high degree of systematic risk in industry returns, and the small number of industries in each quintile (6 or 7 per sub-model), we expected PRISM returns to be volatile.** Indeed, the monthly standard deviation of the cyclicals model has been 2.2% over the last year, with 3.0% volatility for the defensive sub-model. Nevertheless, PRISM can be a useful tool for investors to gain insight on industry positioning.

Exhibit 13: The Defensive Sub-Model of PRISM Had Strong Performance in November, and both Sub-Models Have Worked Well over the Last Six Months



Source: ClariFI, Morgan Stanley Research

Only two industries entered the top quintile of PRISM last month, but one of these - energy equipment & services - moved all the way from Q3 to Q1 (Exhibit 14). Both energy sector industries are now in the top quintile of PRISM. There is also a large contingent of utilities and technology industries. From the health care sector, only health care providers & services are in Q1 of PRISM. In the bottom quintile of PRISM, the only new entries last month were construction materials and transportation infrastructure.

Exhibit 14: Energy Equipment and Services Rose from Q3 to Q1 of PRISM in November

PRISM Industry Ranks - November and October 2014

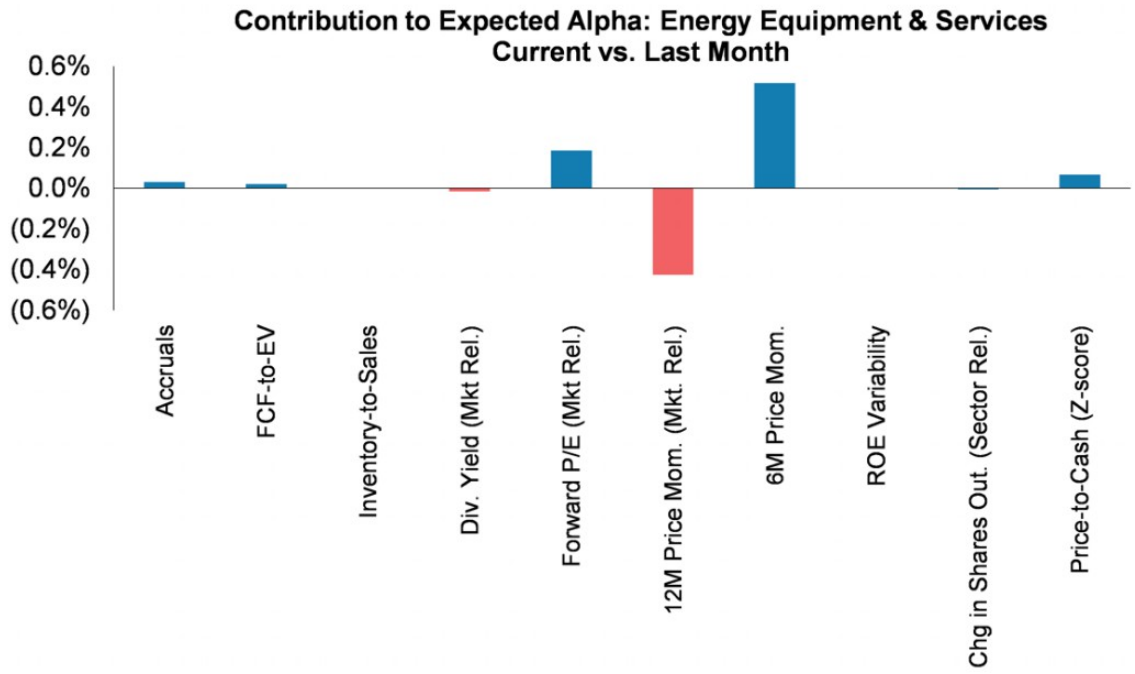
Industry	Current Quintile	Previous Quintile
Communications Equipment	Q1	Q1
Computers & Peripherals	Q1	Q1
Electric Utilities	Q1	Q1
Energy Equipment & Services	Q1	Q3
Gas Utilities	Q1	Q1
Health Care Providers & Services	Q1	Q1
Independent Power Producers & Energy Traders	Q1	Q2
Insurance	Q1	Q1
Multi-Utilities	Q1	Q1
Oil, Gas & Consumable Fuels	Q1	Q1
Road & Rail	Q1	Q1
Semiconductors & Semiconductor Equipment	Q1	Q1
Water Utilities	Q1	Q1
Aerospace & Defense	Q2	Q2
Air Freight & Logistics	Q2	Q2
Capital Markets	Q2	Q1
Chemicals	Q2	Q2
Commercial Banks	Q2	Q2
Commercial Services & Supplies	Q2	Q2
Distributors	Q2	Q2
Electronic Equipment, Instruments & Components	Q2	Q1
Food Products	Q2	Q3
Household Products	Q2	Q2
Industrial Conglomerates	Q2	Q2
Paper & Forest Products	Q2	Q2
Professional Services	Q2	Q2
Tobacco	Q2	Q2
Auto Components	Q3	Q3
Beverages	Q3	Q4
Construction & Engineering	Q3	Q3
Diversified Financial Services	Q3	Q3
Food & Staples Retailing	Q3	Q3
Health Care Equipment & Supplies	Q3	Q3
Hotels, Restaurants & Leisure	Q3	Q2
IT Services	Q3	Q2
Life Sciences Tools & Services	Q3	Q3
Machinery	Q3	Q3
Media	Q3	Q3
Textiles, Apparel & Luxury Goods	Q3	Q3
Wireless Telecommunication Services	Q3	Q5
Airlines	Q4	Q4
Building Products	Q4	Q4
Consumer Finance	Q4	Q4
Containers & Packaging	Q4	Q4
Diversified Consumer Services	Q4	Q3
Diversified Telecommunication Services	Q4	Q4
Marine	Q4	Q3
Metals & Mining	Q4	Q4
Multiline Retail	Q4	Q4
Pharmaceuticals	Q4	Q4
Real Estate Investment Trusts (REITs)	Q4	Q5
Software	Q4	Q4
Specialty Retail	Q4	Q4
Trading Companies & Distributors	Q4	Q4
Automobiles	Q5	Q5
Biotechnology	Q5	Q5
Construction Materials	Q5	Q4
Electrical Equipment	Q5	Q5
Health Care Technology	Q5	Q5
Household Durables	Q5	Q5
Internet & Catalog Retail	Q5	Q5
Internet Software & Services	Q5	Q5
Leisure Equipment & Products	Q5	Q5
Personal Products	Q5	Q5
Real Estate Management & Development	Q5	Q5
Thrifts & Mortgage Finance	Q5	Q5
Transportation Infrastructure	Q5	Q4

