Deutsche Bank
Markets Research

North America
United States

Quantitative Strategy
The Quant View

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A Performance Study on Initial Public Offerings

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Quantitative macro and micro forecasts for the month

In this report we present our latest quantitative forecasts for the coming month. Our models are designed to generate both bottom-up stock selection ideas as well as top-down asset, country, and style allocation calls.

Conditions seem ripe for an increase of IPO activity

With the market reaching all time highs combined with an onslaught of venture backed growth and startup companies; the market seems ripe for an increase in IPO activity.

Analyzing the performance of IPOs is not an easy task

Most financial databases do not contain IPO pricing or fundamental prospectus data. As such, analyzing the performance of IPOs can be challenging.

An event study on IPO performance

In this month's edition of the Quant View we take on this challenge by analyzing the performance of US companies post an IPO. We analyze approximately three thousand IPOs from 1990 to 2013.

Source: *gettyimages.com*

Analyzing IPOs

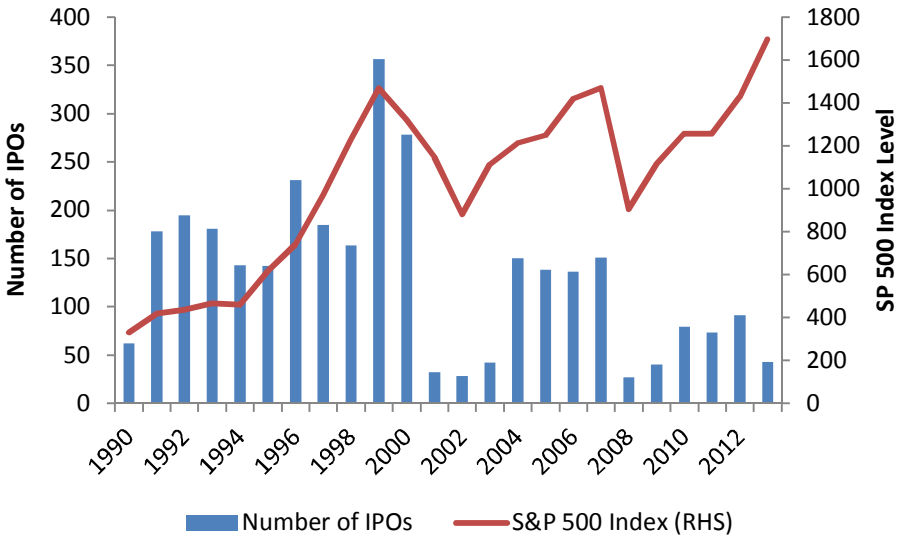
Analyzing the performance of IPOs is challenging

With the market reaching all time highs and an onslaught of venture backed innovative growth and startup companies, conditions are ripe for an increase in IPO activity. However, analyzing the historical performance of IPOs is not a straightforward task. Most financial databases do not contain IPO data. Typical quantitative databases do not contain any fundamental prospectus data. The vast majority of IPOs in the US market occurred prior to 2001; therefore, obtaining high quality historical pricing and fundamental data can be difficult. As such, assessing the performance of IPOs is a challenging feat. In this month's edition of the Quant View we take on this challenge by analyzing the performance of US companies post an IPO. We analyze approximately three thousand IPOs from 1990 to 2013. The goal is to investigate the performance of stocks after their IPO date and possibly identify certain characteristics that may help investors in their selection process.

IPOs in the US are in decline

We begin with Figure 1 which shows the number of IPOs over time. From 1990 to 2013, there were over three thousand IPOs in the US market with a strong run up during the technology bubble. Thereafter, the number of IPOs has declined significantly since the late 1990's. Recent academic studies point out that the decline in IPOs can be attributed to increased regulation around that market as well as additional costs imposed on publicly traded companies.[1] Figure 1 also shows that the number of IPOs is strongly correlated to market performance. This is not too surprising since most companies would prefer to IPO during stable or rising market conditions.

Figure 1: Number of IPO's overtime within the US market

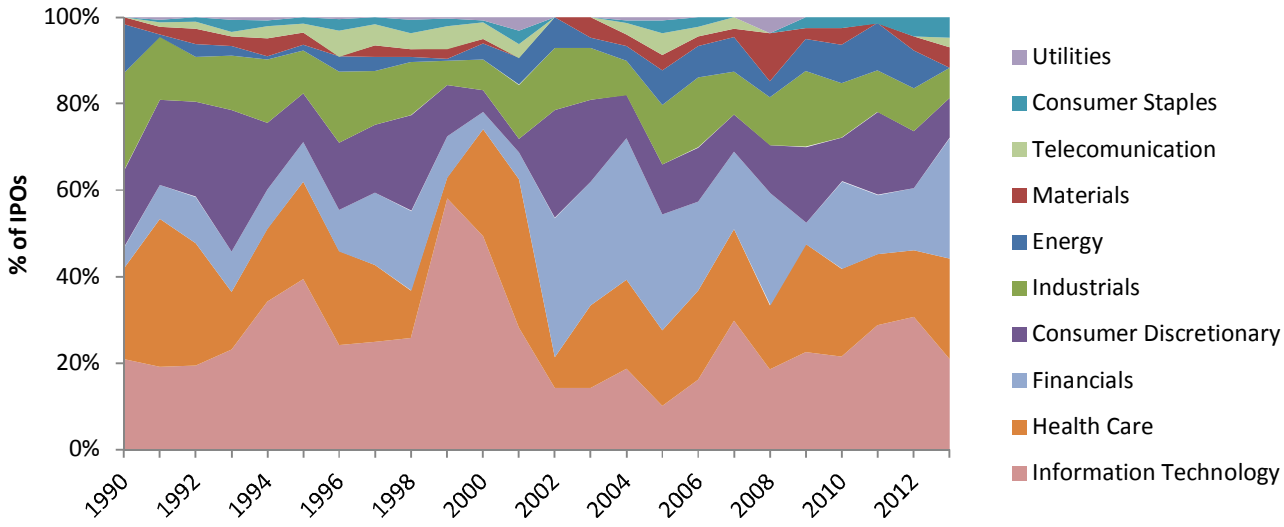


Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

[1] For more information, see Ritter, Jay R. and Gao, Xiaohui and Zhu, Zhongyan, Where Have All the IPOs Gone? (August 26, 2013). Available at SSRN: http://ssrn.com/abstract=1954788 or http://dx.doi.org/10.2139/ssrn.1954788

The get a sense of sector level IPO activity, Figure 2 shows the percentage of IPOs within each sector. The vast majority of IPOs over time tend to be Technology and Health Care stocks, while Utility and Consumer Staple stocks have had the least number of IPOs.

Figure 2: Percentage of IPOs within each sector overtime

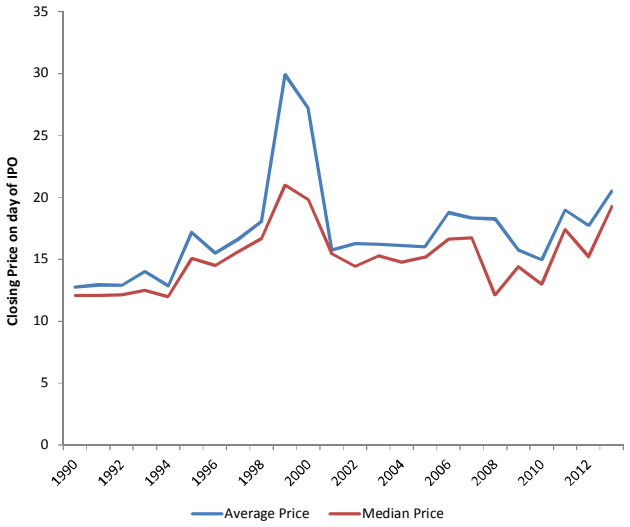


Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 3 shows the average and median closing stock price for US stocks on the day of the IPO. This is not the IPO price but it provides an approximate proxy of the average IPO price for US stocks over time. The figure also shows that there was a significant increase in IPO pricing during the technology bubble.

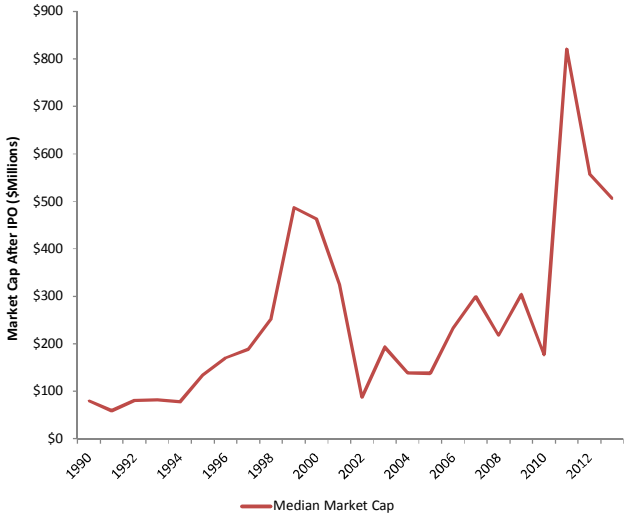
Figure 4 shows the median market cap for US stocks after an IPO. This again is not the IPO valuation, but a proxy of it. We see elevated levels of IPO valuation during the technology bubble of the late 1990s. More recently, IPO valuations have increased substantially.

