Searching for Alpha: Profiting from Capex

Look To Capex Announcements

- **Redistribution to Reinvestment** — As we enter into a new stage of the business cycle, corporates are transitioning from redistribution of profits to growth reinvestment. This view is backed by our strategists - Equity Strategy - Capital Spending Gets More Interesting.

- **Selling High reported Capex…**— Empirical evidence suggests high reported Capex firms experience poor future stock returns. Explanations range from management empire building (over investment) to investors over-reacting to past growth. We propose an alternative explanation.

- **…Is a Value strategy**— Such strategies have more in common with a Value investment than a Growth investment. We suggest reported capex results in poor future performance because it is a lagging variable. Company management disclose capex plans well before they hit company accounts.

- **Buy the Capex Announcement, Sell the Delivery** — Using an alternative events data source, RavenPack, we formulate investment strategies around capex announcements, rather than reported capex. Doing so we find capex announcements result in positive future performance. Announcement data provides a significant timing advantage to reported numbers allowing investors to profit from corporate reinvestment, as well as the documented subsequent price reversal.

Europe

Chris Montagu AC
+44-20-7986-3958
chris.montagu@citi.com

Helen H Krause, CFA
+44-20-7986-8653
helen.krause@citi.com

James J Murray, CFA
+44-20-7986-4579
james.murray@citi.com

David T Chew
+44-20-7986-7698
david.chew@citi.com

Ying Zhu
+44-20-7986-8325
ying.zhu@citi.com

North America

Hong Li
+1-212-816-5062
hong.li@citi.com

Asia

Chris Ma
+852-2501-2404
chris.ma@citi.com

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Executive Summary

As we enter into a new stage of the business cycle, with companies transitioning from redistribution of profits to reinvestment, this research designs investible trading strategies to benefit from corporate reinvestment and the broad growth it brings. Despite being financially intuitive, Growth based factors generally exhibit challenging empirical performance with some investors resorting to using Price Momentum as the Growth portfolio.

The first section of this research examines factors suggested in academia which use CAPEX and Asset Growth data to construct factors. Such information has a clear link to both Growth and corporate reinvestment however we find, like the broader academic literature, high reinvestment results in poor future stock performance. Furthermore, we find these strategies more closely resemble Value factors than Growth.

There are numerous theories proposed in academia as to why such an unintuitive result exists including over-reaction to past growth rates and management empire building. In this research we propose an alternative explanation, reported CAPEX data is a lagging variable. CAPEX often takes years to complete with our fundamental colleagues being well aware of possible management reinvestment before the information finds its way into financial statements.

The second section uses RavenPack event data to incorporate the share price impact of CAPEX spend at announcement rather than at delivery offering a significant timing advantage over disclosures in financial reports. **RavenPack** is a big data analytics provider for financial services. We find compelling evidence that CAPEX announcements result in positive share price performance and have a long drift of around 3 months. Amending our standard portfolio construction, we offer approaches to constructing CAPEX event alpha with institutional levels of turnover. We also show how such a factor resembles our Growth orientates benchmark style, but with significantly enhanced performance.

When it comes to corporate reinvestment;

Buy the announcement, sell the delivery

Growth: The Current Status-Quo

Why Growth is Difficult to Define

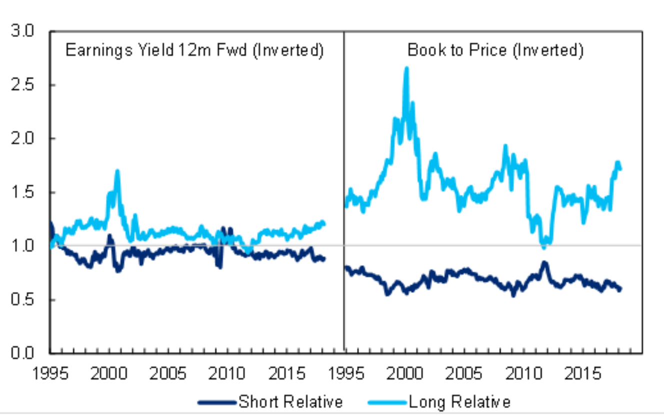
Growth, from the perspective of stock selection, is surprisingly difficult to define. Under the panacea of efficiently priced markets the Growth portfolio was considered the short basket to a (long) Value position. The clear explanation is that stocks trading at premium (discounted) valuations must be doing so due to their better (worse) future growth prospects. In the domain of active money management, holding a stock because its expensive is a tough sell to investors.

Alternatively, Price Momentum is often touted as the Growth portfolio. High Price Momentum represents stocks which have recently experienced share price appreciation moreover, Price Momentum (commonly) has negative correlations to Value being somewhat, if not perfectly, aligned with the efficient market view. However, Price Momentum has a tenuous link to company (and economic) fundamentals making the relationship between economic growth and the performance of stock selection orientated "Growth" difficult to relate.

Estimates Momentum is an evolution of Price Momentum that does depend on firm fundamentals. Recent research we have examined suggests that Estimates Momentum subsumes Price Momentum as a Style (Under the Microscope: Stock Momentum Conflation). However, the performance of Estimates Momentum is also heavily dependent on stock analyst forecast accuracy. Given analysts are traditionally weak at forecasting changes in the macro environment (Searching for Alpha: Purifying Analyst Recommendations: Removing Beta to get to the Alpha) the fundamental link breaks down exactly when it is most required.

Instead, we have historically chosen to construct a Growth portfolio based on (past and forecast future) growth rates of accounting variables. Earnings, Sales and Dividend Growth are all staples of our Growth style composite. This approach has a clear link to firm and economic fundamentals and is not overly reliant on analyst forecast accuracy. While economically intuitive, empirical performance is challenging with long run performance being negative and a low hit-rate offset by solitary months of strong performance. Furthermore, we find this composition tends to perform well when economic growth worsens. We rationalize this with the view that Growth has become scarcer, resulting in investors paying a premium for those stocks. These characteristics make the factor difficult to advocate at any particular point in time.

Figure 1. Growth Valuations, MSCI World



Source: Citi Research, MSCI

Figure 2. Growth Performance, MSCI World

Source: Citi Research, MSCI

In this research we persist with our fundamental focus on Growth, but concentrate our efforts at firm investment activities rather than solely relying on either historical or forecast accounting growth rates. As we explore in the next section, the relationship between stock price performance and real asset investment is currently confusing at best, requiring further investigation.

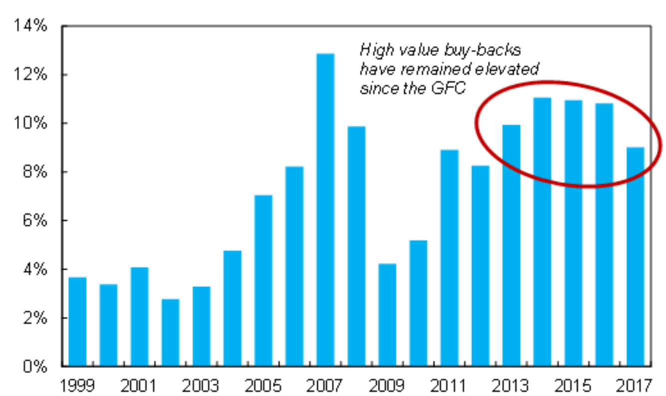
The Company Perspective of Growth

A firm can do three things with operating profits:

- Return them to shareholders (dividends / buybacks);
- Use them to pay-down debt and reduce leverage;
- Reinvest them into the firm for future gains.

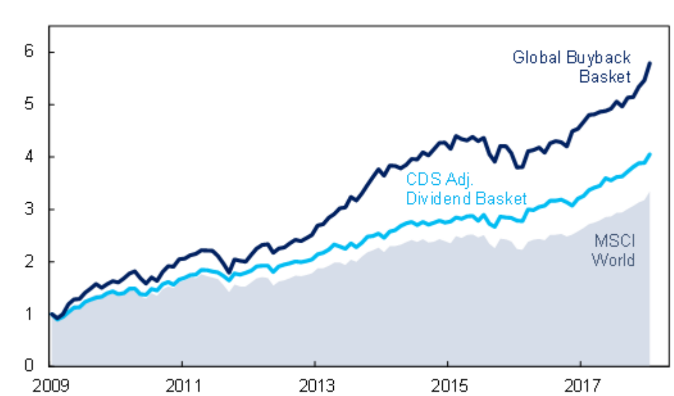
This research examines the latter of these three options and attempts to use the investment activities of firms as a measure for future growth prospects. Risk aversion stemming from the global financial crisis has led investors to richly reward companies which return capital. High dividend yield strategies are a core stable of many Value approaches with Pontiff and Woodgate (2008) demonstrating the performance of share repurchases.

Figure 3. Proportion of MSCI World companies doing buybacks over US$1bn



Source: Citi Research, MSCI, Factset

Figure 4. Buyback and Dividend Performance

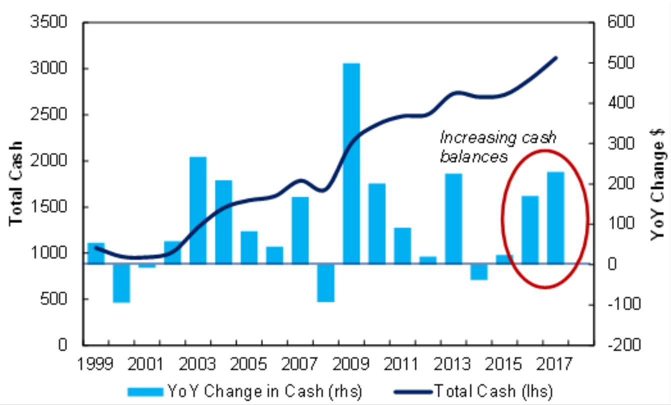


Source: Citi Research. MSCI

Recent history has seen strong performance of both buybacks and income strategies to the extent that reinvestment questions have started to emerge. Receiving large corporate payouts is great, but there is a clear limit to buybacks (the company going private – resulting in illiquid holdings) with dividends requiring re-investment at, possibly, a lower yield.

Leverage reduction has been another recent popular use for operating profits, particularly for Bank stocks. However many companies have been operating with significant, and increasing, cash balances resulting in reduced profitability. It is clear that post the global financial crisis this was required. However, with banks starting to receive regulatory approval to distribute capital back to shareholders, the deleveraging cycle appears to be coming to an end.

Figure 5. Cash on Global Corporate Balance Sheets



Source: Citi Research

Figure 6. Debt to Equity, MSCI World

Source: Citi Research. MSCI

So that leaves us with reinvestment. Going forward we expect firms to utilize profits to generate future growth, resulting in reinvestment being an excellent way to monitor future company growth prospects.

Understanding Reinvestment

The first challenge in using the investment activities of a firm to assess its investment potential is to understand the accounting treatment of both tangible (buildings, computers, etc.) and intangible (personnel, software, internal intellectual property etc.) investments[1].

Intangible Reinvestment

Intangible expenditure is generally[2,3] expensed as incurred. This increases period costs, reducing earnings and making Price/Earnings ratios look less attractive with the balance sheet not changing (but being partially offset tax exemptions). If sufficient economic gain can be demonstrated from R&D investment, then the future cost can be amortized in intangible assets however, the hurdle is very high.

This process is further muddied by acquisitions and research partnerships. Patents acquired from 3rd parties can be treated as an intangible assets however, patents generated from internal R&D are not capitalized unless they meet rather strict sufficient economic gain requirements. Furthermore, it (may) be possible to capitalize R&D expenses through structuring the R&D department as a separate company funded by the parent with all generated intellectual property flowing to the parent.

There is a wealth of literature examining the stock price impact of investments in intangibles with a particular focus on R&D. Chan, Lakonishok and Sougiannis (2001) find high R&D-to-market equity firms earn high subsequent returns with Eberhart et al (2004) finding increasing expenditure on R&D is also richly rewarded with future stock price appreciation. Recently Cohen, Diether and Malloy (2013) use a simple time-series regression to show the past success of R&D is predictive of future success and is not priced in a company's stock.

[1] For more information on previous research that we have done in this area, see: Searching for Alpha: Tangible Benefits of Intangibles: Brand, Respect & Intellectual Capital

[2] IAS 38 – intangible assets can only be recognized if it is highly probable that future economic benefits from the asset will flow to the entity AND the cost of the asset can be reliably measured

[3] US GAAP – R&D can be capitalised if future economic benefits are clear

Chan et al (2001) argue that the required expensing of intangibles, despite them having future economic productivity, results in excessive investor pessimism and ultimately future price appreciation. Furthermore, it is intuitive that firms undertaking reinvestment receive, on average, future stock price appreciation – else why would companies go to the trouble to reinvest?

Despite these attractive results, information on company intangible assets is quite heterogeneous making them hard to compare. The salient academic literature focuses on R&D which has poor coverage as a Worldscope data item and naturally lends itself to certain sectors. Furthermore, as outlined above accounting rules can be inconsistent. For these reasons, while a possible avenue of future enquiry, intangible investment is not the focus of this research.

Tangible Reinvestment

Tangible investment is generally[4] accounted for as capital expenditure (CAPEX) found in cash flow from investing. This increases the total assets of a firm which can be amortized over a number of years and contributes to the reported book value of a firm without affecting reported earnings. All else being equal, increasing CAPEX has no effect on the Price/Earnings ratio of a stock and increases the book value making both the Price/Book ratio and leverage ratios more attractive (through capitalized assets). Reinvesting into tangible assets might be considered lower risk, from an investor perspective, than intangible assets as tangible assets can generally be sold in the event of bankruptcy.