Source: ClariFI, Morgan Stanley Research

Based on an increase of 37bp in expected alpha, energy equipment and services climbed from Q3 of PRISM to Q1 last month. Looking at the changes in contributions to expected alpha over the past month, the main drivers were **an improved price-to-forward earnings ratio, and strong anticipated mean-reversion from 6-month price momentum. Together with smaller positive contributions from lower accruals,**

higher free cash flow to enterprise value and higher cash to price, these improvements outweighed the decline in 12-month price momentum (Exhibit 15).

Exhibit 15: Cheaper Valuation and Anticipated Mean Reversion Outweigh Negative Long-Term Momentum in Pushing Energy Equipment & Services to the Top Quintile of PRISM



Source: ClariFI, Morgan Stanley Research

MOST, BEST and Synergy

We have two models that rank stocks according to their expected risk-adjusted returns (i.e., alphas), one for the upcoming 3-month period [MOST] (see ***US Equity Strategy: Introducing MOST: Morgan Stanley's Quantitative Stock-Selection Model***, February 13, 2011) and one for the upcoming 24-month period [BEST] (***US Equity Strategy: Introducing BEST: Morgan Stanley's New Biannual Equity Selection Tool***, September 11, 2011). In addition to the non-standard forecasting horizons, these alpha models have other distinctive features, including individualized models for custom sectors, no momentum factor in MOST, a negative long-term momentum in BEST, and robust estimation methods.

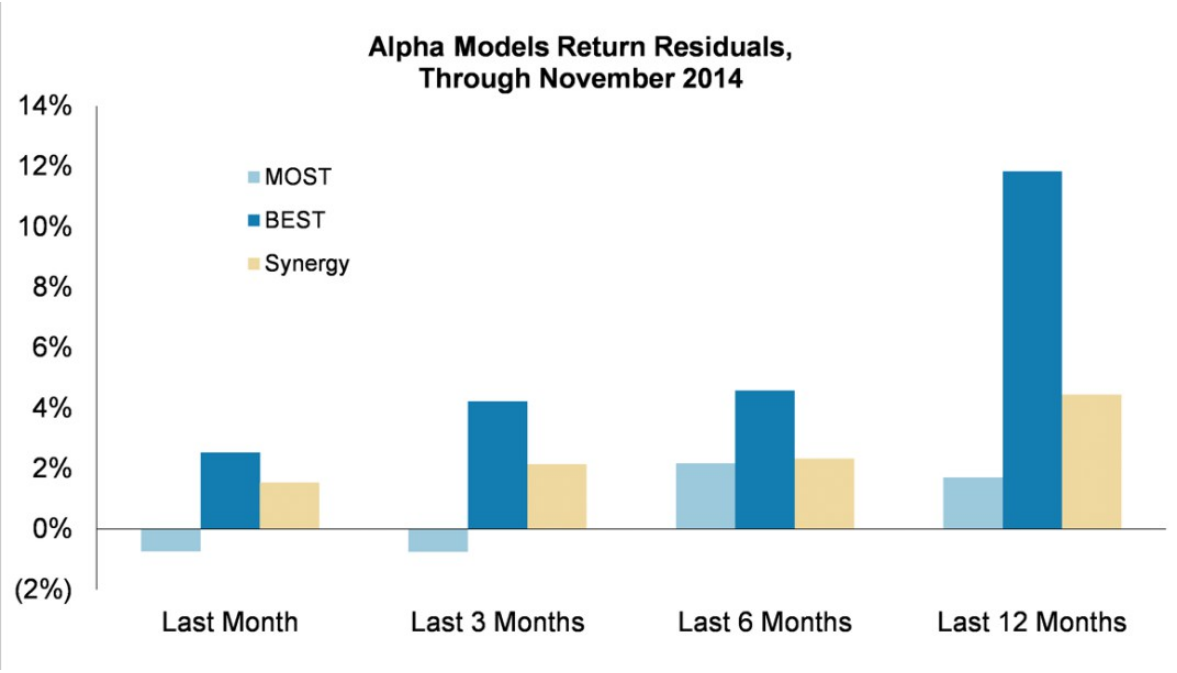
After building MOST and BEST, we found that they are synergistic; i.e., at horizons of 1 to 6 months, stocks that appear in the top two quintiles of both models simultaneously outperform stocks that appear in the bottom two quintiles of both models by more than the Q1-Q5 spread of either model. Since the stocks that meet our criteria are roughly 20% of total historical observations for the top two quintiles and 20% for the bottom two, we refer to the combined relative performance as the Q1-Q5 Synergy model.

Although our alpha models are designed to extract stock-specific returns, they contain some systematic risk exposures. For example, BEST – with a long horizon – has a persistent value bias: all else equal, BEST has better returns when value beats growth. MOST does not have a value bias, but has preferred mid-cap stocks over large- and mega-cap stocks. For details on our alpha model exposures, see ***US Equity Strategy: Unemotional Approaches***, October 4, 2011.

When we remove contributions from systematic risk, we isolate the alpha generation of our alpha models. Since BEST tends to have a value bias, and MOST tends to favor mid-cap stocks, stripping away factor contributions is important in months like this past April that have value and mega-cap rallies. Otherwise, the performance of BEST may be inflated by its inherent style bet, while MOST may be penalized for its underlying size bias.