Figure 3: Average price on the day after an IPO



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 4: Average market cap after IPO



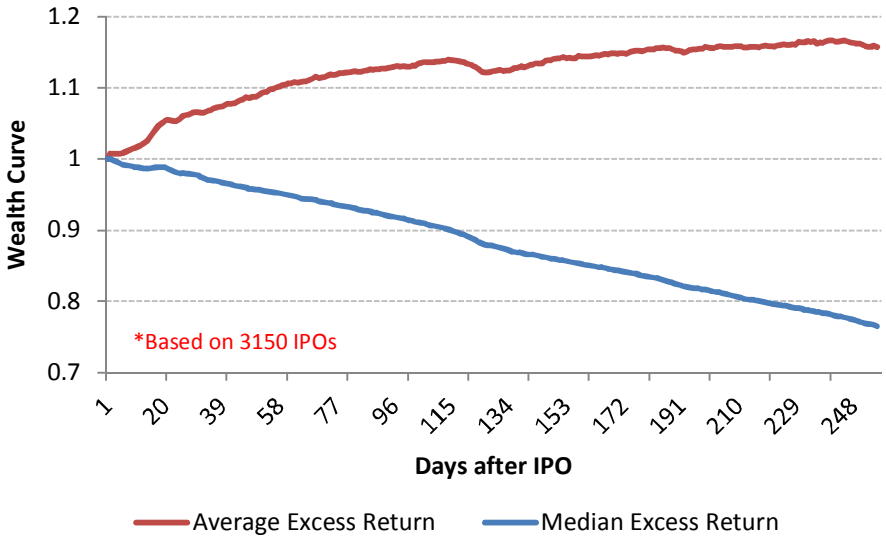
Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Post IPO performance is on average promising

Understandably, investors are most interested in post IPO performance. To analyze this, Figure 5, shows the results of an IPO event study based our sample of approximately three thousand IPOs in the US market. Essentially, our event study aligns all the IPOs together and calculates the average performance of all the stocks post the IPO date. We examine the average excess cumulative performance around the time of an IPO to one year after the IPO (Figure 5). The first quite promising result from the analysis is that the average one year excess return post an IPO is approximately 15%. Just to be clear, returns are based on from the day after the IPO to one year following the IPO date. This is because our financial database does not contain the IPO price. So this analysis assumes that investors purchase the stock the day after an IPO. As such there may be additional performance to gain if investors are able to secure the IPO price.

Figure 5 also shows that the median excess cumulative performance underperforms the average as the IPO progresses over time. This means that the distribution of excess returns is skewed, implying that a majority of IPOs underperform one year after going public, but there are a number of IPOs that significantly outperform. These results may look tempting to those interested in selecting only those outsize performing IPOs, but as we will see in the next section, it may be safer to invest in all offerings to secure positive performance. Figure 5 also shows that a significant portion of the outperformance is derived within the first month (21 days) of an IPO where the average excess performance increases sharply and the median excess performances remains fairly stable.

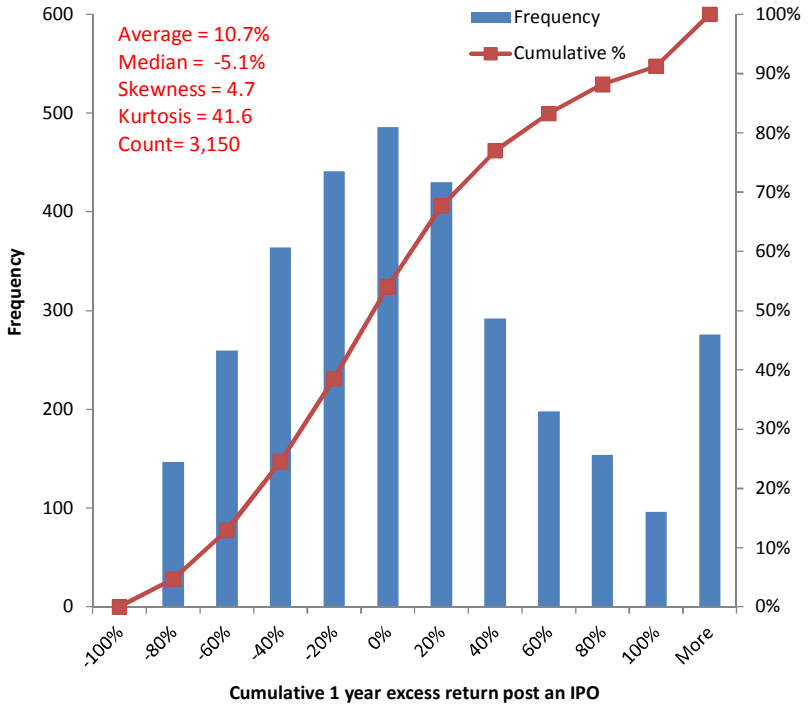
Figure 5: Average/Median excel wealth following an IPO



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Another approach to analyze the performance of IPOs is to plot the distribution of individual excess company returns, one year post the IPO date (Figure 6). At the company level, we see an auspicious average excess performance of approximately 11% over the sample of IPOs. We also see a cluster of companies that have excess returns of greater than 100%. This uneven performance across IPOs leads to a distribution of excess returns that is positively skewed and has excess kurtosis, which is another way of saying the distribution is heavy to the right tail.

Figure 6: Distribution of 1year excess returns

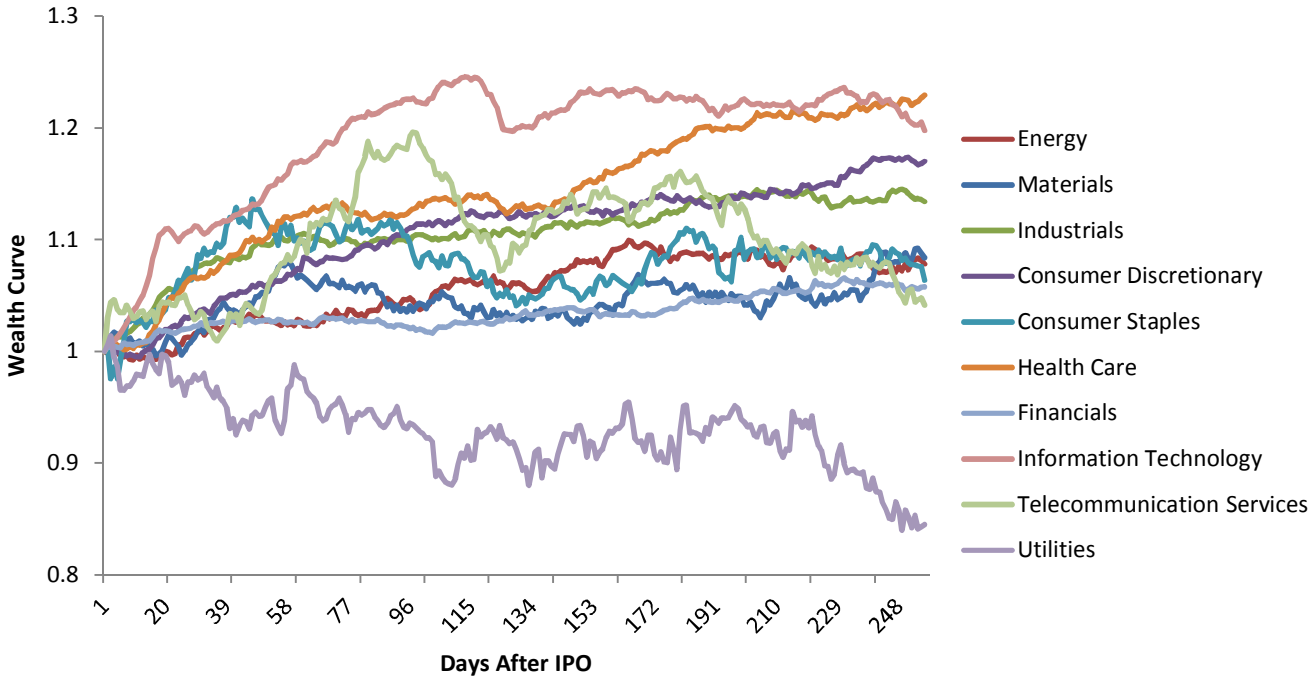


Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

IPO performance by sector

Examining IPOs within sectors can help reveal any important or significant sector performance differences. Figure 7 shows the average excess performance across sectors. The results show that Health Care and Information Technology stocks show the best average performance over the sample.