Despite the clean(er) accounting treatment the effect of high CAPEX on stock prices is confusing. Titman et al (2004) present compelling evidence that high abnormal CAPEX firms perform poorly. Similarly, Cooper, Gulen and Schill (2008) show High (Low) asset growth results in poor (Strong) future share price performance.

At first look these results seem counter-intuitive. Surely companies investing in themselves should, on average, experience strong future stock performance when compared to those that do not, otherwise why reinvest in the first place? Titman et al (2004) justify their results by arguing misaligned incentives exist between company management and shareholders resulting in over-investment due to management empire building. Alternatively, Cooper, Gulen and Schill (2008) argue the effect is due to investor over-reaction to past high growth rates.

The negative relationship between CAPEX and stock returns is also difficult to understand in the context of R&D, which as previously discussed has a strong positive relationship to stock returns. Kumar and Li (2016) construct a real options model arguing CAPEX represents the taking up of an investment opportunity thus depleting the stock of future growth projects. In contrast, R&D is a proxy for increasing the capital stock of future projects thus is value accretive. While the authors offer empirical support for the hypothesis, their work is less than clear. For example, the construction of a new research lab clearly increases the capital stock of future projects, but is accounted for as CAPEX and not R&D which they use as a proxy for increasing capital stock.

[4] US GAAP requires some tangible assets to be classified as R&D expenses if they are acquired for R&D purposes only and the asset has no reasonable alternative future use.

What We Do

This research is split into 2 sections. First it revisits published work finding a negative relationship between CAPEX and stock returns. We find empirical support for the anomalies existence but struggle to find evidence supporting their respective explanations. Instead, we formulate a new hypothesis that reported CAPEX and Asset Growth are inherently lagging variables. New real asset projects take multiple time periods to complete and are commonly included in accounts once (or near) completion. On the other hand, our fundamental colleagues are often aware of large real asset projects at initiation giving them a significant timing advantage.

We postulate that the negative relationship between CAPEX and stock returns is due to reported CAPEX and Asset Growth being lagging variables. These variables capture price reversion to overly hyped CAPEX announcements but offer little by way of capturing the growth phase of reinvestment.

The second section of the note examines this hypothesis by formulating a novel factor using CAPEX events data provided by RavenPack. We show that simple strategies trading around CAPEX news items offer strong performance, even in the presence of our current set of style factors, which exhibit significant Growth tilts.

Reported CAPEX Alpha

Reported CAPEX Alpha

In this section of the note we revisit prior research to both validate their findings and ensure results still hold out-of-sample in different regions and time periods. This provides a solid foundation from which to develop reinvestment alpha strategies.

To perform our empirical analysis we use Worldscope annually reported data rebalanced monthly. Each month we split stocks into five distinct, equally weighted, portfolios based on the value of the test variable with subsequent period performance examined. Backtests have been conducted using both MSCI Europe and MSCI USA constituents with very consistent results found across both regions.

CAPEX Based Signals

Signal Construction and Coverage

As an initial exploration we first examine the performance of abnormal CAPEX spend as constructed by Titman et al (2004). The primary test statistic examined by Titman et al (2004) is current period capital expenditure deflated by the previous three years of capital expenditure which helps to adjust for a size bias in using CAPEX alone.

$$AbCap = \frac{CAPEX_t}{(CAPEX_{t-1} + CAPEX_{t-2} + CAPEX_{t-3})/3}$$

Along with examining the explicit test statistic used in Titman et al (2004) the authors also state that their results are consistent using other measures of abnormal CAPEX such as CAPEX deflated by Total Assets. To validate their results we also examine two additional signals

$$CapAss = \frac{CAPEX_t}{Total\ Assets_t}$$

$$CapDep = \frac{CAPEX_t}{Depreciation_t}$$

CAPEX to Assets is a natural extension of AbCap which deflates CAPEX by the total level of firm assets. This different deflater directly compares the magnitude of CAPEX to a measure of both firm size and prior years CAPEX. This is slightly different to AbCap which focuses on the consistency of CAPEX highlighting companies which are investing considerably relative to their own history. This can therefore be considered more of a CAPEX growth based metric[5].

An intuitive measure we have not encountered in the academic literature is CAPEX to Depreciation (CapDep)[6]. This measure deflates CAPEX by a measure of spend required to maintain current asset levels and is arguably more intuitive than the commonly found alternatives in the literature. Values above (below) one imply the asset base is growing (shrinking).

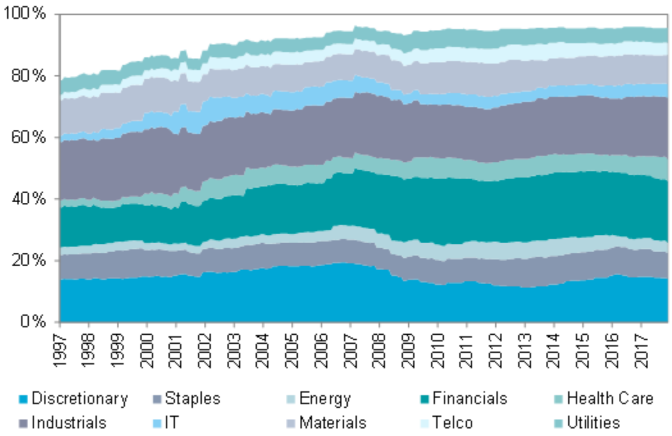
In constructing signals we use Worldscope fundamental data as outlined in Figure 9. One slightly contentious issue is the inclusion of Financials. It is common to remove Financials from metrics utilizing cash flow due to cash flow being entrenched in Financial firm operations. However, in this case we use Worldscope

[5] This can be seen clearly from taking the log of AbCap which is a monotonic transformation so does not change the rank ordering

[6] We have previously used a similar measure in "What Works in Equity Markets – Corporate Policy: Capital Usage", May 2011.

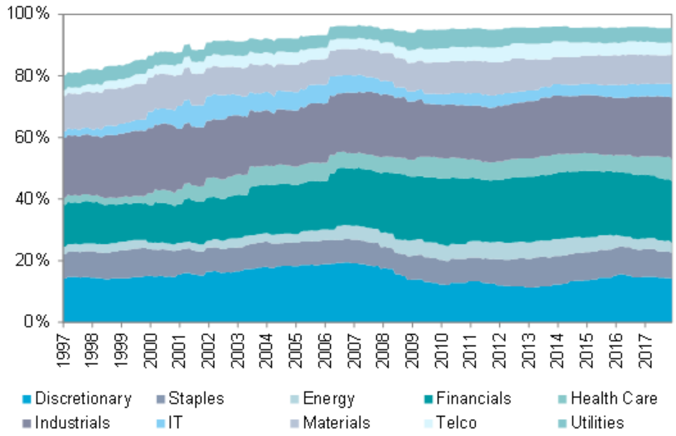
item 4601 which specifies CAPEX as 'additions to fixed assets', removing this often challenging link. Furthermore, after conversations with our banks team, CAPEX is currently a topic of interest within this sector with many institutions requiring or undertaking significant systems upgrades which is likely to make CAPEX a focus of the sector (Banks' IT Cost Challenge - Deep Dive on Information Technology Spend; Banks' IT Cost Challenge Revisited - The Legacy Core Banking System Conundrum).

Figure 7. AbCap Coverage, MSCI Europe



Source: Citi Research, MSCI, Worldscope

Figure 8. CapAss Coverage, MSCI Europe



Source: Citi Research, MSCI, Worldscope

Data coverage across both AbCap and CapAss is high with broad and reliable coverage across all sectors. CapDep is slightly more challenging. Worldscope handle the financial statements of financial firms separately to companies in other sectors. This results in a slightly different set of Worldscope codes being used which includes both depreciation and amortization. Furthermore, coverage for the insurance industry group is very low before 2007.

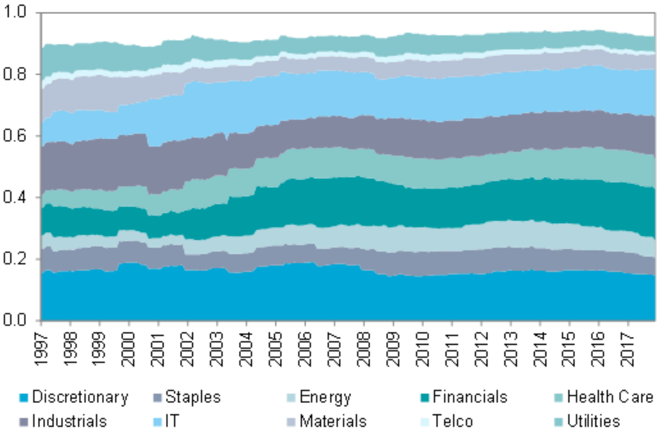
Figure 9. WorldScope IDs

ID	Description
4601	Capital Expenditiure - Additions to Fixed Assets
2999	Total Assets
1148	Depreciation (ex Financials)
4049	Depreciation and Depletion
1148	Depreciation (Financials ex Insurance)
1151	Depreciation, Depletion and Amortization (Insurance)

Source: Citi Research, WorldScope

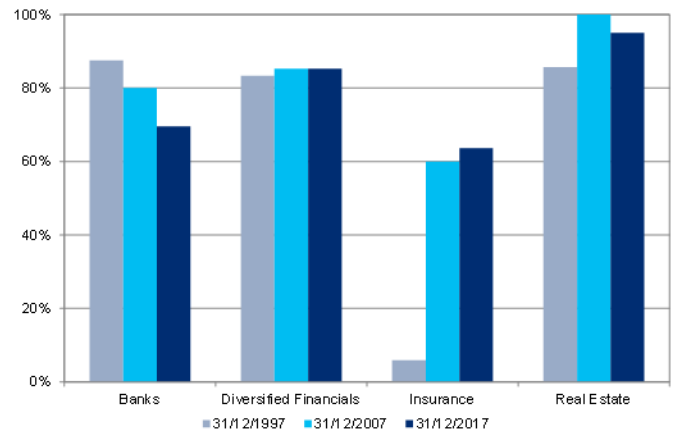
We have performed analysis with and without Financials finding little tangible difference. As such we retain the Financials sector and Insurance industry group in our analysis.

Figure 10. CapDep Coverage, MSCI USA



Source: Citi Research, MSCI, Worldscope

Figure 11. CapDep Financials Coverage, MSCI USA

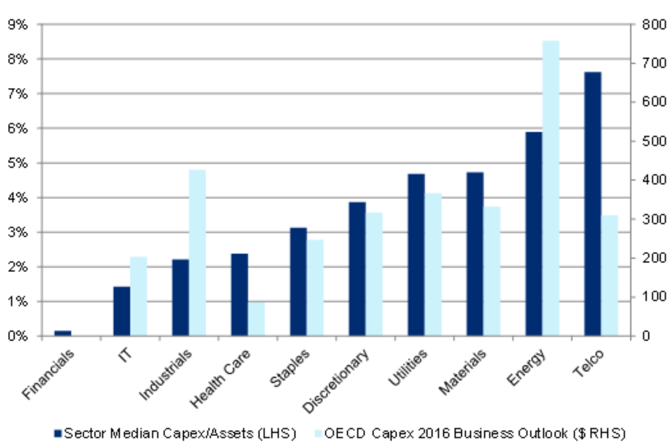


Source: Citi Research, MSCI, Worldscope

The different handling of sectors does, however, raise a more pressing concern as to the extent the aforementioned measures are driven by sector tilts versus stock selection. Figure 12 shows median CAPEX-to-Total Assets highlighting the structural differences between sectors. Furthermore, we borrow data from the OECD to show that dollar spend on CAPEX is again very different between sectors.

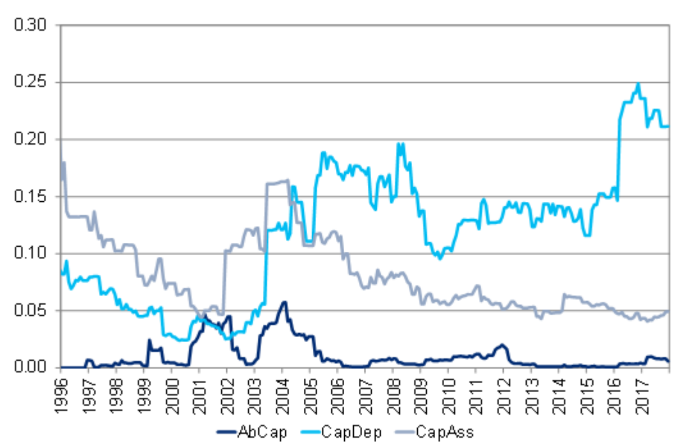
Taking our three signals and splitting them into five equally weighted baskets every month, it is possible to examine the weight of each sector, in each basket. Figure 13 shows the Herfindahl index for Long-Short portfolio sector weights. While sector tilts do exist, it is a pleasant surprise to see that, for the most part they are not that large. However, given the dispersion of CAPEX spend across sectors we believe performing analysis on a sector neutral basis is a sensible approach.