BEST continued its strong recent performance in November, with a Q1-Q5 alpha of 2.54%. Despite MOST having -0.74% alpha last month, the Synergy model gained 1.55% (Exhibit 16). All models have positive Q1-Q5 alphas over the last 6 and 12 months, with 11.83% and 4.45% alphas for BEST and Synergy, respectively, over the last 12 months.

Exhibit 16: BEST Gained 254bp of Alpha in November and Has Generated 11.8% Alpha in the Last 12 Months. Synergy Has also Been Strong with 445 bp of Alpha in the Last 12 Months.



Source: ClariFI, Morgan Stanley Research

Measuring Factor Efficacy

We maintain a library of quantitative factors that spans several categories, including valuation, growth and sentiment, capital use, and technicals. In addition to being the building blocks of our quantitative alpha models, these factors are used by investors in screens and performance attribution. Factor performance is measured as the equal-weight top quintile return minus that of the bottom quintile. Economic principles, intuition and long-run performance combine to give a natural choice for the "good" and "bad" quintiles. Our factor library and detailed sector-level efficacy results are contained in ***US Equity Strategy: The Factor Reference Guide*** , August 5, 2014.

As is the case with portfolios of equities, factors embed differing levels of systematic risk. To quantify these systematic risks in our factor library, we conducted a principal components analysis of the factor covariance matrix; see ***US Quant Research: Quantabees Beware: Explaining Factor Efficacy*** , March 7, 2012. From this analysis, we found four main effects that explain 82% of the factor variation; these effects include a valuation factor and a multi-time-scale momentum factor. When we strip off these effects, we obtain the idiosyncratic performance of factors. For example, idiosyncratic performance sheds light on whether investors focused generally on valuation or specifically on price-to-book over some period. Since factors have different sensitivities to the principal components, their idiosyncratic factor returns may be vastly re-ordered from the raw factor returns.

In November, investors favored stocks with low capital spending (all normalizations), as well as those with low estimate dispersion and high free cash flow. Total yield also worked well on an adjusted basis (i.e., after adjusting for value underperformance). **(Exhibit 17).** There has been a high degree of consistency in the top-performing factors over the last year: eight of the top 9 factors from November were also in the top 9 from the last 3, 6 and 12 months. **Quant equity funds whose models emphasize high free cash flow and low capital spending should have been able to generate solid returns over the last year.**

A number of sales-related factors fared poorly in November: sales stability, sales per employee, sales growth and 1-year sales growth were all in the bottom 10 of adjusted performance. Stocks with high long term growth rates also underperformed last month. While not as consistent as the set of top-performing factors, the bottom 10 factors from last month have been among the worst performers in the last 3, 6 and 12 months.

Exhibit 17: Stocks with Low Capital Spending and High Free Cash Flow Outperformed in November

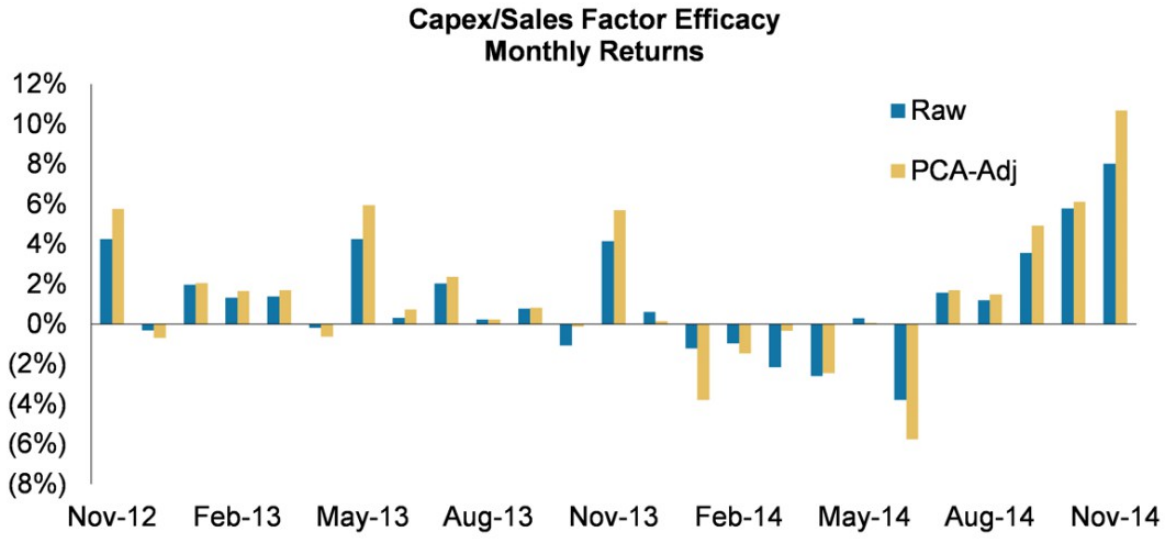
Top 1500 US Stocks: Adjusted Factor Efficacy
Through November 2014

	Factor Ranks							
	1-Month		3-Month		6-Month		12-Month	
Factor	Adjusted	Raw	Adjusted	Raw	Adjusted	Raw	Adjusted	Raw
CapEx-to-Sales*	1	1	1	1	1	3	8	9
CapEx-to-Depreciation*	2	5	5	8	9	10	9	8
Receivables Turnover	3	8	6	9	4	7	7	5
CapEx-to-Assets*	4	7	3	3	2	1	1	1
Estimate Dispersion*	5	12	2	4	7	8	2	7
Free Cash Flow-to-Debt	6	4	4	2	3	2	6	3
Enterprise Value-to-Free Cash Flow*	7	9	7	5	5	4	4	4
Asset Turnover	8	3	13	6	13	9	19	15
Free Cash Flow Yield	9	11	8	7	6	6	3	2
Total Yield	10	47	19	48	18	46	12	12
Enterprise Value-to-EBITDA*	64	63	68	68	69	70	53	43
Forecast long term growth	65	56	69	65	68	59	73	72
Inventory Turnover	66	67	61	64	60	63	62	61
Operating Leverage	67	65	70	70	67	67	64	67
1-Year Sales Growth	68	61	64	60	54	47	60	55
Price-to-EBITDA*	69	69	67	69	70	71	57	50
Sales Growth	70	66	66	63	62	56	66	65
Incremental Margin	71	70	71	71	71	69	68	69
Sales per Employee	72	72	72	72	72	72	52	56
Sales Stability	73	73	73	73	73	73	72	73

Source: ClariFI, Thomson Reuters, Morgan Stanley Research. Note: *indicates that low values are preferred.