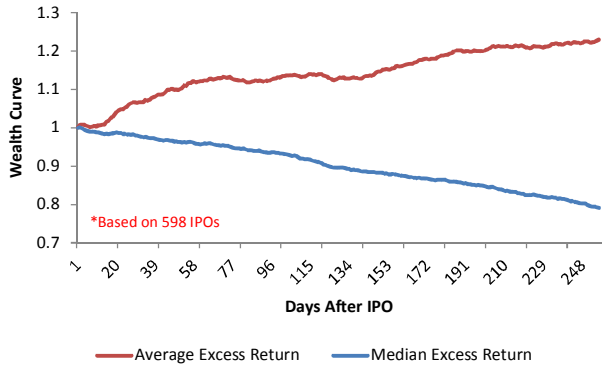
Figure 7: Average excess performance post IPO by sector



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

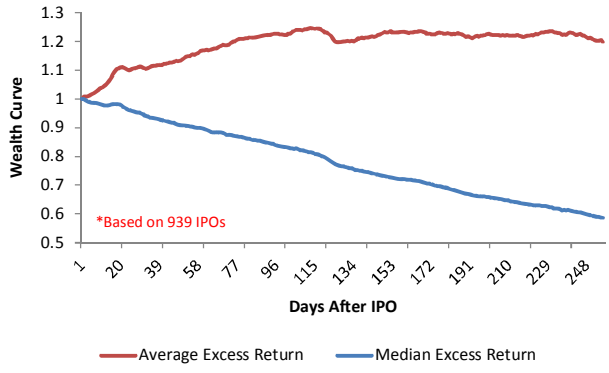
An event study similar to that in Figure 5 can give a more detailed picture of performance in for Health Care and Technology IPOs (Figure 8 and Figure 9).

Figure 8: IPO event study for Health Care stocks



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

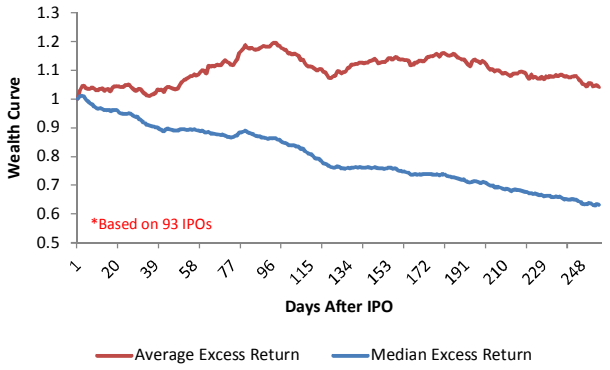
Figure 9: IPO event study for Technology stocks



Source Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

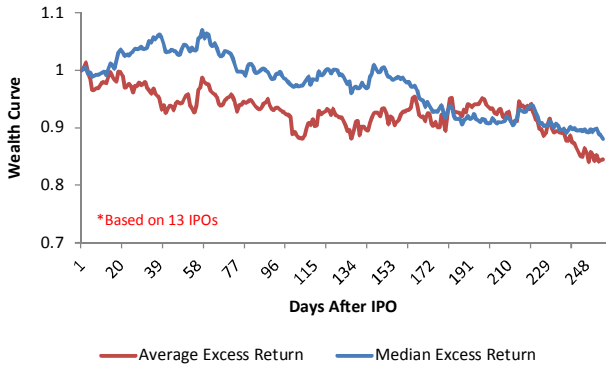
The results in Figure 7 also show that Telecommunication and Utility are the worst performing IPO sectors over the sample. Figure 10 and Figure 11 verify this result using the event study analysis. However, we must keep in mind that these sectors have the least number of stocks and IPOs in our sample. Our financial database has approximately ninety-three and thirteen IPOs for Telecommunication and Utility stocks, respectively. This lack of data will undoubtedly limit the accuracy of these results within these two sectors.

Figure 10: IPO event study for Telecommunication stocks



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

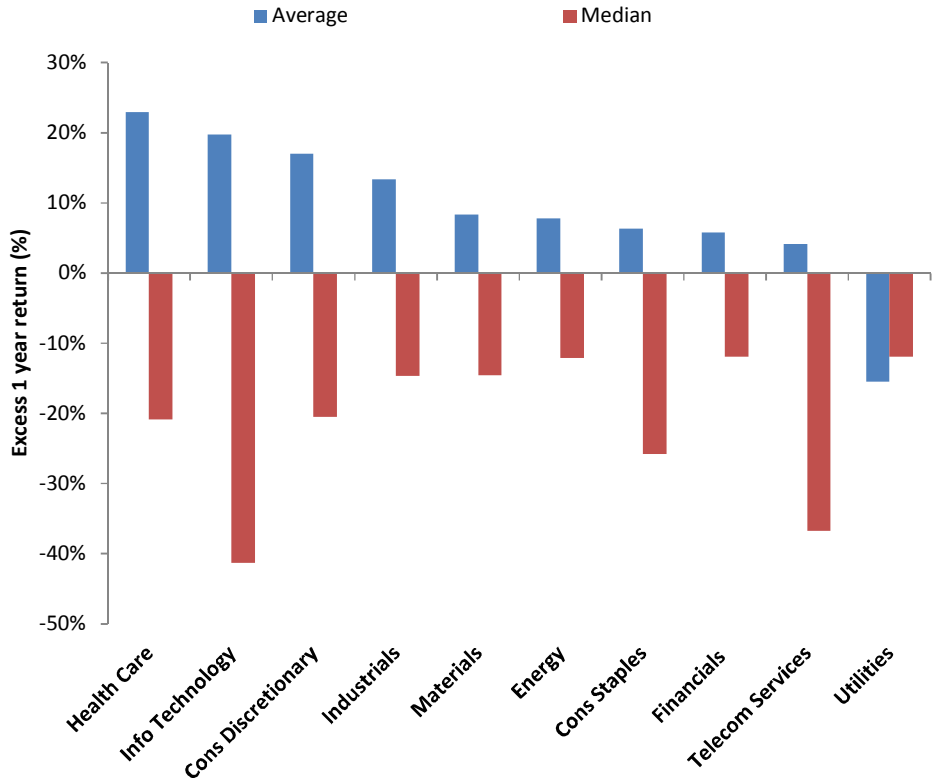
Figure 11: IPO event study for Utility stocks



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Similar to the result in Figure 5, our analysis at the sector level also shows a divergence between the average and median one year excess returns. This skewed result implies that a majority of IPOs underperform after one year; nonetheless, the smaller number of IPOs which outperform have such outsize returns that it causes the average one-year return to IPO investing to be positive over time. These results suggest that, barring any significant IPO selection ability, investors should invest across all the IPOs in order to capture the significant upside offered by a minority of the deals.

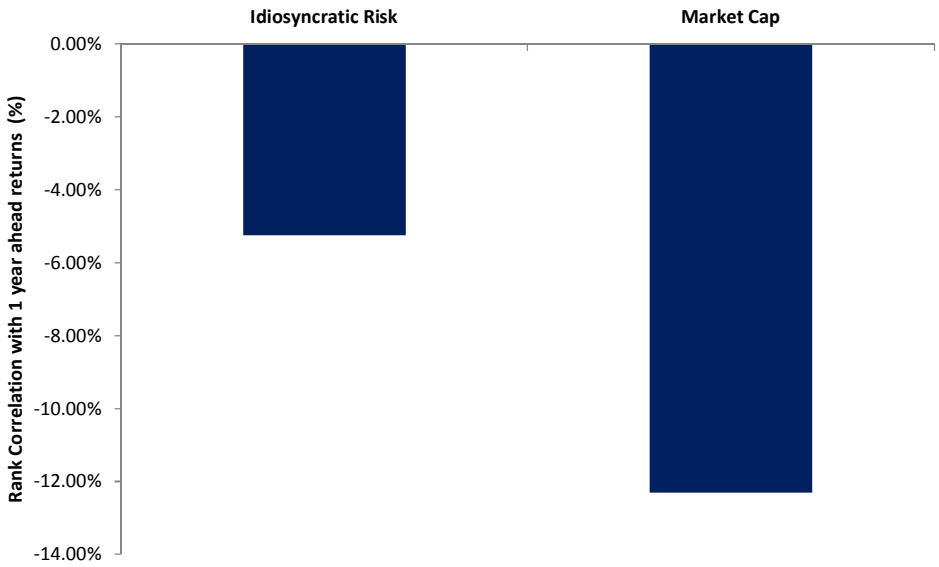
Figure 12: 1 year post IPO performance by sector



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

For investors who want to take the chance and be more selective, we find two results worth consideration. The first and more significant finding is that smaller capitalization IPOs (at time of issuance) tend to have better one-year performance following issuance (Figure 13). Second, we find that stocks with lower idiosyncratic risk – as proxied by comparable existing peers[2] – tend to have better one year performance (Figure 13). This latter result is in line with the low volatility anomaly commonly found in equities and across other asset classes.

Figure 13: Rank correlation between idiosyncratic risk & market cap against 1 year ahead returns



[2] Peers are considered stocks in the same industry and having similar fundamentals.

Macro update

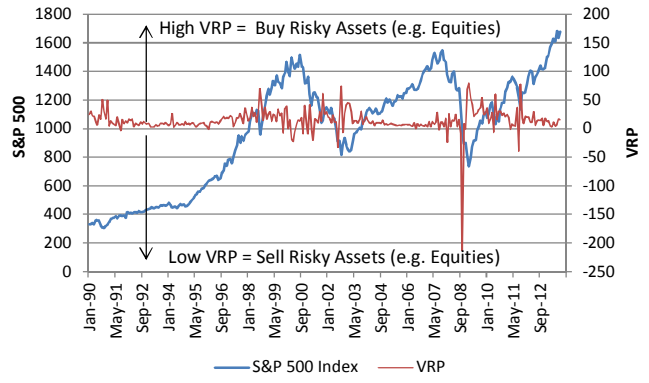
Turning our attention to the bigger picture, we also take the opportunity to update our favorite top-down market indicators.