Figure 12. Capex by Sector



Source: Citi Research, MSCI, Worldscope

Figure 13. Sector Herfindahl Index, MSCI USA



Source: Citi Research, MSCI, Worldscope

Historical Analysis

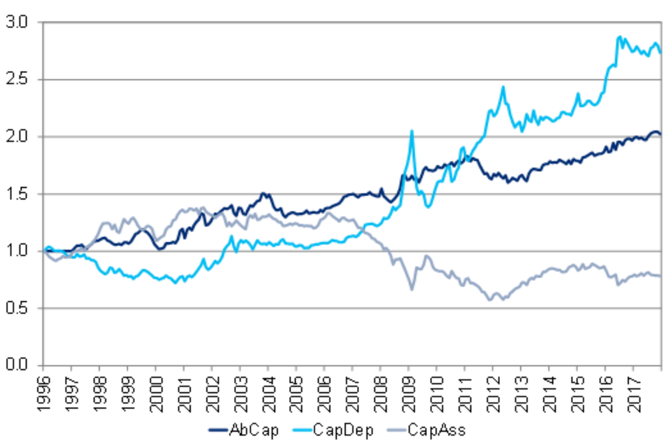
Figure 14 - Figure 18 show the empirical performance and summary statistics of the aforementioned signals for the MSCI Europe and USA. Consistent with prior research both AbCap and CapDep perform well with an information ratio around 0.5. AbCap has relatively symmetric return distribution with monthly maximum losses roughly equal to maximum gains. CapDep exhibits a slight negative skew in max and min monthly returns but overall backtest performance is attractive.

The weak performance of CAPEX to Assets requires further comment. As will be shown in the next section, Cooper, Gulen and Schill (2008) find high asset growth results in future poor performance. Deflating by Total Assets is therefore likely to reduce the CAPEX score of asset-bloat companies mitigating the extent to which over-investment appear extreme. This suggests that deflating by assets is not the best way to formulate the factor, despite claims in academia that its performance mirrors that of AbCap.

"It is clear that large CAPEX firms have subsequent falling stock prices with low CAPEX firms performing well"

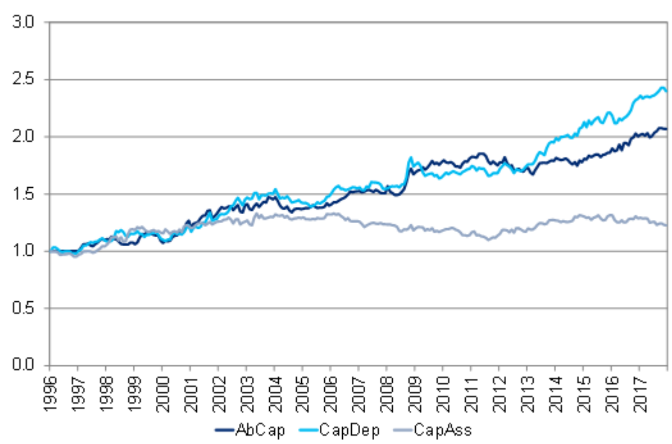
Despite our prior assertion that sector neutrality is important, sector neutral backtests have neither a clear advantage nor disadvantage when compared to their unconstrained equivalents. Sector unconstrained backtests seem to have higher returns at the expense of more volatility. Despite the agnostic result, we retain sector neutrality due to the sensible economic rationale behind the decision.

Figure 14. Unconstrained Performance, MSCI Europe



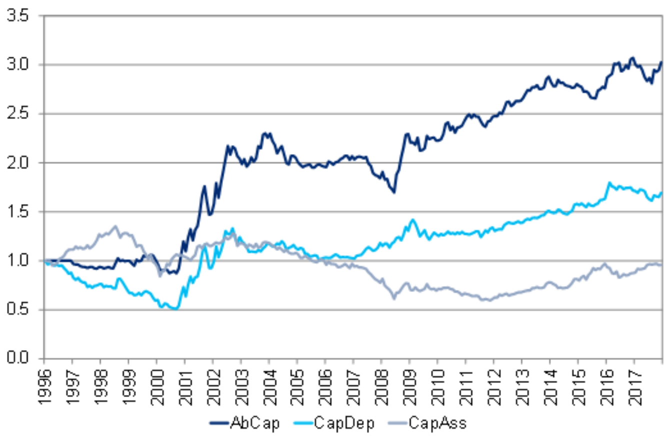
Source: Citi Research

Figure 15. Sector Neutral Performance, MSCI Europe



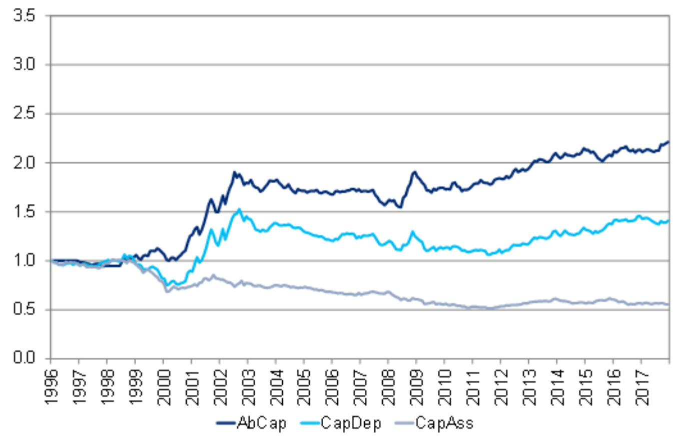
Source: Citi Research

Figure 16. Unconstrained Performance, MSCI USA



Source: Citi Research

Figure 17. Sector Neutral Performance, MSCI USA



Source: Citi Research

Figure 18. Summary Statistics

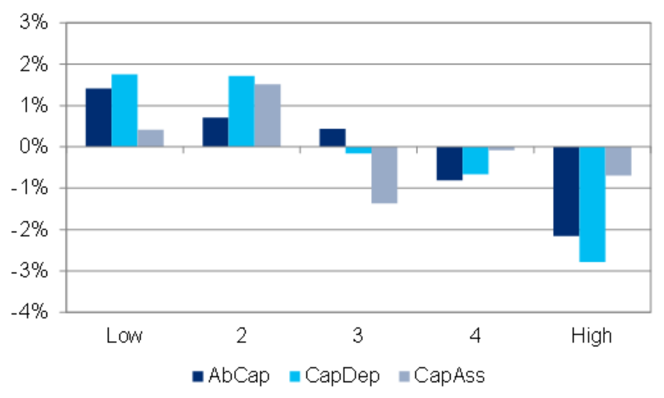
	USA						Europe					
	Unconstrained			Sector Neutral			Unconstrained			Sector Neutral		
	AbCap	CapDep	CapAss	AbCap	CapDep	CapAss	AbCap	CapDep	CapAss	AbCap	CapDep	CapAss
Return	6.2%	5.1%	0.4%	4.0%	1.9%	-2.5%	3.6%	5.3%	-0.6%	3.6%	4.5%	1.1%
Volatility	12.2%	11.1%	10.4%	7.3%	8.9%	6.4%	6.9%	10.8%	11.0%	5.6%	5.8%	5.2%
Hit Rate	53.6%	56.4%	50.8%	52.0%	49.6%	45.1%	59.5%	57.6%	48.1%	57.1%	60.6%	53.4%
IR	0.50	0.46	0.04	0.56	0.22	-0.38	0.52	0.49	-0.05	0.63	0.79	0.21
Max Return	16.3%	13.7%	10.6%	7.6%	10.7%	5.3%	7.0%	10.6%	15.7%	5.1%	5.8%	6.0%
Min Return	-8.9%	-14.1%	-9.4%	-5.8%	-8.5%	-9.4%	-7.2%	-13.0%	-11.6%	-5.3%	-5.3%	-3.8%

Source: Citi Research

Also important to highlight is the performance of the strategy in the US after the technology bubble. This is something which is difficult to explain by itself, but could be a result of an unwinding of over-investment through the period.

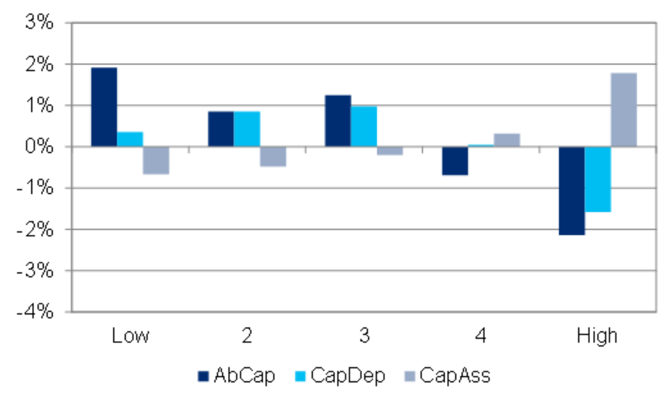
Figure 19 and Figure 20 show there is a broadly monotonic decline in returns across quintiles. It is stark that the high CAPEX basket lost significantly more than basket four. This is in contrast to the low CAPEX baskets where basket two exhibited similar performance to basket one. This asymmetry suggests selecting the high CAPEX stocks expected to underperform is more important than identifying the low CAPEX names which, history suggests, will outperform the market.

Figure 19. Sector Neutral Basket Returns, MSCI Europe



Source: Citi Research, MSCI

Figure 20. Sector Neutral Basket Returns, MSCI USA



Source: Citi Research, MSCI

To examine the extent to which the CAPEX factors provide incremental information to our benchmark Citi style composites, the tables below present t-statistics from performing a time series regression of the CAPEX factor returns sector neutral style composite returns. While in general, results suggest incremental gain to alpha, t-stats are not statistically significant – perhaps unsurprising given the large cap universe.

More interestingly, it is clear that these factors are Value factors in disguise. For both regions they have a strong similarity to our Value composite despite being formed from CAPEX information. Similarly, the factors have a strong negative relationship Growth. While these tilts should not be surprising from the point of view that the strategy is buying low CAPEX, it does not improve our Growth factors – the initial aim of the research.

Figure 21. Style Sensitivity, MSCI Europe

	AbCap	CapDep	CapAss
(Intercept)	1.25	1.30	0.24
Emom	0.60	2.40	0.95
Growth	-5.95	-1.56	1.76
Quality	0.17	-1.96	-1.59
Low Risk	-0.98	0.72	-0.41
Large Cap	-0.92	1.85	0.13
Value	3.32	6.14	3.30
Pmom	4.10	3.82	0.71

Source: Citi Research, MSCI

Figure 22. Style Sensitivity, MSCI USA

	AbCap	CapDep	CapAss
(Intercept)	0.77	-0.36	-1.86
Emom	1.39	0.68	1.20
Growth	-9.21	-5.96	3.34
Quality	3.97	1.98	1.11
Low Risk	0.52	4.13	1.98
Large Cap	0.12	4.03	1.71
Value	1.33	7.81	4.56
Pmom	1.93	3.19	-1.89

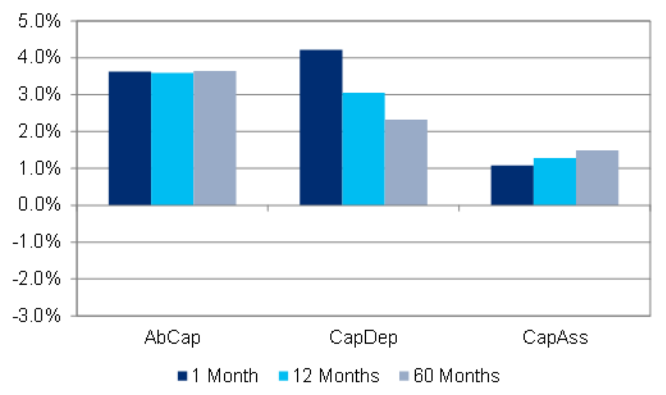
Source: Citi Research

A possible explanation for the empirical preference of low CAPEX stocks is that CAPEX is invested for the long term. Monthly rebalancing does not hold the stocks long enough to obtain the benefit from long run CAPEX spend.

Examining this hypothesis; Figure 23 and Figure 24 take the average returns of an overlapping windows based backtest for 1, (standard), 12 and 60 months. To do this, portfolios are constructed monthly and have 1/12th (1/60th) of capital allocated to each portfolio. It is then held for 12 (60) months with strategy performance being the aggregate of all 12 (60) portfolios held at any one time. Taking this overlapping window approach enables the signal decay to be examined.

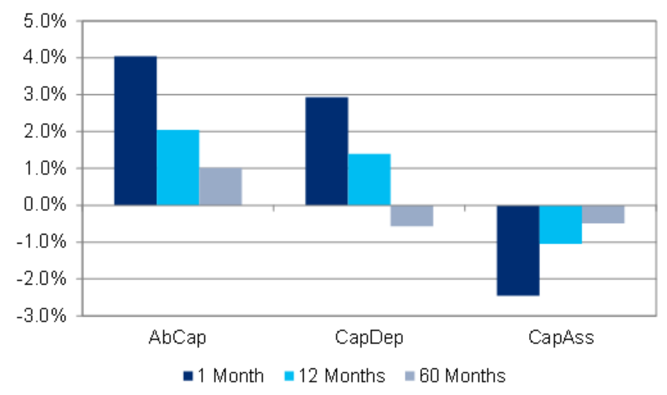
As can be seen from the charts below, holding CAPEX portfolios for a long period of time actually (marginally) improves AbCap and CapAss returns with CapDep still exhibiting positive returns. It is hard to see any evidence of a long term reversal in this approach.