Low capital spenders continued to outperform in November. When normalized by sales, low spenders have led for the last six months. (**Exhibit 18**). The recent outperformance of low capital spenders is more in line with the long-run efficacy of this set of factors. **Declining crude oil prices have negatively impacted energy companies which are prevalent in the top quintiles of capital spending. Indeed last month's strong factor performance was driven mainly by bottom-quintile underperformance:** For capex/sales, Q1 was +1.97% and Q5 was -6.05%; for capex-to-depreciation, Q1 was 1.51% and Q5 was -5.04%; and for capex-to-assets, Q1 was 1.59%, while Q5 was -4.91%.

Exhibit 18: The Exceptional Performance of Capex-to-Sales in November Was mainly Due to Underperformance of High Capital Spenders, particularly Energy Stocks

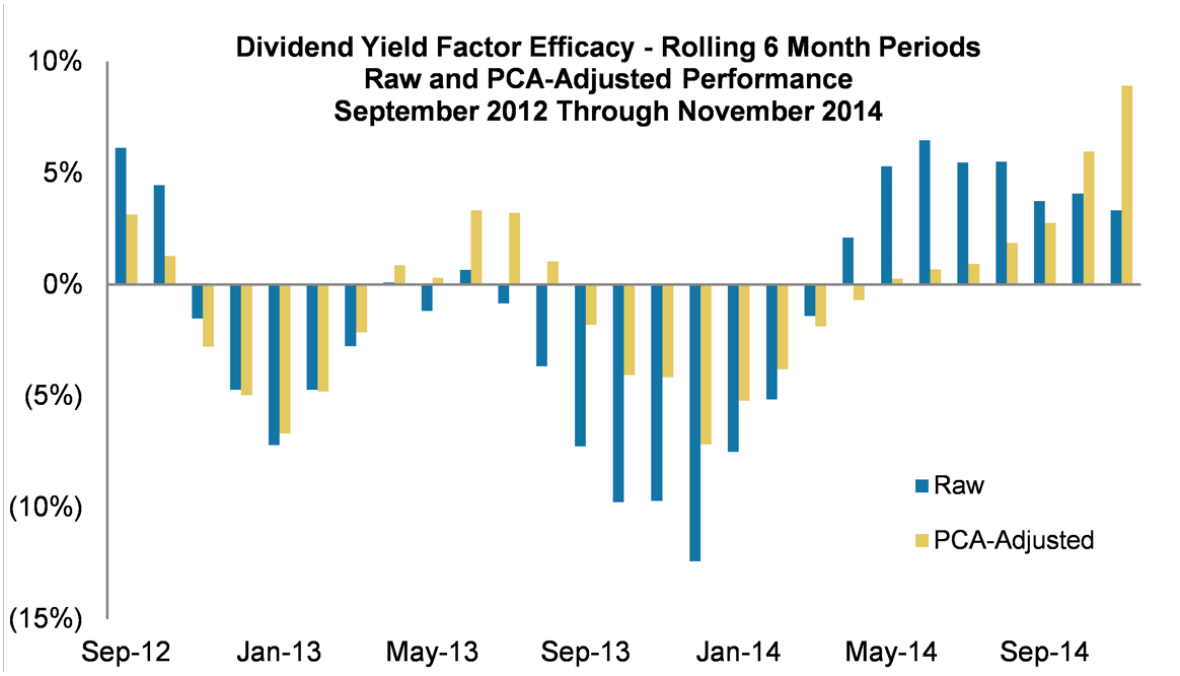


Source: ClariFI, Morgan Stanley Research

High yielding stocks performed well again in November, particularly after adjusting for the underperformance of value stocks (**Exhibit 19**). Continued low bond yields have increased the relative attractiveness of high yielding stocks; this is consistent with our analysis of interest rate sensitivity for the factor

(see ***US Quant Research: Equities Enjoy Some Quality Time*** , September 9 , 2014).

Exhibit 19: The Performance of Dividend Yield Has Been Strong with Continued Low Bond Yields in 2014