Our favorite market timing indicator

Our Variance Risk Premium (VRP) indicator is a contrarian indicator that measures market overreaction and underreaction to realized risk. In simple terms, VRP is the difference between options-implied risk (i.e. the VIX index) and realized risk (i.e. the actual risk in the market measured historically over the last month). If VRP is high, we see this as a buying opportunity for risky assets, like equities and high yield bonds. Why? The intuition is as follows. When VRP is high, VIX has typically shot up dramatically (i.e. the market is in panic mode). At the same time, realized risk has probably also risen, but not to the same extent. In other words, the market has overreacted relative to what the actual, realized data is telling us. Our research shows that such episodes are good buying opportunities for risky assets on about a three month horizon.4 On the other hand, when VRP is low, it tends to be a complacency indicator: investors are failing to price in rising realized risk in the market, and as a result we should be selling risky assets like equities.

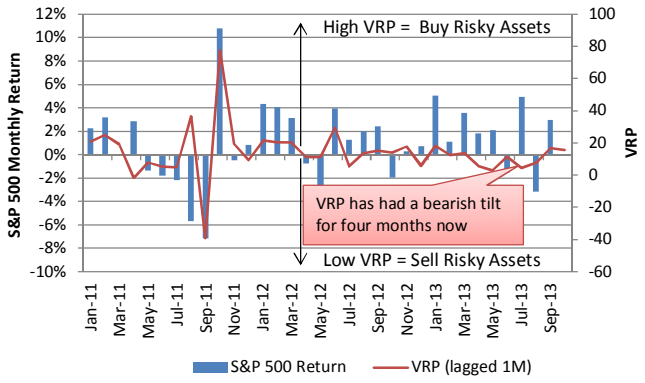
Our Variance Risk Premium (VRP) indicator is a contrarian indicator that measures market overreaction and underreaction to realized risk. Today our VRP indicator is reading 16, compared to a long-term average of 14.3. It's similar compare with last month's reading, suggesting a fairly neutral position. Generally we pay attention to the VRP when it hits extreme levels (like +/- 2 standard deviations).

Figure 14: Variance Risk Premium (VRP)



Source: Deutsche Bank

Figure 15: Recent VRP (lagged) and market returns

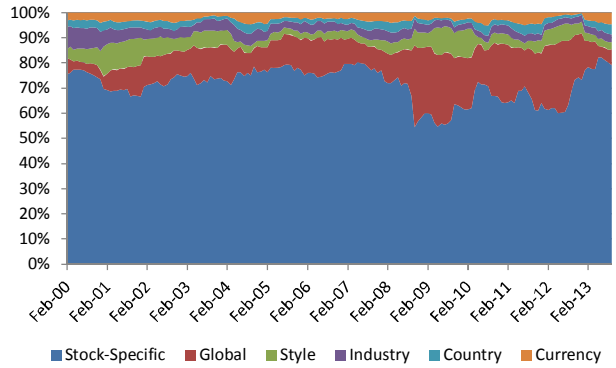


Source: Deutsche Bank

The opportunity set for investors

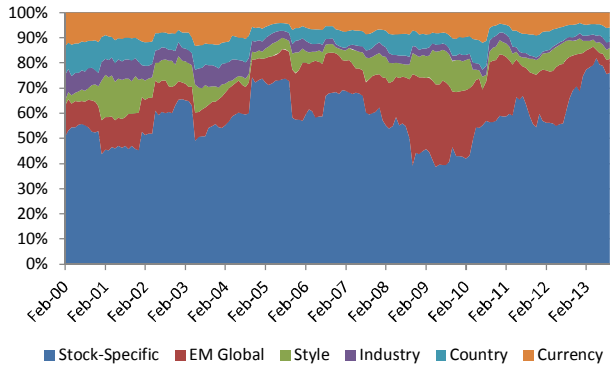
Another metric we keep a close eye on is the so-called "opportunity set" for investors. Think of this as the total alpha on the table. Our main interest is to understand what is driving that opportunity, because this can allow us to position our strategies to pick in the orchard with the juiciest fruit. In Figure 16 we show the opportunity set for global equity investors, and in Figure 17 we show the same thing for emerging market equity investors.

Figure 16: Global opportunity set



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 17: Emerging markets opportunity set



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

The key result is the size of the blue portion relative to the other colors. The blue represents the opportunity explained by stock selection, whereas we can think of the other colors as representing the opportunity from top-down calls like picking the right countries, industries, and styles. When the financial crisis exploded in 2008, we moved into a much more macro-dominated world. As a result, the portion of overall opportunity that could be explained by individual company characteristics (e.g. valuation, growth profile, earnings quality, etc.) shrunk sharply; no one cared if a stock looked good on fundamentals if it was exposed to Europe for example. Needless to say, such an environment was challenging for quants and non-quants alike, since both camps tend to use stock specific information to differentiate between stocks.

The DB Quant Dashboard

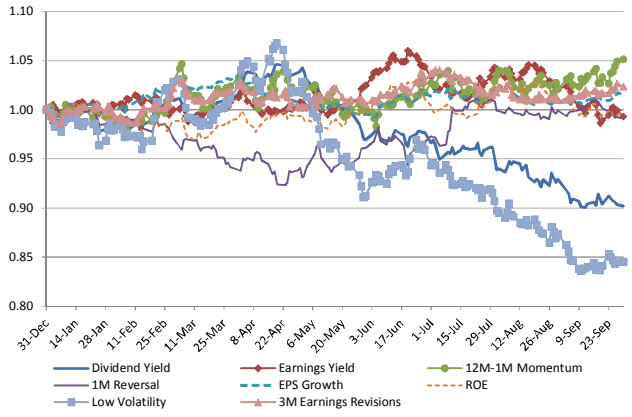
Which styles have been working around the world?

The DB Quant Dashboard is an easy-to-use cheat sheet that shows which styles have been working in key markets around the world. We track cumulative factor performance year-to-date, and highlight what we think are the noteworthy observations in each region. For those who prefer the previous tabular format (which includes more factors), you can find those results in the Appendix.

For more details see our website

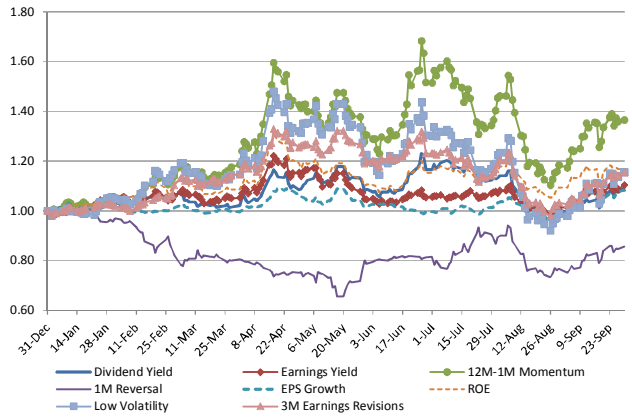
For the most recent daily factor performance, as well as factor performance delineated by different universes (e.g. large cap, small cap) and regions, please see our Global Quantitative Strategy website at https://eqindex.db.com/gqs/. Note that you need a username and password to log on to this website. If you don't have login details, please contact us at DBEQS.Americas@db.com and we'd be happy to set you up.

Figure 18: United States: YTD cumulative factor performance (Q10-Q1 return spread, local currency)



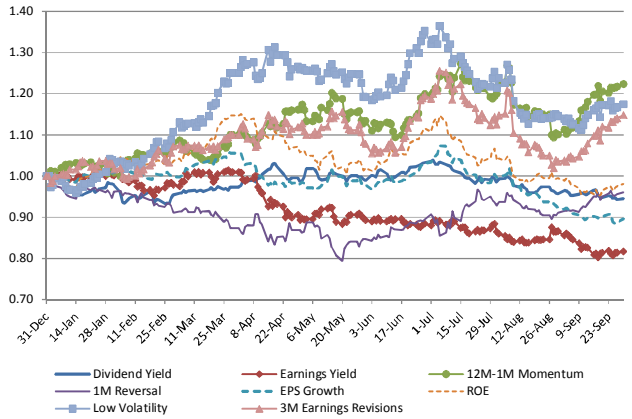
Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 19: Canada: YTD cumulative factor performance (Q10-Q1 return spread, local currency)



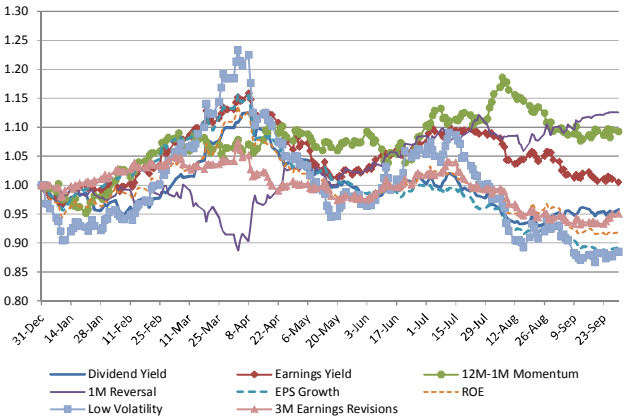
Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 20: United Kingdom: YTD cumulative factor performance (Q10-Q1 return spread, local currency)