Figure 23. Holding Period Analysis, MSCI Europe



Source: Citi Research, MSCI

Figure 24. Holding Period Analysis, MSCI USA

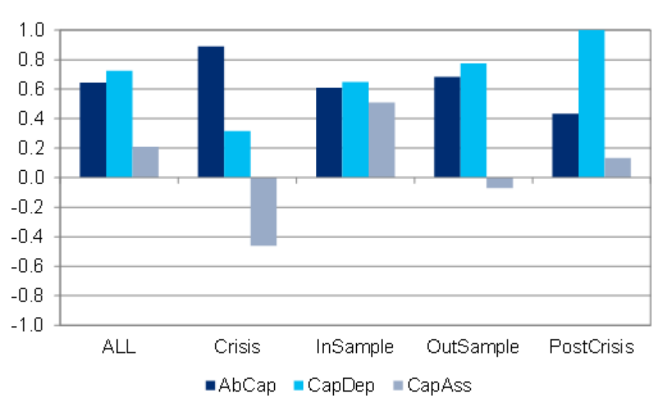


Source: Citi Research, MSCI

An alternative explanation suggested by Titman et al (2004) is that high CAPEX is a result of management empire building resulting in over-investment. Providing evidence for this hypothesis, the authors show firms with the most discretionary spend (high free cash flow), over-invest the most. There is a problem with this analysis. Having high free-cash flow enables investment, but it does not necessarily mean over-investment. Firms with low free-cash flow are likely to under-invest as management do not have the cash to pursue profitable opportunities, even if they want to. Examining free cash flow does not necessarily show over-investment, it simply shows possible reinvestment versus impossible reinvestment.

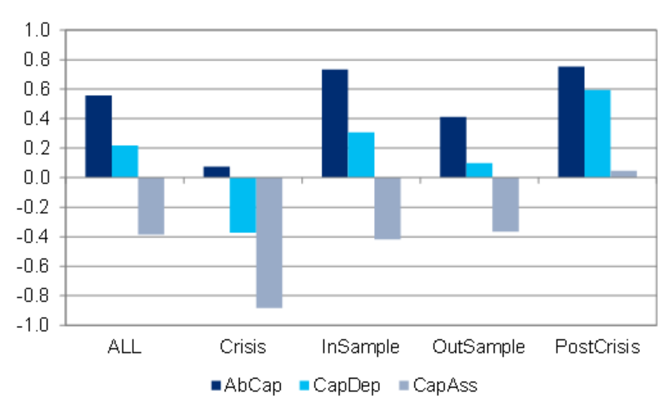
Instead, Figure 25 and Figure 26 examine risk-adjusted performance over different sub-periods, specifically extracting the 2008 financial crisis. The 2008 GFC has presented a wonderful 'petri-dish' to examine this hypothesis as it is difficult to argue over-investment was pervasive or evident at all, during such a severe recession. The charts show factor performance in sample (pre 2004 when the Titman et al paper was published), out of sample (Post 2004) over the crisis period (2008-2009) and after the crisis.

Figure 25. Sub-Period Performance, MSCI Europe



Source: Citi Research, MSCI

Figure 26. Sub-Period Performance, MSCI USA



Source: Citi Research, MSCI

A hypothesis of empire building requires these strategies to perform poorly over the crisis period. However, both AbCap and CapDep exhibit strong performance in Europe with AbCap having its strongest IR over the crisis period. CapAss does exhibit poor performance over the crisis period however, a tertiary look at the strategies wealth curve in Figure 14 shows the factor had poor performance from 2002 – covering significant boom periods where one would naturally assume empire building is rife. In the USA, CAPEX strategies do struggle in the crisis period providing partial support for the hypothesis. However, it is difficult to understand why this would hold in one region, and not in another. This leads us to believe that empire building is at most only a small reason for the underperformance of high CAPEX firms.

Asset Growth based Signal

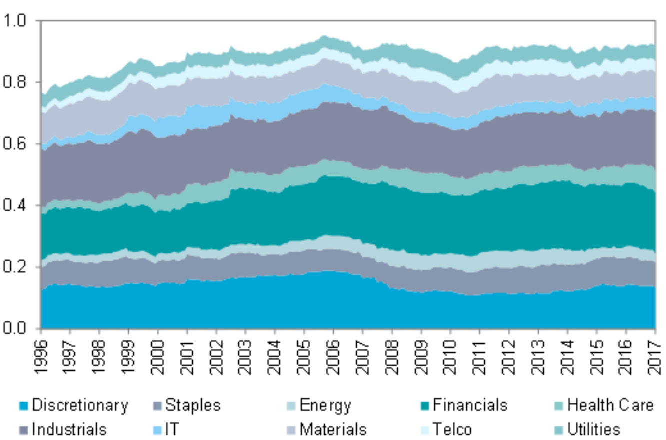
Signal Construction and Coverage

The previous section argued that Titman et al (2004) AbCap measure could be interpreted as a measure of CAPEX growth. This conveniently dovetails into research by Cooper, Gulen and Schill (2008) who find High (Low) Asset Growth results in poor (Strong) future share price performance. CAPEX spend is a precursor for Asset Growth making these two factors inherently related.

As with CAPEX based measures, Asset Growth behaves in a counter intuitive way. Why bother going to the trouble to buy and integrate new assets if it results in lower share price performance? Unlike the empire building hypothesis of Titman et al (2004), Cooper et al (2008) suggest the seemingly unintuitive behavior relates to investors over-reacting to past firm growth rates resulting in poor future returns. In this section of the note we replicate previously published results and explore possible expiations for the empirical finding.

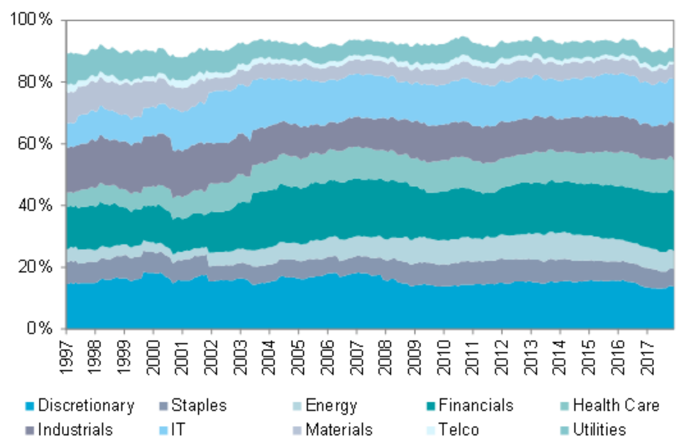
Following Cooper et al (2008) the year on year percentage growth in total assets (Worldscope item 2999) is calculated which we term GrowAss. As one would expect from such a measure, coverage is good across the entire universe for both MSCI Europe and MSCI US

Figure 27. Coverage YoY Asset Growth, MSCI Europe



Source: Citi Research, MSCI

Figure 28. Coverage YoY Asset Growth, MSCI USA

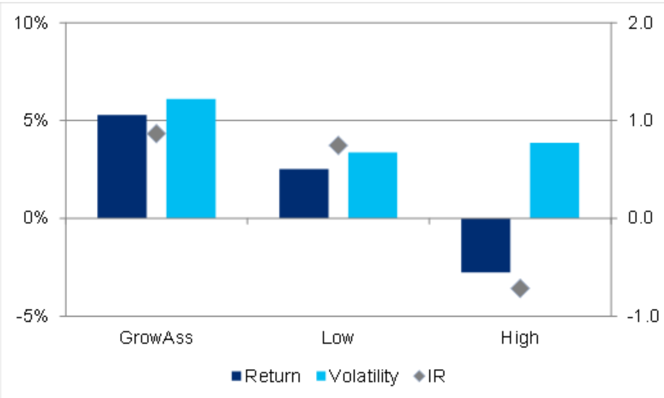


Source: Citi Research, MSCI

Historical Analysis

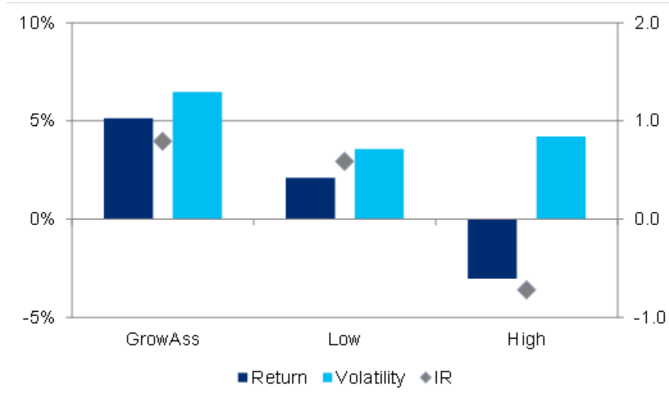
Results, presented in the following charts, show strong performance of buying low Asset Growth stocks and shorting high Asset Growth stocks. Information ratios are relatively strong at around 0.75 for both Europe and US with hit rates approaching the 60% mark. The factor is remarkably symmetric with the high Asset Growth portfolio mirroring that of the low Asset Growth portfolio.

Figure 29. Summary Performance, MSCI Europe



Source: Citi Research, MSCI

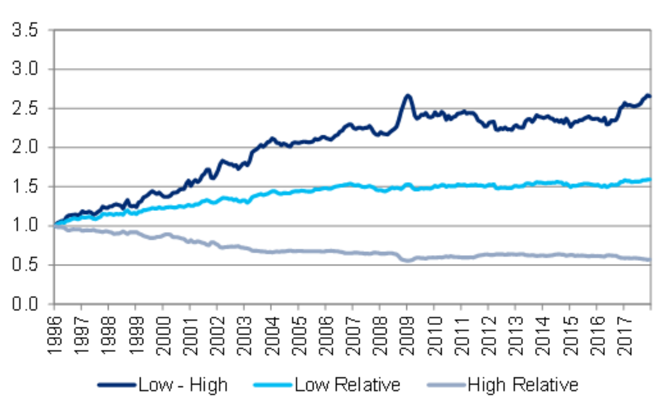
Figure 30. Summary Performance, MSCI USA



Source: Citi Research, MSCI

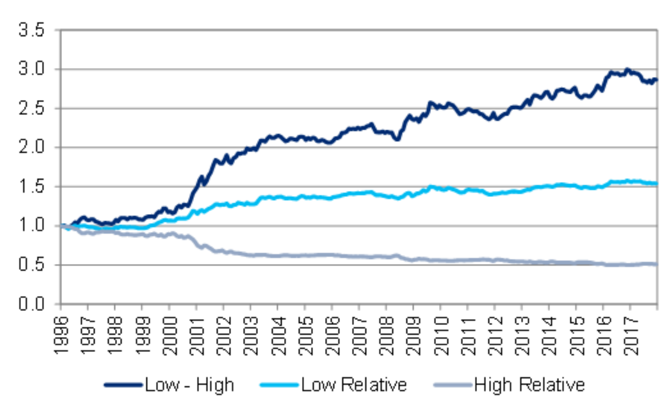
The US still exhibits strong performance around the technology bubble of the early 2000's but performance is more consistent after that being remarkably strong through the financial crisis. The factor exhibited more volatility in Europe through 2008 and 2009 but performance remains strong.

Figure 31. GrowAss Performance, MSCI Europe



Source: Citi Research, MSCI

Figure 32. GrowAss Performance, MSCI USA



Source: Citi Research, MSCI

As one would expect from a strategy which uses annually reported numbers, turnover is low. It is however, significantly higher than the CAPEX based measures which show strong persistence year-over-year in the high CAPEX and low CAPEX basket. This can be seen in Figure 33 and Figure 34 where the main diagonal on the AbCap transition matrix is much larger than the 20% random chance barometer. This is particularly true in the high and low baskets. Conversely, GrowAss is much closer to 20% across its main diagonal suggesting the GrowAss portfolio selects different names every year whereas AbCap, and the other CAPEX based portfolios, transition more slowly through time.

Figure 33. AbCap Transition Matrix (12month), MSCI Europe

		Next Year				
		Low	2	3	4	High
Current	Low	47.8%	22.4%	13.3%	8.0%	8.5%
	2	22.4%	30.0%	22.0%	15.3%	10.4%
	3	13.6%	23.0%	27.5%	22.8%	13.1%
	4	11.1%	15.9%	23.8%	28.2%	21.0%
	High	9.9%	9.9%	14.3%	24.5%	41.4%

Source: Citi Research. MSCI

Figure 34. GrowAss Transition Matrix (12month), MSCI Europe

		Next Year				
		Low	2	3	4	High
Current	Low	26.4%	22.2%	18.2%	16.2%	17.1%
	2	21.8%	23.8%	21.0%	16.4%	17.0%
	3	17.4%	20.8%	21.9%	21.2%	18.6%
	4	17.4%	16.8%	21.4%	22.6%	21.8%
	High	19.9%	16.5%	16.8%	20.8%	26.0%

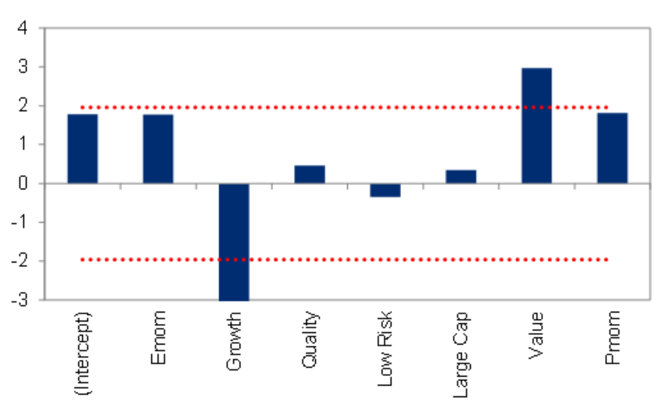
Source: Citi Research, MSCI

Performing long-short return regressions against our benchmark style factors the chart below (left) show strong alpha with positive tilts to Value and negative tilts to Growth. This is similar in nature to the CAPEX based signals which also has positive tilts to Value and negative tilts to Growth. This is an interesting finding as it suggests our factors are not really capturing Growth at all, but are really Value factors in disguise.