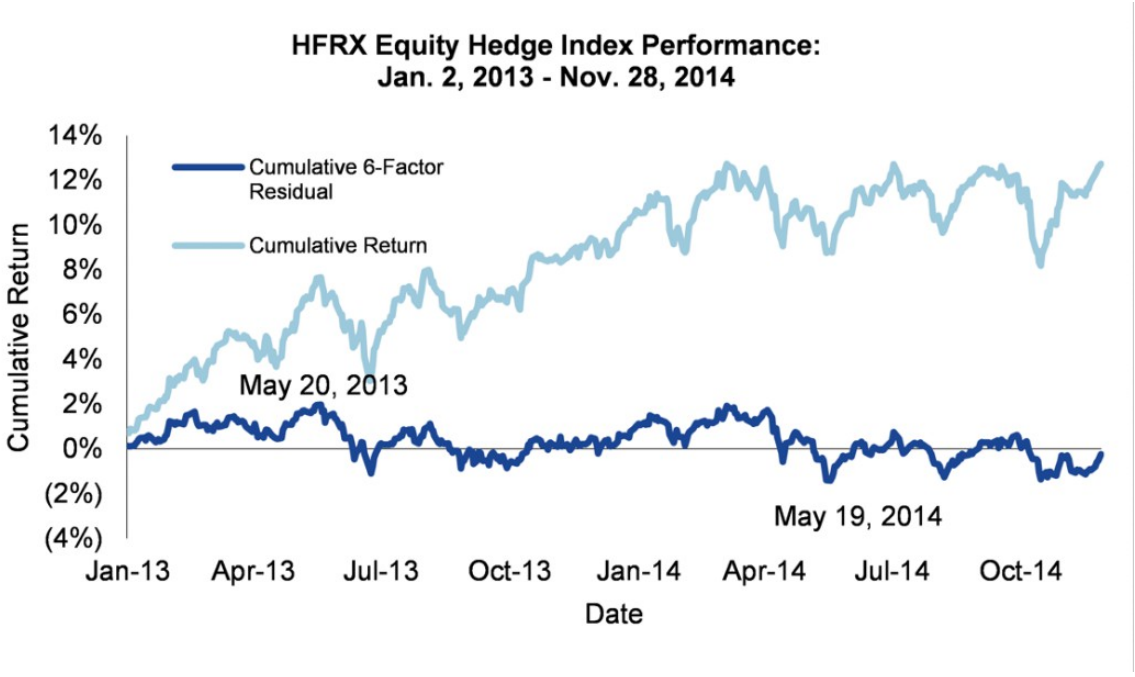
Source: ClariFI, Morgan Stanley Research

Modestly Positive November for Equity Long/Short Alpha, but No Rebound for Event Driven Funds

Equity long/short hedge fund alpha, as estimated from the HFRX Equity Hedge Index, was modestly positive in November, at +5bp. Although this is an improvement from October, it still leaves the index with net negative cumulative alpha (-24bp) since January 2013 **(Exhibit 20**). Given the pickup in stock-specific risk (see next section), this period should have been a favorable environment for alpha generation. **We recently analyzed hedge fund alpha generation (see *US Quant Research: Schrödinger's Stat: Uncertainty in Hedge Fund Alpha* , June 23, 2014), and found that negative market timing contributions have masked some improvement in alpha; however, the magnitude of alpha remains well below pre-Crisis levels.**

The equity market beta of the HFRX Equity Hedge Index rose to 0.367 in November. This is a fairly sharp increase from 0.3 in early August. Higher volatility in September and October and some crowded positions may have contributed to this rise.

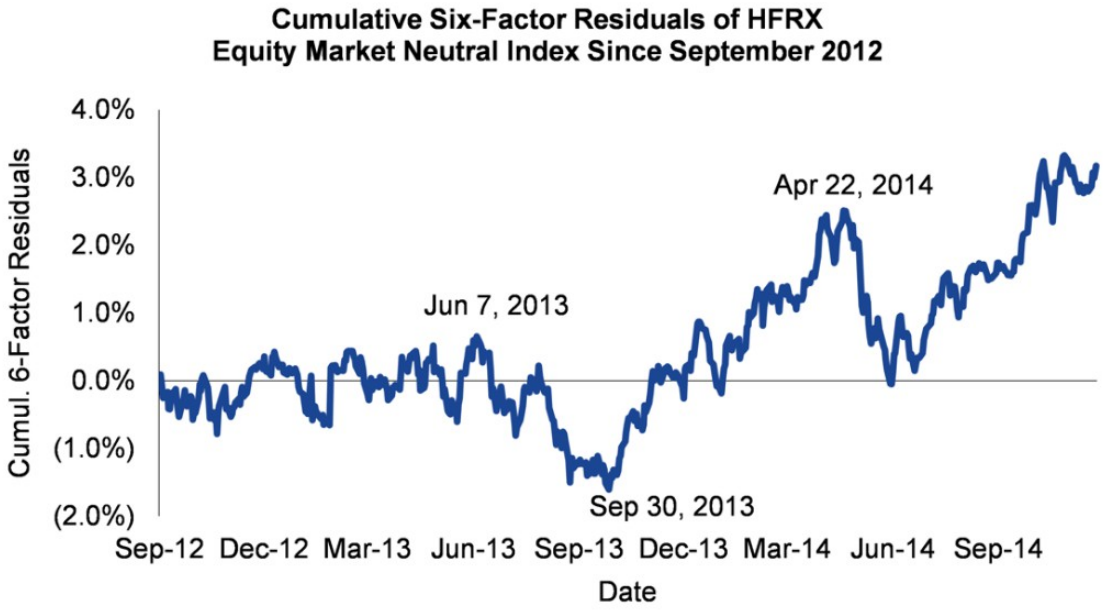
Exhibit 20: The HFRX Equity Hedge Index Gained 5bp of Alpha in November, but Remains at Negative Cumulative Alpha since January 2013



Source: ClariFI, Hedge Fund Research, Morgan Stanley Research

Although quant equity hedge funds, as proxied by the HFRX Equity Hedge Index, gave back an estimated 16bp of alpha in November, they have still gained over 3% alpha since late-June (**Exhibit 21**). Negative residuals for this index during the first half of November exceeded positive residuals during the second half of the month.