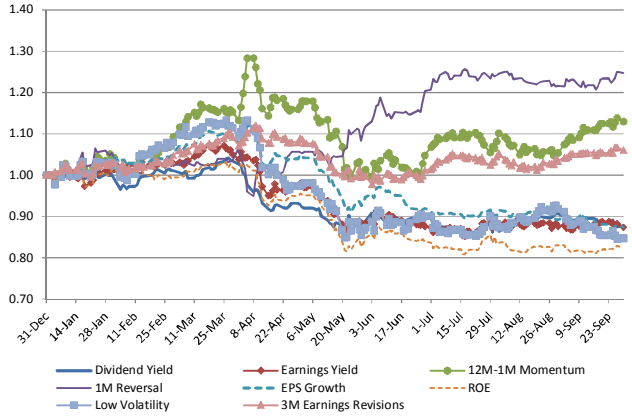
Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 21: Europe ex UK: YTD cumulative factor performance (Q10-Q1 return spread, local currency)



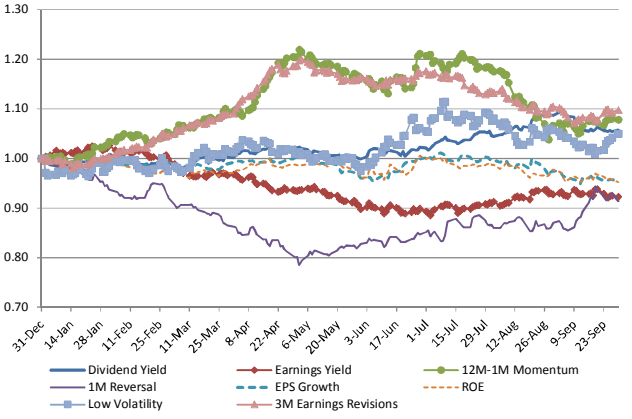
Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 22: Japan: YTD cumulative factor performance (Q10-Q1 return spread, local currency)



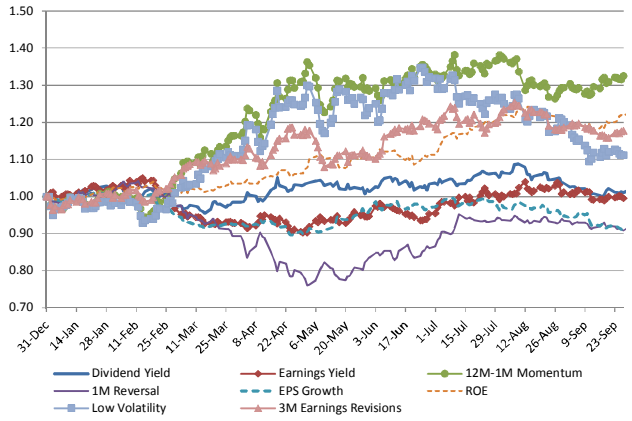
Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 23: Asia ex Japan: YTD cumulative factor performance (Q10-Q1 return spread, local currency)



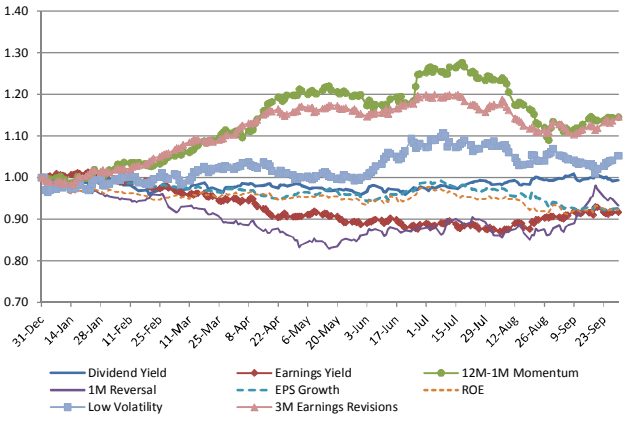
Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 24: Australia/New Zealand: YTD cumulative factor performance (Q10-Q1 return spread, local currency)



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 25: Emerging Markets: YTD cumulative factor performance (Q10-Q1 return spread, local currency)



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Bottom-up stock selection

QCD U.S. stock selection model

- The QCD model is our flagship stock selection model for U.S. equities.
- The model incorporates a number of unique features including dynamic factor selection, a non-linear TREE component, and active style and sector rotation.
- For complete details on the model, please see Luo et al., "QCD Model: DB Quant Handbook", 22 July 2010.

Current stock recommendations

Figure 26 shows the best 20 buy ideas and sell ideas from today's model. Note that a complete ranking for all Russell 3000 stocks is available in spreadsheet format. If you would like to get a copy of the spreadsheet, please contact us at DBEQS.Americas@db.com.

Figure 26: Current QCD model stock recommendations

BEST BUY IDEAS (SECTOR NEUTRAL)

Ticker	Name	CUSIP	GICS Sector	QCD Score (higher is better long)
LEA	LEAR CORP	521865204	Consumer Discretionary	25.4%
SRI	STONERIDGE INC	86183P102	Consumer Discretionary	24.9%
INT	WORLD FUEL SERVICES CORP	981475106	Energy	17.5%
NATR	NATURES SUNSHINE PRODS INC	639027101	Consumer Staples	17.4%
CCK	CROWN HOLDINGS INC	228368106	Materials	16.9%
USNA	USANA HEALTH SCIENCES INC	90328M107	Consumer Staples	16.1%
WLB	WESTMORELAND COAL CO	960878106	Energy	15.0%
ACM	AECOM TECHNOLOGY CORP	00766T100	Industrials	14.4%
ZEUS	OLYMPIC STEEL INC	68162K106	Materials	14.2%
TTEC	TELETECH HOLDINGS INC	879939106	Information Technology	13.8%
EEFT	EURONET WORLDWIDE INC	298736109	Information Technology	13.1%
ABC	AMERISOURCEBERGEN CORP	03073E105	Health Care	12.1%
LLY	LILLY (ELI) & CO	532457108	Health Care	12.0%
AGCO	AGCO CORP	001084102	Industrials	11.8%
SIGI	SELECTIVE INS GROUP INC	816300107	Financials	11.4%
AXP	AMERICAN EXPRESS CO	025816109	Financials	9.1%
UGI	UGI CORP	902681105	Utilities	8.8%
NVE	NV ENERGY INC	67073Y106	Utilities	7.7%
CBB	CINCINNATI BELL INC	171871106	Telecommunication Services	4.8%
T	AT&T INC	00206R102	Telecommunication Services	4.7%

BEST SELL IDEAS (SECTOR NEUTRAL)

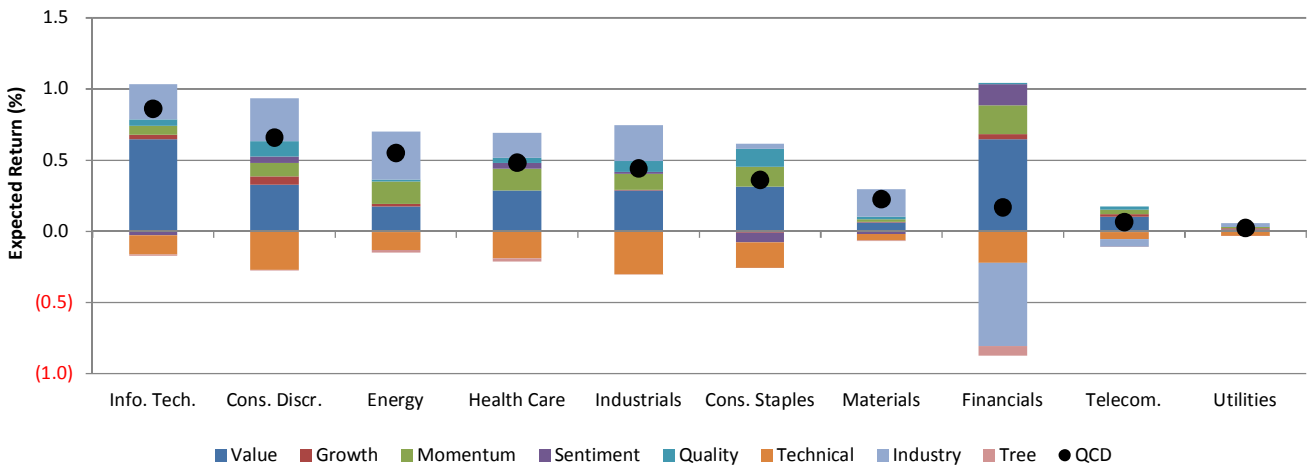
Ticker	Name	CUSIP	GICS Sector	QCD Score (lower is better short)
CUBI	CUSTOMERS BANCORP INC	23204G100	Financials	-26.6%
OMER	OMEROS CORP	682143102	Health Care	-25.0%
WD	WALKER & DUNLOP INC	93148P102	Financials	-22.5%
PRKR	PARKERVISION INC	701354102	Information Technology	-22.0%
RBCN	RUBICON TECHNOLOGY INC	78112T107	Information Technology	-21.7%
ACHN	ACHILLION PHARMACEUTICALS	00448Q201	Health Care	-21.1%
EOX	EMERALD OIL INC	29101U209	Energy	-15.9%
SHLD	SEARS HOLDINGS CORP	812350106	Consumer Discretionary	-15.6%
TWER	TOWERSTREAM CORP	892000100	Telecommunication Services	-14.9%
BOBE	BOB EVANS FARMS	096761101	Consumer Discretionary	-14.4%
IRDM	IRIDIUM COMMUNICATIONS INC	46269C102	Telecommunication Services	-13.7%
ACFN	ACORN ENERGY INC	004848107	Industrials	-12.4%
LWAY	LIFEWAY FOODS INC	531914109	Consumer Staples	-12.4%
YRCW	YRC WORLDWIDE INC	984249607	Industrials	-11.0%
BPZ	BPZ RESOURCES INC	055639108	Energy	-10.6%
IPI	INTREPID POTASH INC	46121Y102	Materials	-10.2%
SNAK	INVENTURE FOODS INC	461212102	Consumer Staples	-10.2%
MCP	MOLYCORP INC	608753109	Materials	-8.5%
GNE	GENIE ENERGY LTD	372284208	Utilities	-8.4%
UTL	UNITIL CORP	913259107	Utilities	-8.0%

Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Current sector recommendations

The QCD model also implicitly makes sector predictions. Figure 27 shows the current ranking of the 10 GICS Level 1 Sectors, ranked from best (most likely to outperform this month) to worse (least likely to outperform). The bars show the key drivers for each call.

Figure 27: Current QCD sector recommendations

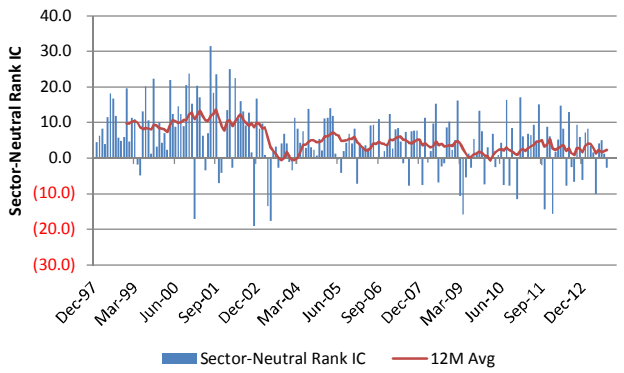


Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Model performance

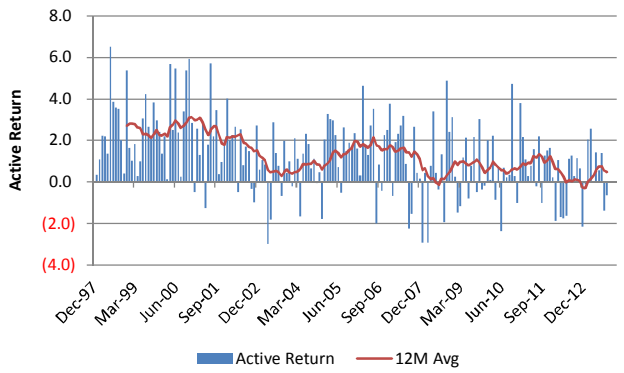
The QCD model has performed well since inception. Figure 28 shows the pure signal performance, measured as a monthly sector-neutral rank information coefficient (IC). Figure 29 shows the performance of an actual model portfolio, after costs, based on a realistically optimized market-neutral strategy.

Figure 28: Model performance, sector-neutral rank IC



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

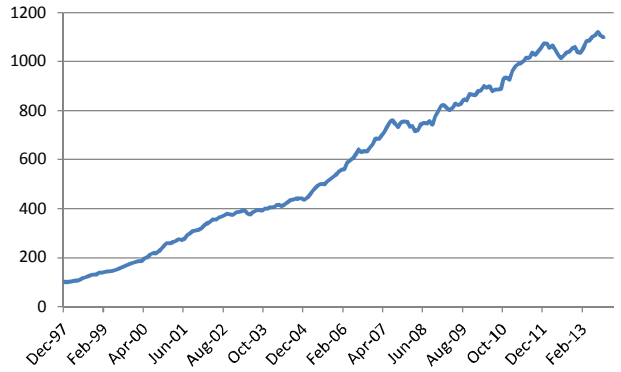
Figure 29: Model portfolio active return, after costs



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

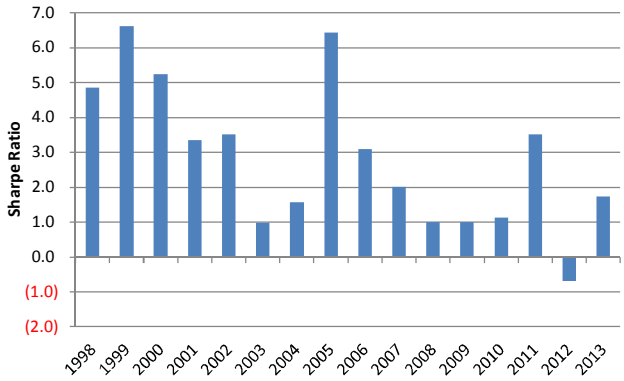
Figure 30 shows the cumulative performance of the optimized strategy, and Figure 31 shows the annualized Sharpe ratio (after costs) by calendar year.

Figure 30: Model portfolio cumulative, after costs



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 31: Annualized Sharpe ratio, after costs



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

N-LASR global stock selection model

- The N-LASR model is our flagship stock selection model for global equities.
- The model is based on a machine learning algorithm called AdaBoost, and is designed to adaptively learn which factors to use, often in a non-linear way.
- For complete details on the model, please see Wang et al., "Signal Processing: The Rise of the Machines", 5 June 2012.

Current stock recommendations

Figure 32 shows the best 20 buy ideas and sell ideas from today's model. Note that a complete ranking for all global stocks is available in spreadsheet format. If you would like to get a copy of the spreadsheet, please contact us at DBEQS.Americas@db.com.

Figure 32: Current N-LASR model stock recommendations

BEST BUY IDEAS

Ticker	Name	SEDOL	County	N-LASR Score (higher is better long)
PAG LN	Paragon Group Companies	B2NGPM	UK	2.94
LNC	LINCOLN NATIONAL CORP	2516378	USA	2.88
PHIA NA	Koninklijke Philips Electronics NV (Royal Ph	598662	Netherlands	2.74
WIN GY	Wincor Nixdorf AG	B012VF	Germany	2.67
LEVE3 BS	Mahle Metal Leve S.A.	B0HZY4	Brazil	2.52
AET	AETNA INC	2695921	USA	2.45
902 HK	Huaneng Power International Inc H Shares	609967	China	2.39
AHT LN	Ashtead Group	005367	UK	2.38
SLT GY	Schaltbau AG	478360	Germany	2.37
KOMN SW	Komax Group AG Reg	597863	Switzerland	2.34
MHK	MOHAWK INDUSTRIES INC	2598699	USA	2.32
175 HK	Geely Automobile Holdings Ltd.	653182	China	2.30
CS FP	AXA	708842	France	2.28
FR FP	Valeo	493757	France	2.28
068400 KS	AJ Rent A Car Co Ltd	B7MF5R	Korea	2.27
AIG	AMERICAN INTERNATIONAL GROUP	2027342	USA	2.27
3086 JT	J Front Retailing Co Ltd	B23TC1	Japan	2.26
1319 TT	Tong Yang Industry	689884	Taiwan	2.25
AKGRT TI	Aksigorta AS	B03MND	Turkey	2.25
KLR LN	Keller Group	048662	UK	2.24

BEST SELL IDEAS

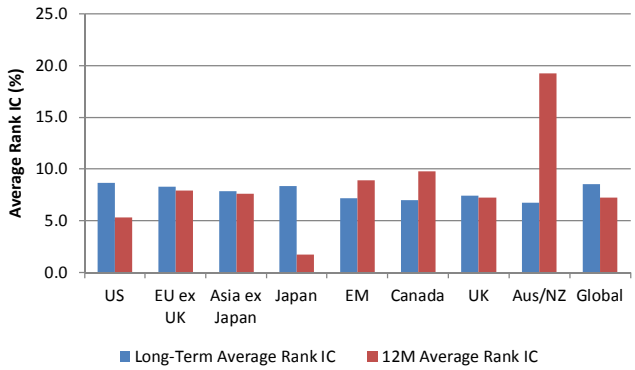
Ticker	Name	SEDOL	County	N-LASR Score (lower is better short)
ODHN SW	Orascom Development Holdings A(	B2R90D	Switzerland	-2.44
6425 JT	Universal Entertainment Cor	612689	Japan	-2.39
036490 KS	OCI Materials Co Ltd	619957	Korea	-2.37
GENP MK	Genting Plantations BHD	605768	Malaysia	-2.36
LLXL3 BS	LLX Logistica S.A.	B3BXMS	Brazil	-2.35
EURN BB	Euronav SA	B04M8J	Belgium	-2.31
6868 HK	Tenfu Cayman Holdings Co Ltd	B6SWBX	China	-2.29
PARRO FP	Parrot	B04VST	France	-2.28
4553 JT	Towa Pharmaceutical Co	689958	Japan	-2.27
BNCL	BENEFICIAL MUTUAL BANCORP	B1YWQT9	USA	-2.25
IJMP MK	IJM Plantations Bhd	672092	Malaysia	-2.22
IPI	INTREPID POTASH INC	B2QVR76	USA	-2.22
CFFN	CAPITOL FEDERAL FINL INC	B3KWJV0	USA	-2.19
2702 JT	McDonald's Hldgs Co Japan	637186	Japan	-2.19
VLTR	VOLTERRA SEMICONDUCTOR CORP	B018W17	USA	-2.14
MFRISCOA MM	Minera Frisco SAB de CV	B3QHKH	Mexico	-2.13
HHFA GY	Hamburger Hafen und Logistik AG	B28SK0	Germany	-2.12
RMTI	ROCKWELL MEDICAL INC	2142494	USA	-2.09
WABC	WESTAMERICA BANCORPORATION	2950374	USA	-2.09
1103 TT	Chia Hsin Cement Corp	619062	Taiwan	-2.08

Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Model performance

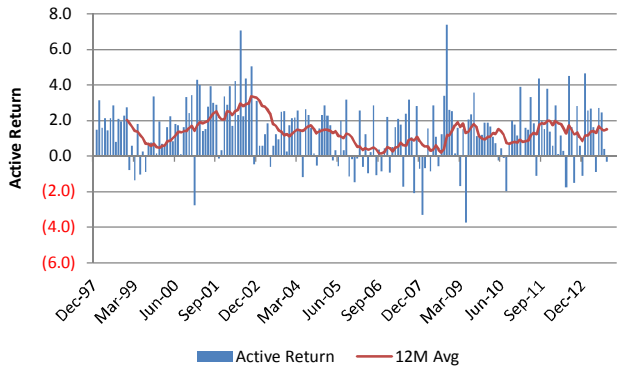
The N-LASR model has performed well since inception. Figure 33 shows the average pure signal performance, measured as a monthly rank information coefficient (IC), in different regions. Figure 34 shows the performance of a global model portfolio, after costs, based on a realistically optimized market-neutral strategy.

Figure 33: Regional model performance, average rank IC



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

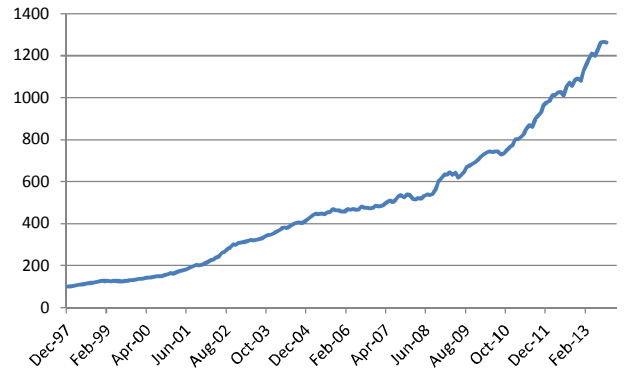
Figure 34: Global portfolio active return, after costs



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

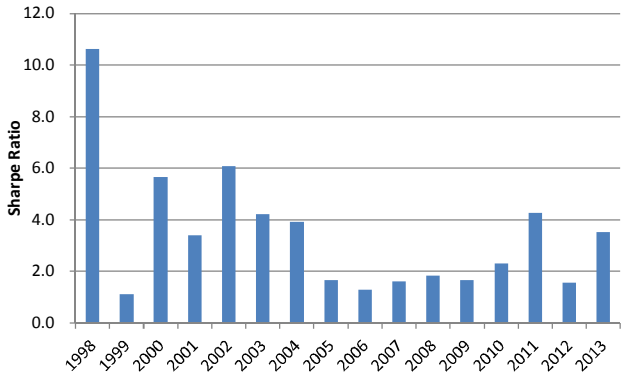
Figure 35 shows the cumulative performance of the optimized strategy, and Figure 36 shows the annualized Sharpe ratio (after costs) by calendar year.

Figure 35: Global portfolio cumulative, after costs



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 36: Annualized Sharpe ratio, after costs



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Top-down country rotation

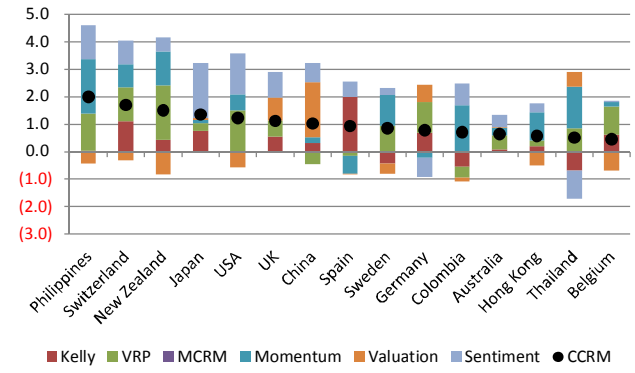
CCRM country rotation model

- Our Composite Country Rotation Model (CCRM) uses three sets of inputs to dynamically rotate between countries in the MSCI All Country World Index.
- The inputs include top-down macro signals (e.g. VRP, Kelly's Tail Risk), aggregate bottom-up fundamental signals (e.g. country-level valuation and momentum), and lead-lag signals based on economic trade linkages.
- For complete details on the model, please see Luo et al., "Signal Processing: New Insights in Country Rotation", 9 February 2012.

Current recommendations

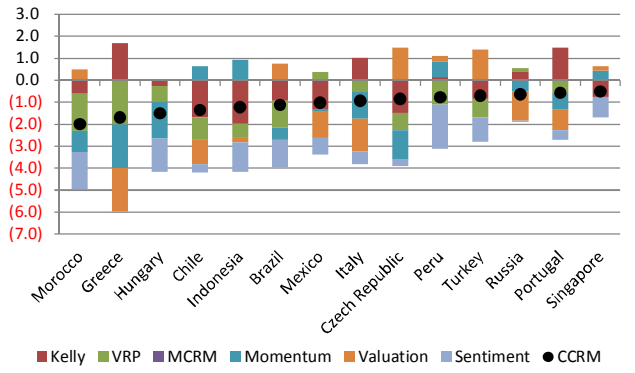
Figure 37 and Figure 38 show the top and bottom third of countries, as ranked currently by our CCRM model. The bars show what is driving these calls.

Figure 37: Top tercile countries



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 38: Bottom tercile countries

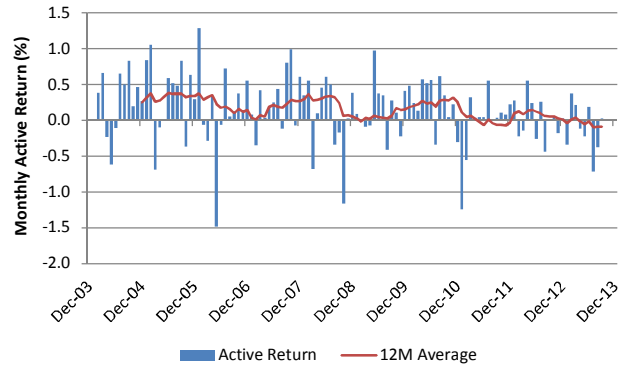


Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Model performance

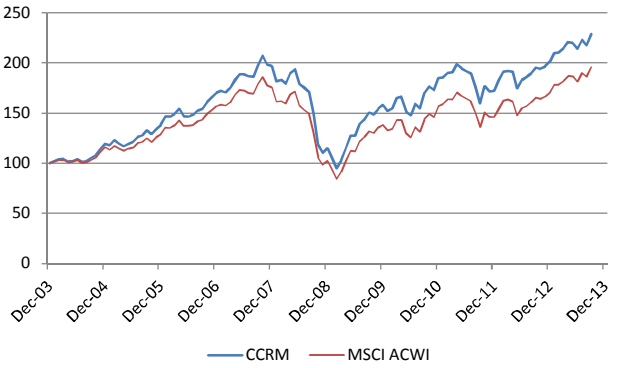
Figure 39 and Figure 40 show the performance of the model over time.

Figure 39: Monthly returns



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 40: Cumulative performance



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Top-down asset allocation

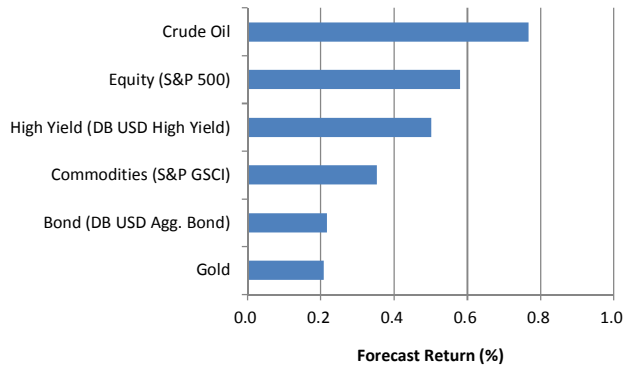
Quant Tactical Asset Allocation (QTAA) model

- Our Quantitative Tactical Asset Allocation (QTAA) model uses a model-of-models methodology to rotate between six asset classes.
- The model uses a wide range of fundamental and market-based factors as inputs, and dynamically selects a subset of those factors to use at each point in time.
- For complete details on the model, please see Luo et al., "Signal Processing: Quant Tactical Asset Allocation", 19 September 2011.