A relationship to value is likely to be a consequence of shorting high asset growth / high CAPEX rather than buying it. It stands to reason that, despite using sensible growth orientated accounting variables, this is really a value strategy in disguise.

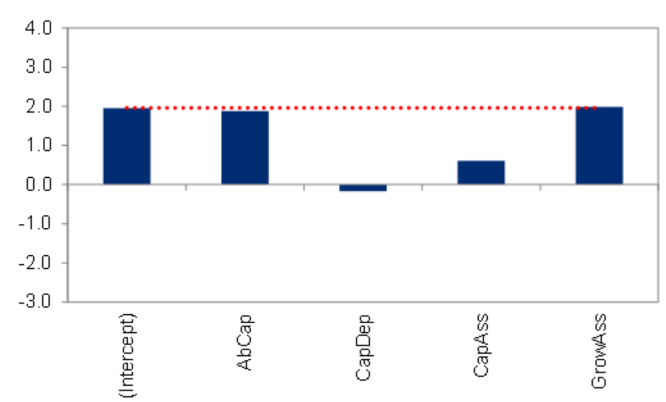
The relationship between Asset Growth and CAPEX metrics is also of interest. Are they capturing the same anomaly or do they offer incremental alpha? Figure 36 presents t-stats from running a Fama-Macbeth regression showing that four factors in combination offer statistically significant alpha. However, AbCap and GrowAss appear to be the most important factors with CapDep and Cap Ass having relatively small loadings. This suggests CapDep and CapAss are perhaps not necessary in any composite construction. In the US, the Fama-MacBeth regressions tilt more towards AbCap than GrowAss.

Figure 35. GrowAss Style Regression t-statistic, MSCI Europe



Source: Citi Research, MSCI

Figure 36. Fama-MacBeth Regression t-statistic, MSCI Europe



Source: Citi Research, MSCI

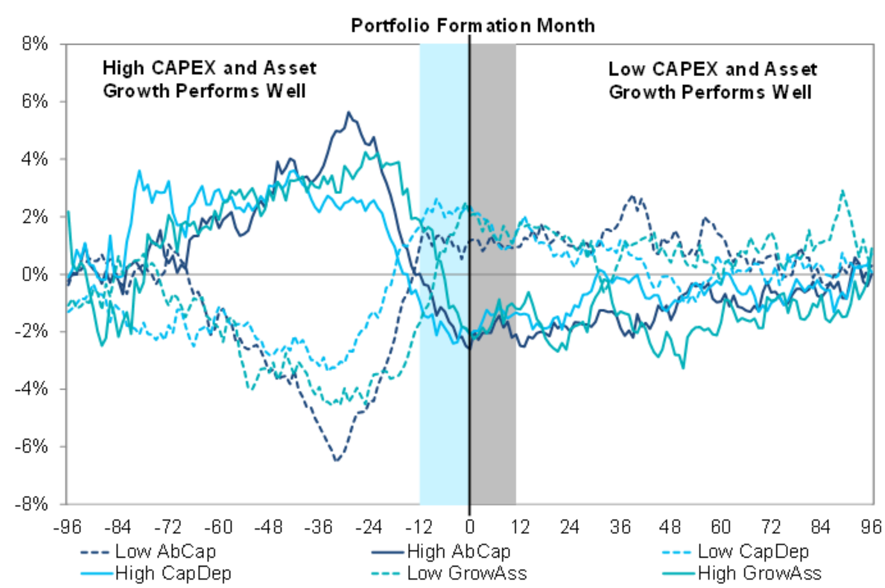
The above analysis suggests GrowAss is highly related to our prior CAPEX measures. However, unlike the management empire building explanation as constructed for CAPEX measures, Cooper, Gulen and Schill (2008) propose the negative relationship between Asset Growth and future returns is due to an over-reaction to previous growth rates. The authors argue that investors over-extrapolate past growth into the future.

To examine this, Figure 37 and Figure 38 show the results of an event study around portfolio formation of each of our factors. Every month a new set of portfolios is formed, excess market performance is examined up to seven years before, and after formation. Returns are then averaged across all portfolios to provide insight into average performance around portfolio formation. For an over-reaction hypothesis to hold, strong performance is needed before portfolio formation with weak results after.

Results are compelling. The grey shaded area shows performance after formation and represents our previously performed backtests. In-line with those results high CAPEX and Asset Growth portfolios perform poorly. However, in the 12 months preceding portfolio formation high CAPEX stocks perform poorly (blue region). It is hard to argue a reversion from investor over-reaction to past high growth rates, when the reversion starts before the high growth rates are published.

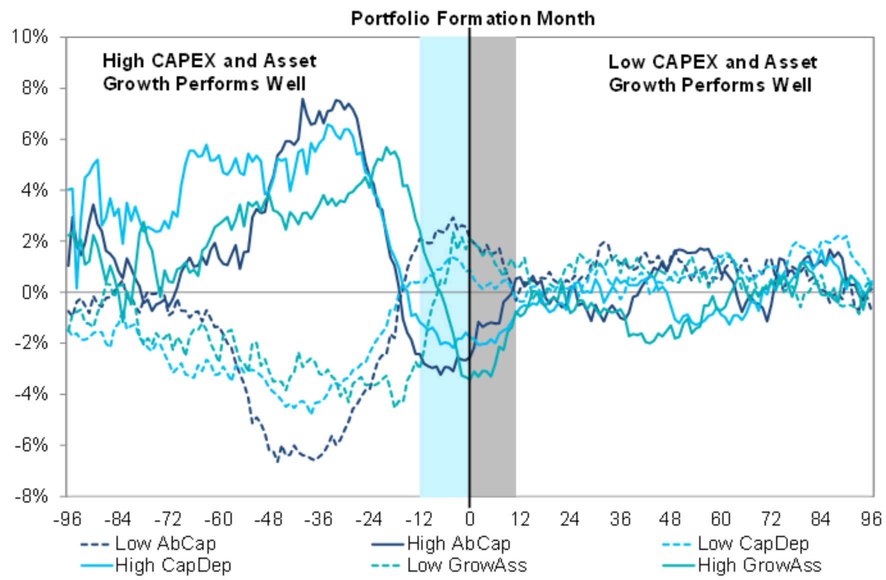
An alternative hypothesis that is not explored or examined in the academic literature is that the charts below present evidence for CAPEX and Asset Growth being lagging measures of growth. While not required from a regulatory perspective, many firms take pleasure in announcing and presenting future growth plans which will transform the company into some perfect future version of its current self. We postulate the announcement of such projects creates excitement and investor over-reaction which reverses over the duration of CAPEX projects when challenges occur.

Figure 37. Event Study – Portfolio Formation, MSCI Europe



Source: Citi Research, MSCI

Figure 38. Event Study – Portfolio Formation, MSCI US



Source: Citi Research, MSCI

Company management need to receive shareholder approval of projects to prevent a preference for simply returning cash through dividends. As such, over-optimistic plans are presented with promises made which are ultimately difficult to deliver. Project announcements lead to great excitement and over-reaction. Underwhelming delivery, from arguably unrealistic expectations, leads to subsequent disappointing share price performance. This disappointing realization occurs towards the end of projects, exactly when asset are being added to company balance sheets and the final set of bills need to be paid.

The next section explores this hypothesis through the use of a novel dataset, using CAPEX announcement data provided by RavenPack.

Conclusions: Reported CAPEX Alpha

As documented in the academic literature, we find high CAPEX companies experience future share price underperformance. Unlike the broader academic literature, we find relatively little evidence that this unintuitive result is due to management empire building. We do find support for over-reaction however, reversion from over-reaction occurs before the publication of accounts suggesting over-reaction to growth rates is unlikely.

As a novel result, we show that such strategies published in academia have more in common with Value strategies than Growth. As such, while they may add information to a Value investor, they do little to assess the Growth prospects of a firm and do not help us at the current stage of the business cycle where corporates are beginning to put capital to work.

Finally, we have proposed an alternative explanation, namely CAPEX published in financial reports lags the true economic value add of projects which is priced in stock returns. The next section of the report examines this further through the use of CAPEX announcement data provided by RavenPack. Such data has a clear timing advantage to reported financial statements.

Event CAPEX Alpha

Event CAPEX Alpha

So far we have offered evidence that the underperformance of high Asset Growth and high CAPEX companies relates to a reversal in investor over-reaction which bares more relation to a Value investment than a Growth investment. This section examines approaches to constructing Growth based signals from leveraging a novel datasets from RavenPack examining CAPEX newsflow.

Using CAPEX announcements to assess the relationship between real asset investments and stock returns is not a new idea. McConnell and Muscarella (1985) use 658 capital expenditure announcements finding the information to be value relevant with the reaction to CAPEX announcement being positive. Woodridge and Snow (1990) use 767 announcements confirming earlier findings. However, Born and Ryan (2000), Del-Brio et al (2003) and Kim et al (2005) find insignificant relationships between CAPEX announcements and future stock returns.

A possible reason for these inconclusive results is the size of the sample used. All data was hand collected with no study having more than 1,000 announcements and Del-Brio et al (2003) only using 114 announcements for Spanish firms. The hand collected nature of the data also presents significant challenges for practitioners wanting to implement the approach with it, to date, being little more than of academic interest.

In this research we use data provided by RavenPack which uses proprietary machine learning methods to classify events from news sources. Using their data our sample starts with over 440,000 events from the beginning of 2000 to the end of 2017. After removing events not related to MSCI World constituent stocks and before 2008 where coverage is challenging, our final sample uses around 70,000 events over a 9 year period. This substantially improves on prior studies and utilises a data provider which enables real time evaluation for investors wanting to implement a strategy using this information.

Data Handling and Exploratory Analysis

With any new data source the first, and often most challenging problem, is to blend it with our existing datasets. Unlike many alternative datasets we have encountered, this was straightforward. RavenPack have their own static stock identifiers which map to point-in-time SEDOL, ISIN and CUSIPs. They have a security master which can be downloaded from their web portal which they inform us is updated daily.

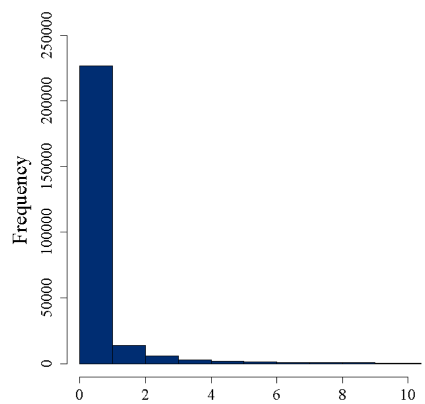
While we encountered differences in dates of identifier changes from our Thompson Reuters security master to RavenPack, combining the datasets was reassuringly easy and passed a myriad of spot checks. While it is easy to dismiss this as simply “How it should be” our experience is that this is rarely the case and the simple mapping procedure significantly reduced the amount of time required to perform analysis.

We obtained the data itself via the RavenPack web portal performing a bulk download for all topics of type CAPEX, CAPEX Guidance and Investment from the beginning of 2000 to the end of 2017. While this was useful for a set research project, it should also be noted that RavenPack have an API which enables ‘Real Time’ processing enabling strategies built off the data to be processed in live strategies.

RavenPack obtain news items from many providers. In our sample of 440,000 CAPEX events there are over 2,000 different providers with Dow Jones NewsWire, the LSE Regulatory News Service, Business Wire, PR Newswire and Reuters all featuring heavily. One of the challenges with multiple sources is that each solitary event is likely to be captured multiple times. To prevent event repetition all data was filtered such that repeated news items on the same day were removed with only the first source to report being retained. Furthermore, RavenPack provide an event similarity key which links both news items and corporate entities linked to the same news event.

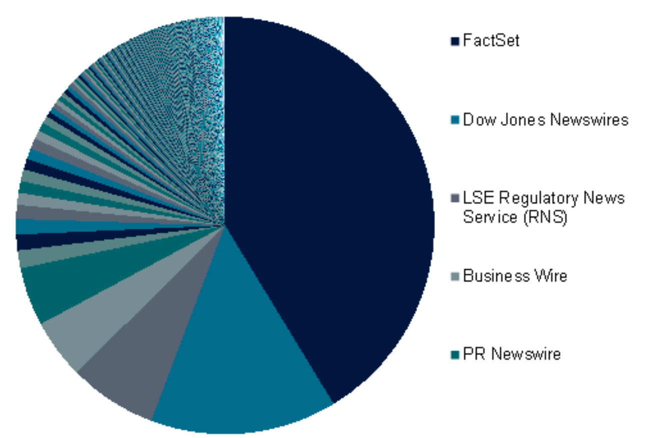
Despite removing repeated news items on the same day, the data still contained multiple line items with the same event similarity key and entity ID as provided by RavenPack. One possible reason for this is that CAPEX based news is not ground breaking and rarely makes the front pages of print media. Its priority to news vendors (and possibly investors) is relatively low resulting in news stories containing similar content being published over a number of days. To further prevent repetition only the first entry of an event with both the same event similarity key and Entity ID was retained. Doing this significantly reduced our data size from over 440,000 to just over 250,000 events.