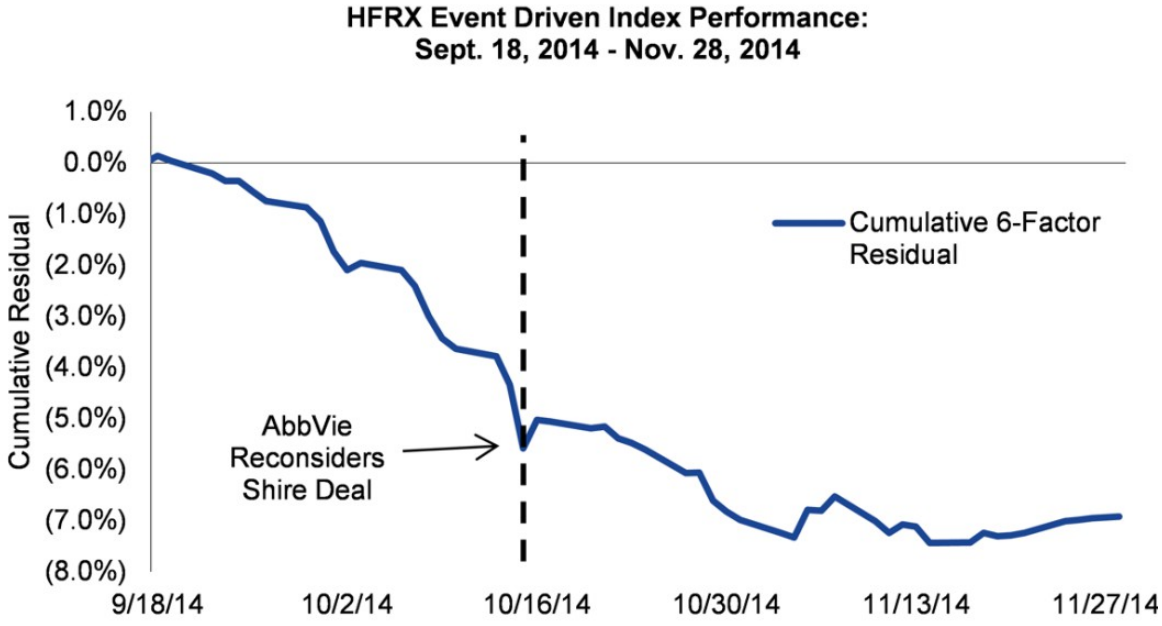
Exhibit 21: The HFRX Equity Market Neutral Index Lost 16bp of Alpha in November, primarily during the First Half of the Month. The Index Has still Gained over 3% Alpha since June.



Source: ClariFI, Hedge Fund Research, Morgan Stanley Research

After incurring large losses in September and October, event-driven hedge funds (e.g., those engaged in merger arbitrage) failed to rebound in November. We estimate that the alpha of the HFRX Event Driven Index was 7bp in November, coming off of -7% alpha between September 18 and October 31 (**Exhibit 22**).

Exhibit 22: The HFRX Event Driven Index Failed to Rebound from its September/October Alpha Decline in November

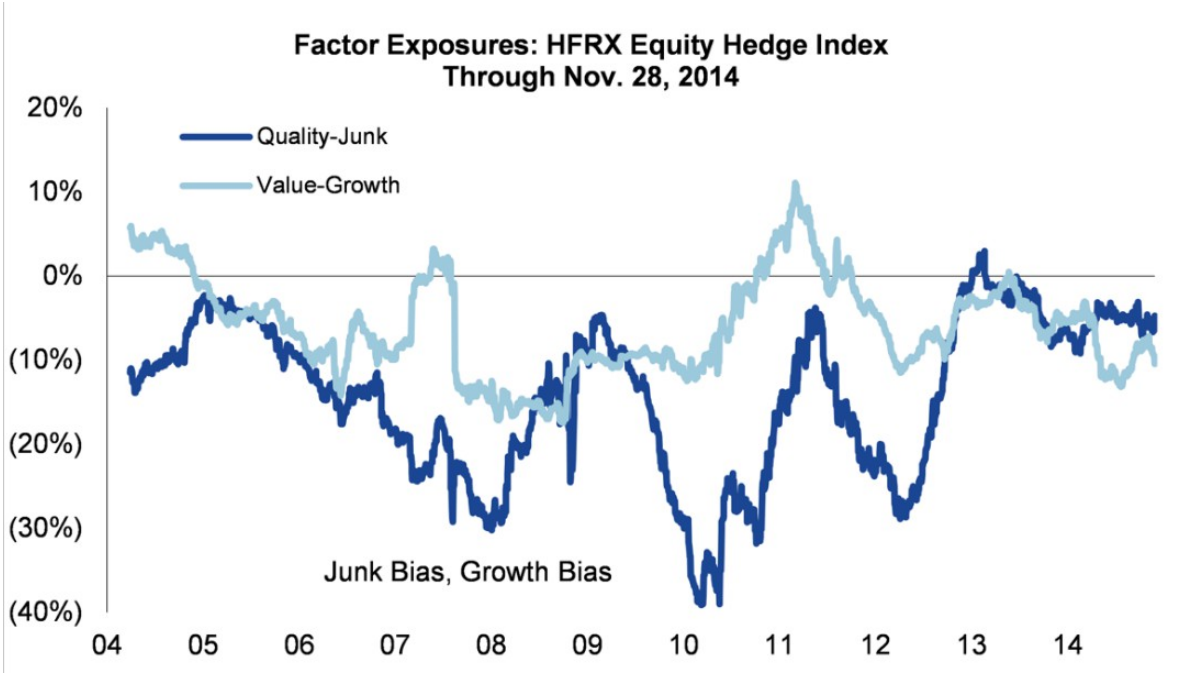


Source: ClariFI, Hedge Fund Research, Morgan Stanley Research

Stocks Consistent with Hedge Fund Factor Exposures

Equity long/short hedge funds maintained their growth and low quality/junk biases in November (Exhibit 23). Both the growth and junk biases have been consistent over the past decade. As discussed in an earlier note (see ***US Quant Research: Non-Normal Activity***, Nov. 4, 2013), growth and junk biases tend to increase the skewness (i.e., positive asymmetry) of equity return distributions and are consistent with hedge funds seeking lottery-like payoffs.