Figure 39. Repeated Events



Source: Citi Research, RavenPack

Figure 40. Proportion of News from each Source



Source: Citi Research, RavenPack

An additional consideration is the extent to which the news items captured really relate to either CAPEX, or the entity in question. Data is being collected by machine creating a high likelihood that at least some of the events in our sample are either not CAPEX orientated, or do not relate to the entity the event is mapped to. This is hard to completely mitigate with perhaps the best protection being that we hold relatively large portfolios such that on average, performance mirrors that of high CAPEX announcements companies. To aid with this potential problem, RavenPack also provide two relevance scores, one which estimates the relevance of the event to the stock, another which estimates the relevance of the event to CAPEX.

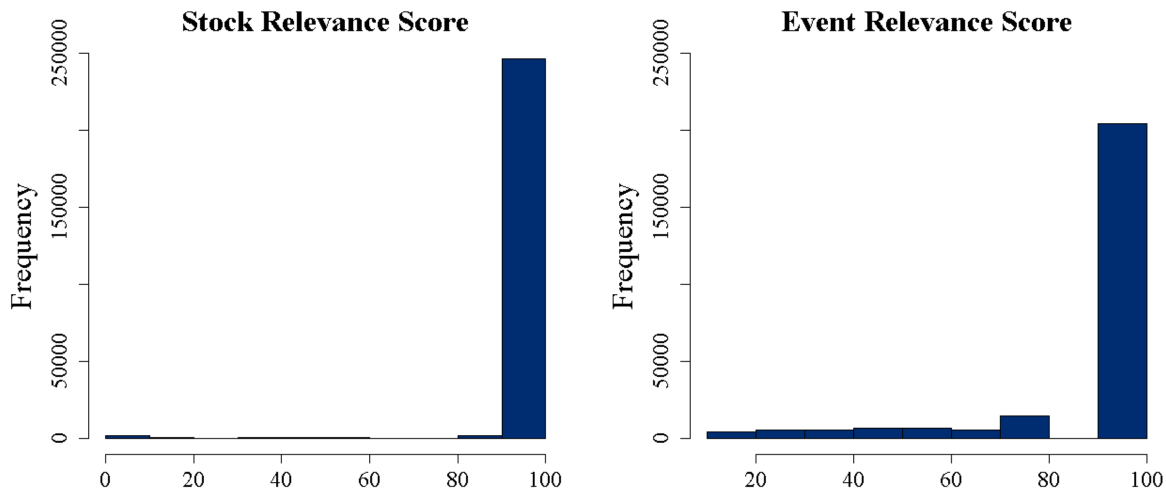
In an attempt to retain a clean dataset we remove all events which have a stock relevance score of below 75, and an event relevance score of below 80. These values have been selected following the RavenPack user manual which states;

"[Stock relevance] values above 75 are considered significantly relevant"

With an event relevance score above 80 suggesting CAPEX, or an associated term, is mentioned frequently and prominently[7] in the news story. Applying these filters slightly reduces our data sample.

[7] i.e. earlier on in the news event.

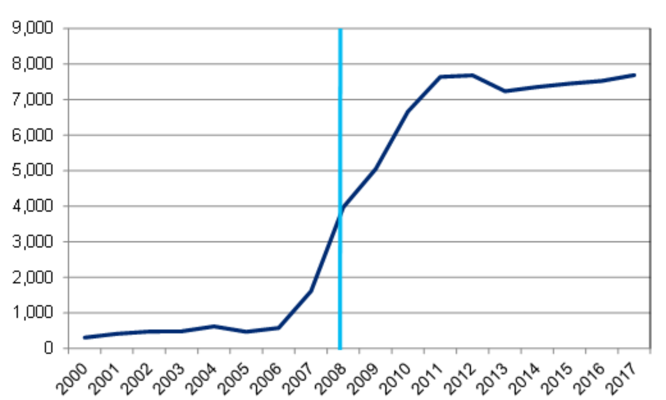
Figure 41. RavenPack Relevance Score



Source: Citi Research, RavenPack

As a final step, for empirical testing we extract all events which correspond to stocks inside the MSCI World. Using the index as our broad investible universe this results in 73,263 events. Examining coverage through time it is clear that there is a significant increase in the annual number of events after 2007. We therefore perform analysis over the period January 2008 to December 2017.

Figure 42. Number of Events per Year, MSCI World Stocks



Source: Citi Research, RavenPack, MSCI

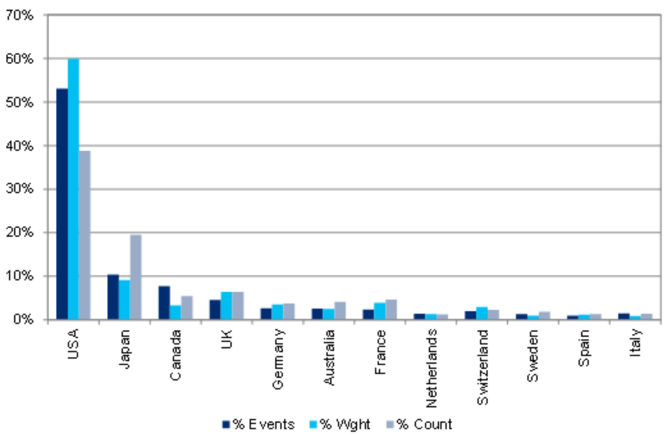
Figure 43. Event Count after Processing

Action	Event Count
Initial	430,040
Remove Repeats	254,418
Remove Irrelevant	204,414
Mapped to Security Master	197,316
MSCI World Constituent	73,263
>31/12/2007	68,280

Source: Citi Research, RavenPack, MSCI

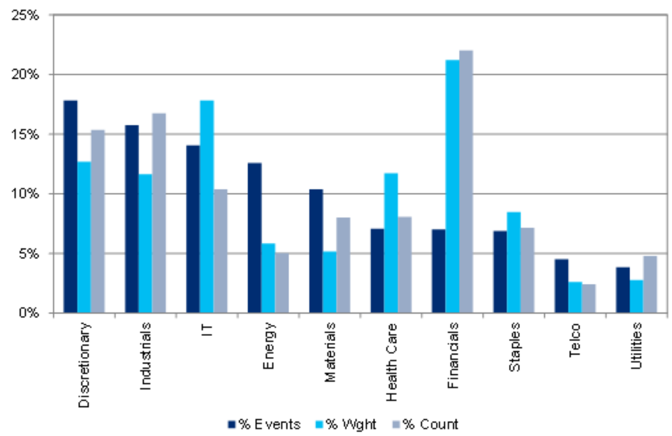
Taking all events inside the MSCI world, Figure 44 and Figure 45 plot the proportion of events within each country and sector against the cap weighted, and equal weighted MSCI World index. The number of events track the benchmark constituents well with there being perhaps a slight bias towards English language countries versus countries like Germany and France. This is not surprising as all of the news sources used are in English. However, from looking at the data any foreign language bias should be very small. From a sector perspective the number of events has broad coverage across sectors. Financials are clearly under represented with capital intensive Energy and Materials sectors intuitively being over represented.

Figure 44. Country Distribution of Events (versus MSCI World Feb 2018)



Source: Citi Research, RavenPack, MSCI

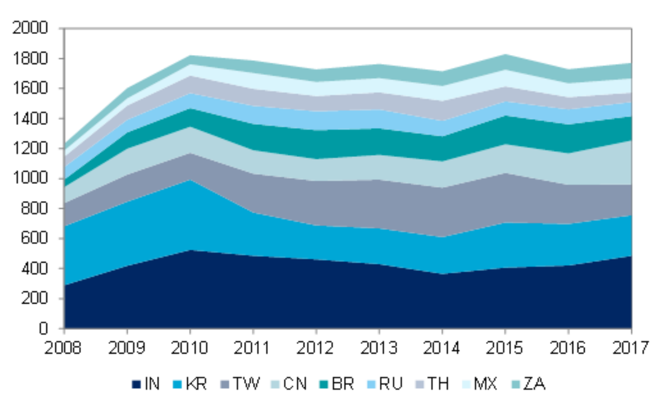
Figure 45. Sector Distribution of Events (versus MSCI World Feb 2018)



Source: Citi Research, RavenPack, MSCI

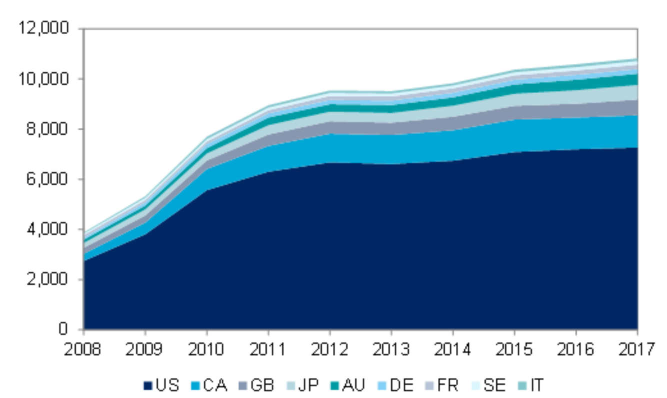
It is noticeable from Figure 43 that the RavenPack dataset also covers a large number of companies outside of the MSCI World. Exploring this further Figure 46 and Figure 47 present the country distribution from stock CAPEX events which are not represented in the MSCI World index. Here it is clear that the RavenPack data coverage extends to be significantly deeper than the largest, most liquid, stocks in the world with strong coverage in a number of EM markets. Deep coverage in USA facilitates use of the data beyond MSCI USA and into the Russell indices.

Figure 46. Number of Events, Outside MSCI World, EM



Source: Citi Research, RavenPack, MSCI

Figure 47. Number of Events, Outside MSCI World, DM



Source: Citi Research, RavenPack, MSCI

Investment Strategies

All CAPEX Events

Following our previously discussed hypothesis, in this section of the note investment strategies are constructed around the hypothesis that stock prices appreciate around positive CAPEX announcements. A simple way to examine this hypothesis is to buy all stocks after a CAPEX event. While this is a rather indiscriminant approach to implementation it is important to remember there are no regulatory requirements to announce CAPEX spend changes. As mentioned before in this report, we hypothesize that the majority of CAPEX announcements are, at least expected, to be taken by the market in a positive light, else why make the announcement?

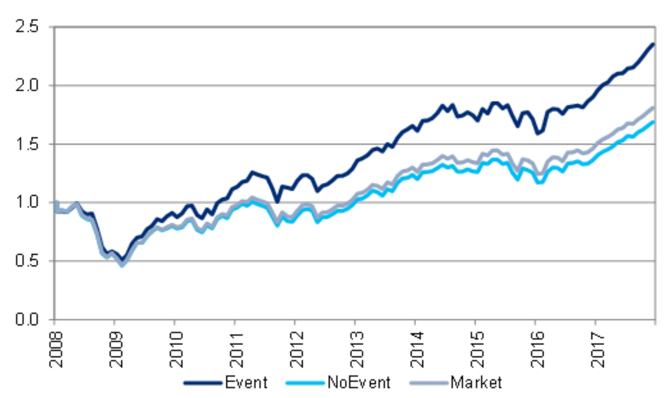
Figure 48 and Figure 49 presents performance and summary statistics from buying all CAPEX announcements over the prior month, and holding them for one month. This is a very crude way to implement an 'event' strategy for a number of reasons; most notably it can take up to a month to get CAPEX event stocks into the portfolio. Despite this rather clear restriction, the approach offers reasonably strong performance providing strong encouragement for profiting from CAPEX event announcements.

Figure 48. Backtest Summary Statistics, MSCI World

	Event	NoEvent	Event - NoEvent	Event - Market
Return	10.2%	7.0%	3.2%	2.5%
Volatility	17.7%	18.3%	4.9%	4.2%
Hit Rate	66.7%	60.8%	55.0%	54.2%
IR	0.57	0.38	0.66	0.61
Max Return	17.8%	16.3%	4.1%	3.9%
Min Return	-20.4%	-22.8%	-3.3%	-2.8%

Source: Citi Research, RavenPack, MSCI

Figure 49. Wealth Curve, MSCI World



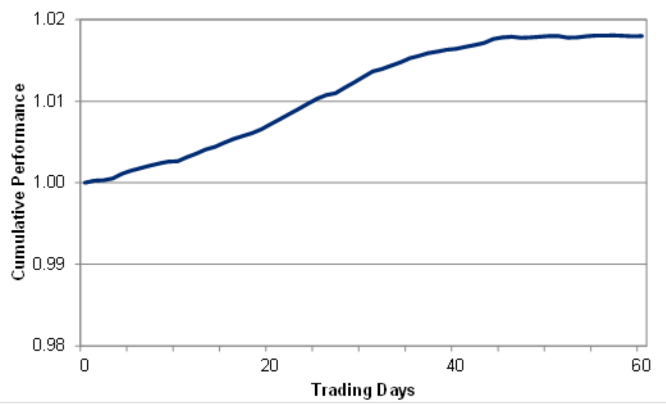
Source: Citi Research, RavenPack, MSCI

A notable challenge with the above strategy is that turnover is very high. Companies are required to make new CAPEX announcements every month to keep their firm in the event portfolio generating significant amounts of turnover. High turnover is a widely known problem with trading around events.