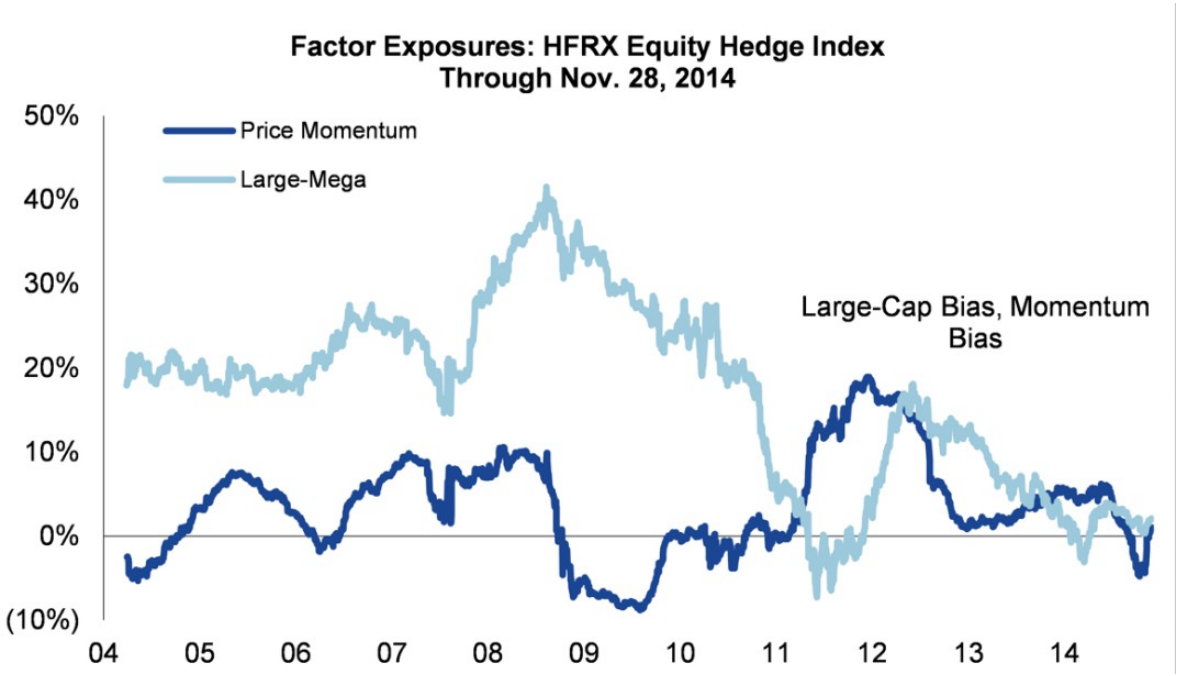
Exhibit 23: The HFRX Equity Hedge Index Maintained its Growth and Junk Biases in November



Source: ClariFI, Hedge Fund Research, Morgan Stanley Research

After briefly having a negative momentum bias, equity hedge funds returned to their more traditional positive momentum bias in November (Exhibit 24). The anti-mega-cap bias of the HFRX Equity Hedge Index also increased last month.

Exhibit 24: The HFRX Equity Hedge Index Is back to a Positive Momentum Bias, and its Anti-Mega-Cap Bias Increased Last Month



Source: ClariFI, Hedge Fund Research, Morgan Stanley Research

We construct screens of stocks that are consistent with or opposite to the current multi-factor exposures of the HFRX Equity Hedge Index. In **Exhibit 25**, we show stocks with exposures *consistent* with those of the index: large-cap stocks only, with a growth bias (i.e., not value or neither), a low-quality bias (bottom two quartiles), and a momentum bias (to three quintiles of price momentum). **The overweight-consistent list is dominated by biotechnology, pharmaceutical and technology stocks**

Exhibit 25: Stocks Consistent with Hedge Fund Exposures include a Number of Biotech, Pharma and Technology Names

Ticker	Company	Sector	Market Cap ($B)
CELG	Celgene Corp	Health Care	90.8
ACT	Actavis Plc	Health Care	69.7
REGN	Regeneron Pharmaceuticals	Health Care	41.5
ALXN	Alexion Pharmaceuticals Inc	Health Care	38.2
MU	Micron Technology Inc	Information Technology	37.5
WMB	Williams Cos Inc	Energy	37.5
CRM	Salesforce.Com Inc	Information Technology	37.3
VRTX	Vertex Pharmaceuticals Inc	Health Care	28.1
CCI	Crown Castle Intl Corp	Financials	27.5
ILMN	Illumina Inc	Health Care	26.9
SNDK	Sandisk Corp	Information Technology	22.7
STX	Seagate Technology Plc	Information Technology	21.6

Source: ClariFi, Morgan Stanley Research. For important disclosures regarding companies that are the subject of this screen, please see the Morgan Stanley Research Disclosure Website at www.morganstanley.com/researchdisclosures. Prices as of 12/5/2014: CELG: $113.63, ACT: $267.5, REGN: $423.21, ALXN: $197.66, MU: $36.07, WMB: $51.13, CRM: $58.95, VRTX: $118.71, CCI: $79.95, ILMN: $190.83, SNDK: $102.64,, STX: $66.09..

In **Exhibit 26**, we show stocks with the opposite factor sensitivities to equity hedge fund indexes, drawn from either the mega-cap and large-cap cohorts. These stocks have a value bias (not growth or neither), a high quality bias (top two quartiles in our quality model), and a negative momentum bias (bottom three quintiles of price

momentum). **Stocks in this list have exposures consistent with underweights by equity hedge funds, and are dominated by financial and energy companies.**

Exhibit 26: Large- and Mega-Cap Stocks with Value, Quality and Positive Momentum Biases - These Stocks Are Consistent with Equity Hedge Fund Underweights

Stocks with Exposures Opposite to Equity Long/Short Hedge Funds As of December 1, 2014

Ticker	Company	Sector	Market Cap ($B)
XOM	Exxon Mobil Corp	Energy	391.1
GE	General Electric Co	Industrials	261.3
JPM	Jpmorgan Chase & Co	Financials	224.3
CVX	Chevron Corp	Energy	211.2
PFE	Pfizer Inc	Health Care	197.0
T	AT&T Inc	Telecommunication Services	181.8
GS	Goldman Sachs Group Inc	Financials	85.2
COP	Conocophillips	Energy	83.4
USB	U S Bancorp	Financials	78.3
OXY	Occidental Petroleum Corp	Energy	61.6
MET	Metlife Inc	Financials	60.9
COF	Capital One Financial Corp	Financials	46.0
PNC	Pnc Financial Svcs Group Inc	Financials	45.7
D	Dominion Resources Inc	Utilities	42.2
PSX	Phillips 66	Energy	39.8

Source: ClariFi, Morgan Stanley Research. For important disclosures regarding companies that are the subject of this screen, please see the Morgan Stanley Research Disclosure Website at www.morganstanley.com/researchdisclosures. Prices as of 12/5/2014: XOM: $94.37, GE: $26.09, JPM: $61.38, CVX: $112.28, PFE: $31.67, T: $33.91, GS: $191.95, COP: $69.31, USB: $44.53, OXY: $82.54, MET: $55.18, COF: $82.09, PNC: $88.37, D: $72.74, PSX: $74.97.