To examine the decay of CAPEX announcements further, Figure 50 shows the average cumulative return around CAPEX announcements. There is a clear drift post CAPEX announcement lasting for up to three months after the event date suggesting high turnover can be mitigated with a more sensible portfolio construction approach.

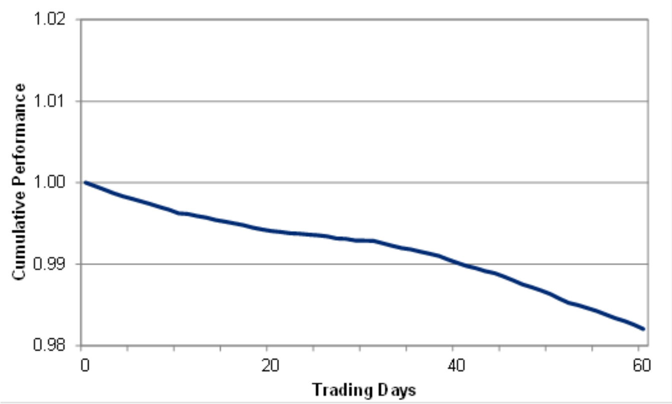
However, this analysis highlights an alternative concern. While Figure 50 presents cumulative mean performance finding a positive drift, Figure 51 shows the cumulative median performance is consistently negative. It is possible that positive performance is being generated by a small number of high performing events with the majority actually struggling.

Figure 50. Mean Cumulative Performance After Event



Source: Citi Research, RavenPack

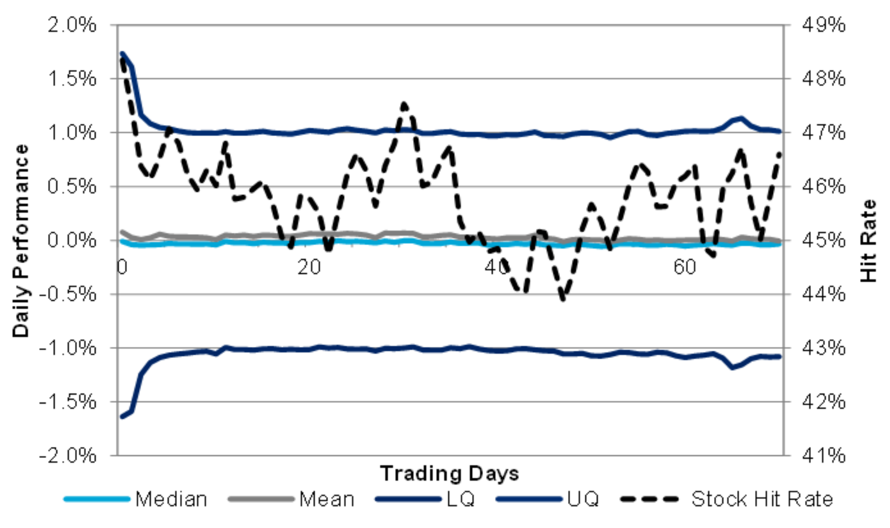
Figure 51. Median Cumulative Performance After Event



Source: Citi Research, RavenPack

To examine this further, Figure 52 shows the daily excess return distribution of CAPEX event stocks overlaid by the daily hit rate in excess of the MSCI World. From looking at the upper and lower quantile it is clear that the outperformance of CAPEX event stocks is not simply due to a small number of positive outliers with the daily excess return distribution being relatively symmetric within the upper and lower quantile. Hit rates are however consistently below 50% across the event horizon which suggests there may be substantial room to improve on the strategy through being selective between CAPEX events.

Figure 52. Daily Return Distribution



Source: Citi Research, RavenPack

It is clear from Figure 50 that a monthly rebalance approach is not intuitive. Rebalancing monthly can result in some events waiting up to 20 days before being included in the portfolio reducing the efficacy of the strategy. The other side of this coin is that investors which cannot use leverage are required to sell an asset every time they wish to buy an alternative. The unpredictable timing of CAPEX announcements makes the strategy difficult to execute.

A possible approach to solving this problem is to form overlapping portfolios weekly, and hold them for three months. As an illustrative example, divide some initial wealth into 12 equal pots, representing the number of weeks that CAPEX events should be held for. At the end of every week, buy the stocks which have made CAPEX announcements funded by selling stocks which have been held in the portfolio for 12 weeks. The net result is weekly execution, but of a small value of the total portfolio resulting in much reduced turnover.

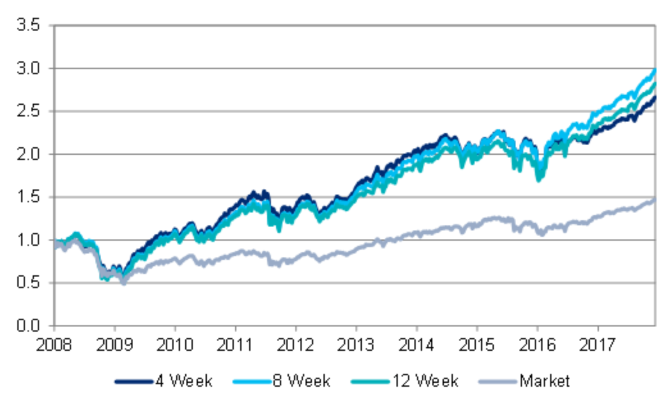
Figure 53 and Figure 54 present summary statistics and a wealth curve from buying all CAPEX announcement stocks weekly and holding for 4, 8 or 12 weeks, generating a maximum of 1300%, 650% and 433% turnover per year[8]. Performance of the three strategies is impressive with strong risk adjusted performance when compared to the benchmark.

Figure 53. Summary Statistics, Long Only, MSCI World

	4 Week	8 Week	12 Week
Return	12.2%	13.4%	12.8%
Volatility	21.9%	21.9%	22.0%
Hit Rate	56.6%	58.0%	57.0%
IR	0.56	0.61	0.58
Max Return	17.3%	17.3%	17.6%
Min Return	-15.2%	-16.0%	-17.3%

Source: Citi Research, RavenPack, MSCI

Figure 54. Wealth Curve, Long Only, MSCI World



Source: Citi Research, RavenPack, MSCI

In active risk space, information ratios are around one, with modest minimum monthly falls and high hit rates. Performance does however, appear to have been significantly better at the beginning of the sample period rather than in the more recent past. To allay such fears, Figure 57 shows 26 week annualized moving average showing strong performance across the full sample, even after the bumper year in 2009. This is further presented in Figure 58 with return summary statistics for 2 year sub periods exhibiting strong performance with 3 out of 4 time horizons offering information ratios greater than 1.

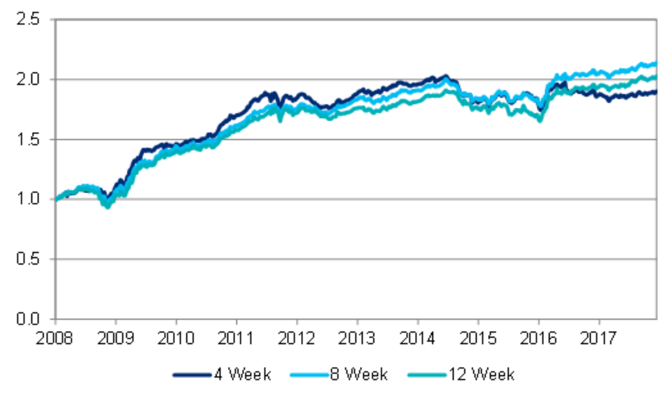
[8] 52/4, 52/8, 52/12 respectively

Figure 55. Summary Statistics, MSCI World Relative

	4 Week	8 Week	12 Week
Return	6.7%	7.8%	7.3%
Volatility	7.2%	6.7%	6.8%
Hit Rate	55.9%	57.0%	58.4%
IR	0.93	1.17	1.08
Max Return	4.8%	4.0%	4.2%
Min Return	-3.9%	-4.4%	-4.3%

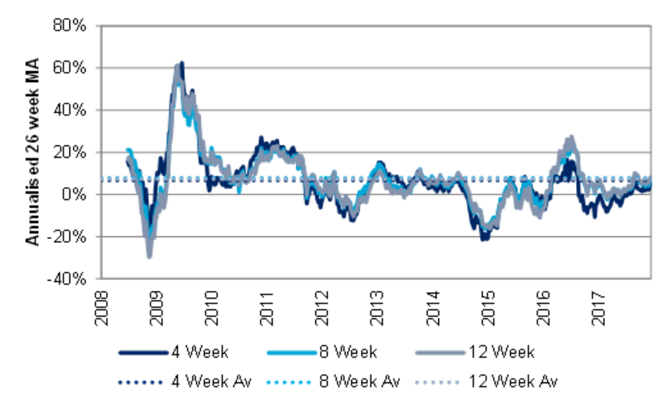
Source: Citi Research, RavenPack, MSCI

Figure 56. Wealth Curve, MSCI World Relative



Source: Citi Research, RavenPack, MSCI

Figure 57. Rolling Returns



Source: Citi Research, RavenPack, MSCI

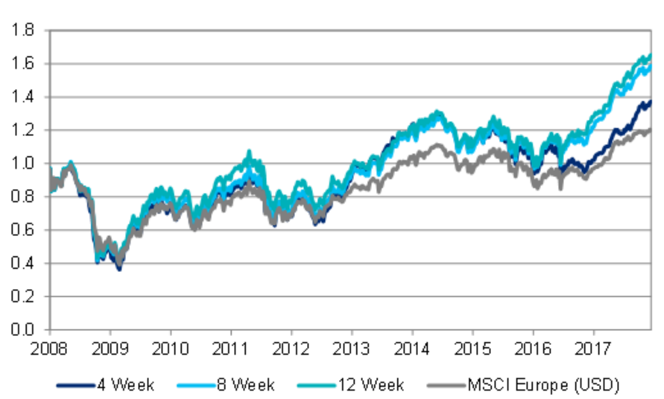
Figure 58. 2 year sub period, 8 weeks relative

	8 Week Relative			
	2010-2011	2012-2013	2014-2015	2016-2017
Return	8.5%	4.3%	-1.7%	7.8%
Volatility	6.0%	3.9%	5.2%	5.7%
Hit Rate	60.9%	56.2%	50.5%	56.3%
IR	1.4	1.1	-0.3	1.4
Max Return	3.0%	1.4%	2.0%	4.0%
Min Return	-2.7%	-1.3%	-1.7%	-1.8%

Source: Citi Research, RavenPack, MSCI

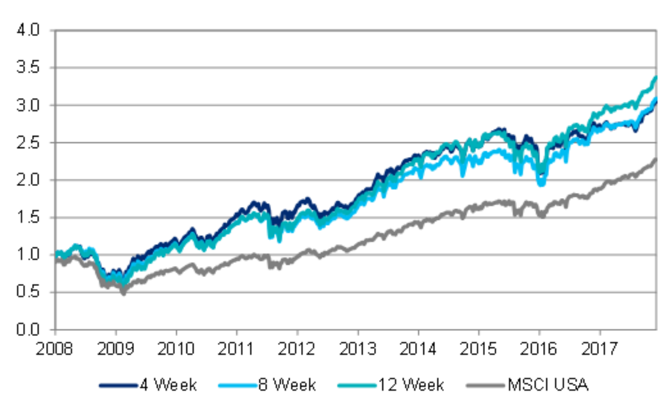
For ease of comparison to the previous section, Figure 59, Figure 60 and Figure 61 presents performance of MSCI USA and MSCI Europe constituents and events separately. Results are consistent across both regions with information ratios over 0.5 and relatively symmetric max and min weekly returns.

Figure 59. MSCI Europe only Events



Source: Citi Research, RavenPack, MSCI

Figure 60. MSCI USA only Events



Source: Citi Research, RavenPack, MSCI

Figure 61. Summary Statistics –Active Return USD

	Europe			US		
	4 Week	8 Week	12 Week	4 Week	8 Week	12 Week
Return	2.1%	3.5%	3.9%	3.6%	3.8%	4.7%
Volatility	7.4%	6.3%	5.7%	7.2%	6.2%	6.1%
Hit Rate	53.5%	54.4%	55.2%	49.0%	51.7%	54.2%
IR	0.28	0.56	0.67	0.50	0.61	0.77
Max (Weekly) Return	4.7%	6.1%	5.7%	6.4%	4.3%	4.7%
Min (Weekly) Return	-4.6%	-4.6%	-4.2%	-4.0%	-2.6%	-2.7%

Source: Citi Research, RavenPack, MSCI

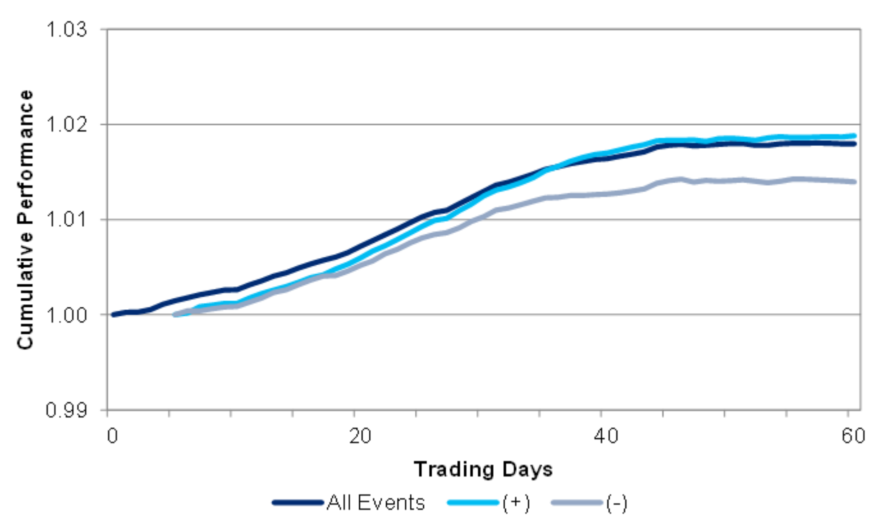
Selecting CAPEX Events

Despite the strong performance from buying all CAPEX events, it is exceptionally naïve and has a low hit rate at the stock level. RavenPack offer short term sentiment scores which attempt to garner direction from the language used in the news item. While we have examined using these, in this instance we found they added little value possibly due to the very specific nature of CAPEX events. Alternative possible future research could examine feature extraction from text rather than sentiment, identifying the size of the project and providing otherwise unknown data in a structured way.

Instead we opt for a more rudimentary approach. The long drift around CAPEX announcements and our weekly rebalance schedule enables us to obtain information purporting to the market reaction of the announced CAPEX. We therefore examine the change in price from one week before to one week after, the CAPEX announcement. Positive excess market performance is interpreted as a positive CAPEX move, with negative market excess performance being interpreted as the converse. Clearly, this incorporates a one week delay in implementation such that an 8 week holding period starts at the beginning of week 2 and running until the end of week 9 as measured from the initial event date.

Figure 62 show performance around CAPEX events classifying events as either positive or negative based on their return reaction. Also included is the naïve strategy examined previously. While there does seem to be some incremental gains from being more selective with CAPEX events, the majority of those gains appear to be subsumed by the cost of delaying execution by a week.

Figure 62. Event Study



Source: Citi Research, RavenPack, MSCI

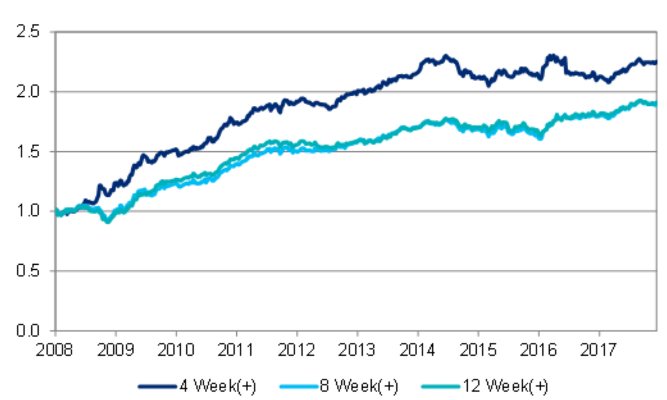
Performing a weekly backtest only using positive reaction events, Figure 63 and Figure 64 demonstrate performance is broadly comparable to the all event approach. The shorter, 4 week holding period, benefits most from the additional event reaction overlay improving average annual returns by 1.5%. However, the longer holding periods are relatively agnostic to the approach generating lower returns and risk, resulting in similar information ratios. Overall, it is difficult to advocate the additional filter unless clients intend on running the strategy with relatively short holding periods.

Figure 63. Summary Statistics, Long – MSCI World

	4 Week(+)	8 Week(+)	12 Week(+)
Return	8.4%	6.7%	6.7%
Volatility	7.6%	6.3%	6.1%
Hit Rate	56.6%	57.8%	58.4%
IR	1.11	1.06	1.09
Max Return	7.3%	3.6%	3.2%
Min Return	-5.6%	-4.0%	-4.0%

Source: Citi Research, RavenPack, MSCI

Figure 64. Wealth Curve, Long – MSCI World



Source: Citi Research, RavenPack, MSCI

Style Relationship

Having constructed a novel factor based on CAPEX announcements, it is important to demonstrate that the factor offers an alternative source of returns from our benchmark factors. Furthermore, and as discussed above, it is useful to validate the factor as a Growth orientated factor. This is particularly pertinent, as the factors examined in the literature, namely AbCap and GrowAss bear more resemblance to Value strategies ex-post than Growth.

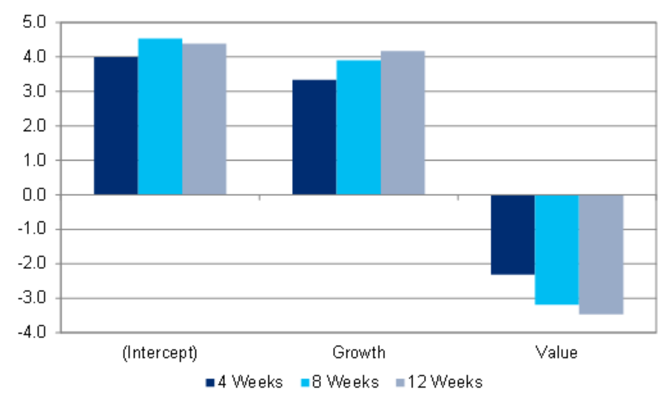
Figure 65 presents t-stats from running a weekly time-series regression of CAPEX event factor returns against our standard style factor returns. The intercept (Alpha) has a clearly significant t-stat suggesting, once controlling for our benchmark styles the factor still adds value. Examining the relationship between CAPEX announcement and our benchmark factors, CAPEX announcement is similar to Growth, and dissimilar to Value providing the desired relationship. Also of interest is the clear negative relationship to Low Risk, strongly implying this is a pro-cyclical factor, which one would expect should it track the broader economic cycle

Figure 65. T-Stat from Time Series Return Regression

	4 Weeks	8 Weeks	12 Weeks
(Intercept)	3.99	4.53	4.38
EMom	-1.90	-2.40	-2.12
Growth	3.34	3.90	4.17
Quality	-0.81	-1.39	-1.13
Low Risk	-7.79	-8.17	-8.43
Large Cap	-2.22	-2.59	-2.94
Value	-2.32	-3.19	-3.46
PMom	1.92	1.98	1.60

Source: Citi Research, RavenPack, MSCI

Figure 66. Alpha, Value and Growth t-Stats



Source: Citi Research, RavenPack, MSCI

Conclusions: Event CAPEX Alpha

As we enter into a new stage of the business cycle where companies transition from redistribution of profits to reinvestment, we have examined the literature attempting to design trading strategies which benefit from corporate reinvestment. The academic literature offers approaches which, in some cases, provide strong and robust performance but, in all cases we are aware, profit from an unwinding of high CAPEX expectations rather than explicitly benefiting from reinvestment. This results in strategies which more closely resemble Value than Growth.

Using RavenPack data we have offered strong evidence that corporate reinvestment strategies can be constructed from announcements regarding reinvestment, rather than financial statement based information. Such strategies are much more aligned to Growth than those suggested in the academic literature, enabling investors to profit from corporate reinvestment, as well as the well documented subsequent reversal.

A significant challenge with using events data is high turnover. We have formulated a simple and intuitive portfolio construction approach to mitigate this concern while benefiting from the long decay of the signal. We have also highlighted further interesting areas of research identifying the relatively low hit rate of stocks at each point in time offering opportunities for more specific event selection.

When it comes to corporate reinvestment;

Buy the announcement, sell the delivery

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Previously Published Research

Figure 67. Research Reports (since 2009)

Report	Date Published
Searching for Alpha: Tactical Style Rotation – Using Risk and Return to Manage Style Exposure	7-Sep-2017
Searching for Alpha: Big Data – Navigating New Alternative Datasets	10-Mar-2017
Searching for Alpha: Betting Against Accurate Beta	13-Feb-2017
Searching for Alpha: Competitive Advantage – Survival of the Fittest	19-Sep-2016
Searching for Alpha: Financial Strength Redux	9-Sep-2016
Searching for Alpha: Dynamic Style Weighting – Risk-Based Equity Style Allocation	14-Apr-2016
No Shorts Please: Long-Only Pure Style Portfolios	4-Mar-2016
Industry Alpha insights: Banks – One Size Does Not Fit All	18-Feb-2016
Under the Microscope: Stock Momentum Conflation	21 Sep-2015
Searching for Alpha: Macro Moves Markets	15-Sep-2015
Searching for Alpha: Style Performance, Trading Volumes and Investor Agreement	23-Mar-2015
World Radar Screen: Refining Our Global Search for Alpha	13-Mar-2015
Searching for Alpha: Networking with Analysts: Modelling Analyst Forecast Dependence	18-Feb-2015
The Rise of Low Risk Investing: Is it Getting Crowded Out There	01-Oct-2014
Under the Microscope: Five Innovations in Momentum Investing	27-Mar-2014
Searching for Alpha: Timing Price Momentum	07-Mar-2014
Equity Risk Premia Investing: A New Methodology For Monitoring Style Performance	27-Nov-2013
Stock Market Country Selection: Changes to a Well Established Model	23-Jul-2013
Searching for Alpha: Digging for Dividends – QUARI QUality with A Reliable Income	02-Jul-2013
Global Theme Machine: An Objective Way of Identifying Attractive Investment Themes	24-Jun-2013
Searching for Alpha: Purifying Analyst Recommendations – Removing Beta to get to the Alpha	25-Mar-2013
Searching for Alpha: Tangible Benefits of Intangibles – Brand, Respect & Intellectual Capital	06-Nov-2012
Global Quantitative Research Conference: 2012 Conference Proceedings	26-Sep-2012
Low-Risk Portfolio Strategies: Sharpe Ratio Maximisation and Multi-Asset Applications	09-Mar-2012
Macro Risk and Style Rotation: A Guide Rather than a Prescription	28-Feb-2012
Searching for Alpha: Accruals Volatility – A New Approach to Quality Investing	14-Sep-2011
Industry Alpha Insights: Four Approaches to Tactical Industry Selection	24-Aug-2011
Industry Alpha Insights: Quantifying Industry Specific Fundamentals	17-Mar-2011
Low-Risk Equity Portfolios: More than just Minimum Variance	18-Nov-2010
Under the Microscope: Measuring Systemic Risk – The Absorption Ratio	15-Nov-2010
Under the Microscope: Optionality in Valuation	14-Jun-2010
Searching for Alpha: Earnings Surprise – Still Profiting from Surprises	31-Mar-2010
Searching for Alpha: Optimising Style Rotation Strategies	15-Oct-2009

Source: Citi Research

Figure 68. What Works in Equity Markets (last 24 Months)

Report	
PE: Which Calculation Works the Best	14-Feb-2018
Predicting the Future	11-Jan-2018
Brands Matter……	04-Sep-2017
Top of the Market?	08-Aug-2017
Waiting for Earnings Delivery	27-Jan-2017
Style Purification – Does it Help?	24-Jan-2017
Single Factor or Multi-Factor Investing	22-Jul-2016
Are Spin-offs Money Spinners?	10-May-2016
Income and Low Risk Crowding	25-Apr-2016
Look for Persistent Earnings Leadership	24-Feb-2016

Source: Citi Research

Citi Quant Research Team

Figure 69. Citi Quantitative Teams *For informational purposes only*

Global Quantitative Research		
Europe		
Chris Montagu[1]	+44-20-7986-3958	chris.montagu@citi.com
Helen Krause[1]	+44-20-7986-8653	helen.krause@citi.com
James Murray[1]	+44-20-7986-4579	james.murray@citi.com
David Chew[1]	+44-20-7986-7698	david.chew@citi.com
Ying Zhu[1]	+44-20-7986-8325	ying.zhu@citi.com
North America		
Hong Li[5]	+1-212-723-2881	hong.li@citi.com
Jason Li[5]	+1-212-816-6033	jason.li@citi.com
Tiffany Zhou[5]	+1-212-816-4659	tiffany.zhou@citi.com
Richard Schlatter[5]	+1-212-816 6279	richard.w.schlatter@citi.com
Asia		
Chris Ma[2]	+852-2501-2404	chris.ma@citi.com
Jason Kim[2]	+852-2501-2735	jason.jh.kim@citi.com
Liz Dinh[3]	+61-2-8225-4896	liz.dinh@citi.com
Bhavik Bochar[4]	+91-22-4277-5019	bhavik.bochar@citi.com
Academic Consultant		
Jose M Carabias[1]	+44-20-7986-3958	gqlondon@citi.com

1 Citigroup Global Markets Ltd; 2 Citigroup Global Markets Asia Limited; 3 Citigroup Pty Limited, 4 Citigroup Global Markets Inc., 5 Citigroup Global Markets India Private Limited

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Citi Research Quantitative World Radar Screen Model Coverage	30%	40%	30%			
% of companies in each rating category that are investment banking clients	40%	36%	30%			
Citi Research Asia Quantitative Radar Screen Model Coverage	21%	60%	19%			
% of companies in each rating category that are investment banking clients	41%	30%	27%			
Citi Research Australia Radar Model Coverage	48%	0%	52%			
% of companies in each rating category that are investment banking clients	48%	0%	33%			

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