Stock-Specific Risk Rebounded Slightly in November

Stock specific risk (252-day) rose slightly in November, from 0.570 to 0.576, keeping it above the prior year's value of 0.561; this is beneficial for subsequent alpha generation, (see US Quant Research: Idiosyncratic Risk Returns, Jan. 11, 2013) (Exhibit 27). When measured over a 63-day period, stock specific risk also rose in November. This latter measure is more volatile, but suggests that the improvement in stock specific risk is not merely due to year-ago returns rolling off the estimation interval.

Exhibit 27: Stock-specific Risk Rose in November, and Remains above its Year-Ago Level

Source: ClariFI, Morgan Stanley Research

Appendix: Refining Our Crude Oil Analysis

In our recent factor reference guide (see ***US Equity Strategy: The Factor Reference Guide*** , August 5, 2014), we included crude oil price change as a driver of contemporaneous equity returns (along with rates, spreads, currencies and other commodities). Since that time, crude oil prices have declined sharply, and this has been a key contributor to recent cross-sectional performance of stocks and cohorts. Given these recent large moves in crude oil, we are conducting a refinement of our analysis to include different aspects of crude oil price moves.

Specifically, we investigate:

1. Effects of lagged price changes in crude oil

a. Cheaper/more expensive crude oil generally feeds through to cheaper/more expensive gasoline prices, but there may be a delay between crude moves and gasoline moves. Since the latter are more important for consumers, the effect on spending may be lagged and the actual impact (including surprises) may only be visible later. Consequently, lagged crude price changes may be important – particularly on the consumer side

b. Include several monthly lags

2. Asymmetries in crude oil price moves

a. Price spikes can have different impacts than collapsing prices

b. We include absolute values of crude oil price moves (and their lags; see (1))

3. Large up/down swings

a. Large moves – those over some threshold – may influence prices differently than smaller moves

b. To balance size of moves and frequency, we use +/-5% and +/-10% as thresholds

4. Separating supply-based moves from demand based ones

a. We attempt to disentangle supply-based moves from demand-based ones by combining crude oil price changes with GDP growth

b. About 29% of quarters since 1983 had annualized GDP growth below 3%. We form a binary variable for months that have crude oil declines and are in anemic GDP quarters, which we denote as “demand driven declines”. Conversely, months in quarters with 2% or higher GPD growth and crude oil price declines are denoted as “supply driven declines”.

c. On the other hand, about 28% of quarters since 1983 have had GDP growth in excess of 5%. Months where crude oil prices rose during quarters with robust GPD growth were flagged as “demand driven increases”.

d. We also form three variables by multiplying the demand/supply driven flags by their respective monthly crude oil percent changes.

e. Idea is that IF crude oil prices decline sharply and GDP growth is at least OK, then a supply shock is more likely than a collapse in demand to be responsible for crude oil price declines. Alternatively, if the price decline occurs with a decline in GDP (or a below-average GDP) then demand may be more likely to be responsible

Data:

Monthly crude oil and equity cohort (sector, industry, size, style, quality, beta and cyclical/defensive) returns, from April 1983 through November 2014; we use WTI prior to 2010 and Brent starting in 2011; in between, we interpolate between the two series.

Procedure:

- Form 18 crude oil-related independent variables

- Test for individual significance on each equity cohort – we use least trimmed squares (LTS) to identify outliers in each equity cohort/crude oil factor pair, then run ordinary least squares (OLS) regressions on the subsets excluding outliers

- Evaluate fundamental relevance of each significant factor

- Run stepwise (forward) regressions that include all significant crude oil factors that are fundamentally relevant, as well as the equity market factor. Outliers from individual regressions are pooled and excluded

Our crude oil based factors are summarized in the table below (**Exhibit 28**)

Exhibit 28: We Tested 18 Crude-Oil Related Factors

Variables Tested in Crude Oil Analysis

Variable
Crude MoM%
Demand Driven Decrease:
GDP<3% & Crude <=0%
GDP<3% & Crude <=0% * Crude
Supply Driven Decrease:
GDP>=3% & Crude <=0%
GDP>=3% & Crude <=0% * Crude
Supply Driven Increase:
GDP<5% & Crude >0%
GDP<5% & Crude >0% * Crude
Large Crude Oil Changes:
Crude MoM% >10%, >5%, <-10%, ,-5%
Lags of Crude MoM%:
1-Month, 2-Month, 3-Month
Abs. Value Crude MoM% (Asymmetry):
Same Month, 1,2,3-Month Lags

Source: ClariFI, Bloomberg, Morgan Stanley Research

These factors were then applied to a number of sectors, cohorts and industries (**Exhibit 29**)

Exhibit 29: We Tested Our Crude Oil Factors on a Number of Sectors, Cohorts and Industries

Cohorts Analyzed
Cohort
S&P 500
Size (Mega-Cap, Large, Mid, Small)
Style (Growth, Value, Neither)
Quality (High Quality, Moderate, Low, Junk)
Beta (High Beta, Low Beta)
Cyclicals, Defensives, Neither
Sectors (10 GICS)
Industries (Largest 57 GICS Industries)

Source: ClariFI, Bloomberg, Morgan Stanley Research