Current recommendations and performance

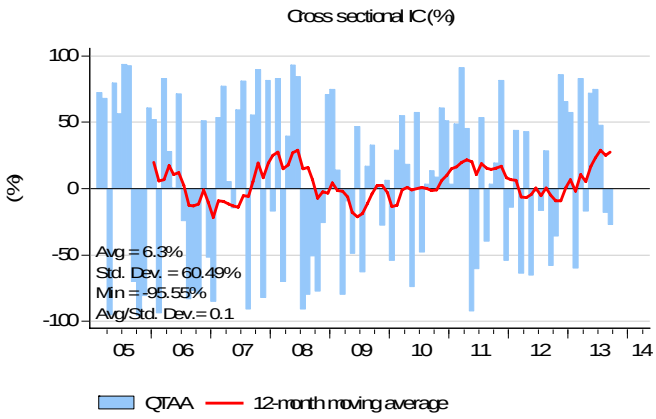
Figure 41 shows the current ranking of our six asset classes, ranked from best to worse in terms of month-ahead forecast returns. Figure 42 shows the monthly performance of the QTAA model over time.

Figure 41: Current QTAA forecasts



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 42: Performance of QTAA model



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Top-down style rotation

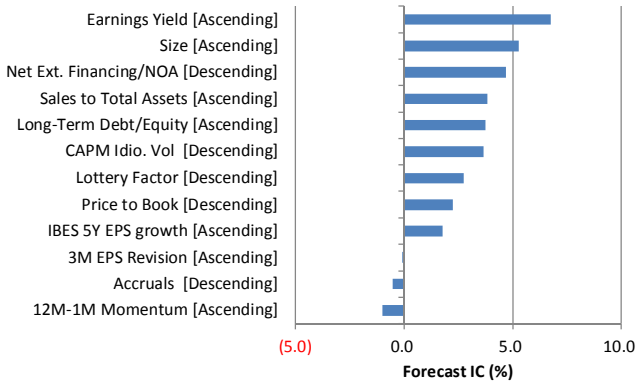
Style rotation model

- Our Style Rotation model dynamically rotates between 12 "typical" quant factors.
- The model uses market-based and macroeconomic inputs to predict month-ahead factor returns using a backwards stepwise linear regression model.
- For complete details on the model, please see Luo et al., "Signal Processing: Style Rotation", 7 September 2010.

Current recommendations and performance

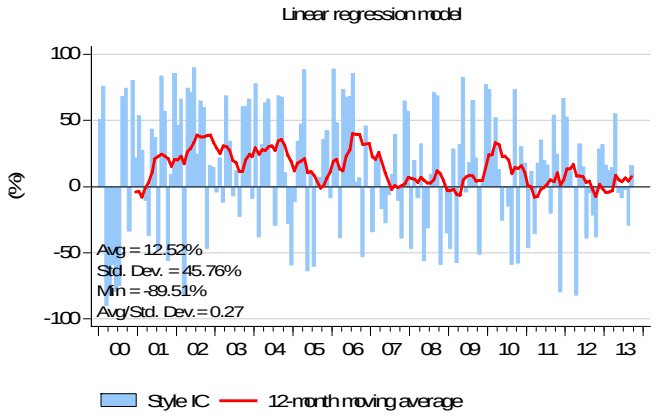
Figure 43 shows the current ranking of our 12 factors, ranked from best to worse in terms of month-ahead forecast performance. Figure 44 shows the monthly performance of the Style Rotation model over time.

Figure 43: Current style rotation forecasts



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 44: Performance of style rotation model



Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Appendix: Factor performance

Figure 45: US factor performance, measured as rank IC (Russell 3000 universe)

		Current	Average IC (%)			Since Inception									
								Avg /					# of	Avg # of	Hit	Serial
Factor Name	Direction[1]	# of Stocks	Last M	12M Avg	3Y Avg	Avg	Std Dev	Std Dev	Max	Min	p-value[2]	Months	Stocks	Rate (%)	Corr (%)[3]
1. Value															
1 Dividend yield, trailing 12M	Ascending	2,988	(11.17)	(0.50)	1.26	2.86	14.41	0.20	42.59	(33.26)	0.00	308	2,873	54.87	99.24
2 Expected dividend yield	Ascending	2,988	(10.76)	(0.50)	1.47	3.11	14.94	0.21	44.46	(33.89)	0.00	308	2,873	54.22	99.31
3 Price-to-operating EPS, trailing 12M, Basic	Descending	2,337	(3.83)	3.90	1.41	2.83	10.36	0.27	30.82	(32.28)	0.00	232	2,354	59.91	95.23
4 Operating earnings yield, trailing 12M, Basic	Ascending	2,939	0.73	4.50	3.81	4.86	12.96	0.38	47.24	(33.30)	0.00	232	2,872	62.07	96.44
5 Earnings yield, forecast FY1 mean	Ascending	2,802	1.38	5.13	3.58	4.43	12.30	0.36	48.88	(34.61)	0.00	308	2,539	62.99	94.98
6 Earnings yield, forecast FY2 mean	Ascending	2,791	1.62	5.12	2.96	3.88	11.91	0.33	47.02	(34.31)	0.00	308	2,439	63.64	94.36
7 Earnings yield x IBES 5Y growth	Ascending	1,723	6.77	4.90	1.96	1.85	10.45	0.18	41.11	(26.63)	0.01	232	1,924	59.05	93.47
8 Sector-rel Operating earnings yield, trailing 12M, Basic	Ascending	2,939	4.86	4.34	3.55	4.35	8.31	0.52	28.96	(14.90)	0.00	232	2,870	69.40	96.01
9 Hist-rel Operating earnings yield, trailing 12M, Basic	Ascending	2,073	(5.75)	(0.36)	0.76	1.59	6.89	0.23	20.73	(18.74)	0.01	138	2,015	61.59	96.88
10 Operating cash flow yield (income stmt def)	Ascending	2,988	0.45	4.24	3.03	4.10	10.84	0.38	47.14	(32.67)	0.00	308	2,873	64.94	96.03
11 Cash flow yield, FY1 mean	Ascending	1,620	5.34	4.06	1.02	2.76	17.54	0.16	66.06	(54.29)	0.01	278	762	58.63	95.75
12 Free cash flow yield	Ascending	2,867	0.86	4.75	3.78	4.92	7.88	0.62	31.93	(22.64)	0.00	271	2,511	75.65	94.64
13 Price-to-sales, trailing 12M	Descending	2,904	(2.58)	5.12	1.70	1.84	10.93	0.17	30.02	(41.46)	0.00	308	2,798	56.82	99.12
14 Price-to-book	Descending	2,867	(13.70)	0.55	(0.81)	0.80	10.65	0.08	26.28	(35.75)	0.19	308	2,763	49.03	97.65
15 EBITDA/EV	Ascending	2,948	(0.19)	3.24	2.57	4.16	9.67	0.43	39.32	(27.15)	0.00	308	2,819	67.86	95.55
16 Price-to-book adj for ROE, sector adj	Descending	2,671	(5.50)	1.83	(0.46)	0.47	8.72	0.05	22.50	(33.21)	0.35	308	2,433	49.35	95.61
2. Growth															
17 Hist 5Y operating EPS growth	Descending	2,865	3.60	1.96	2.33	1.06	8.67	0.12	30.58	(22.70)	0.07	220	2,733	52.73	97.26
18 Hist 5Y operating EPS acceleration	Ascending	2,865	0.13	2.59	0.20	0.83	6.65	0.12	25.31	(16.13)	0.07	220	2,733	54.09	94.74
19 IBES 5Y EPS growth	Ascending	2,439	11.57	0.89	1.98	0.93	8.10	0.12	21.65	(27.86)	0.04	308	2,298	54.22	98.28
20 IBES 5Y EPS growth/stability	Ascending	2,439	13.59	1.21	2.21	1.37	7.71	0.18	20.64	(19.20)	0.00	308	2,298	56.82	98.62
21 IBES LTG EPS mean	Descending	1,978	(13.00)	(2.14)	(1.38)	1.63	15.81	0.10	37.64	(52.38)	0.07	308	2,151	49.35	97.75
22 IBES FY2 mean DPS growth	Ascending	2,170	(5.22)	(0.12)	0.97	0.86	8.52	0.10	24.12	(21.96)	0.24	135	1,492	50.37	87.82
23 IBES FY1 mean EPS growth	Ascending	2,745	0.72	2.56	1.87	1.06	7.48	0.14	20.76	(24.42)	0.01	308	2,518	61.36	88.80
24 Year-over-year quarterly EPS growth	Ascending	2,966	(1.05)	2.87	3.01	2.53	7.02	0.36	23.85	(21.12)	0.00	232	2,876	66.38	81.52
25 IBES FY1 mean CFPS growth	Descending	1,467	(14.15)	(4.66)	(1.56)	0.37	11.18	0.03	38.08	(42.07)	0.61	235	529	50.21	92.72
26 IBES SUE, amortized	Ascending	2,634	0.71	0.73	1.83	0.80	6.48	0.12	20.62	(16.30)	0.05	247	1,093	54.25	73.92
3. Price Momentum and Reversal															
27 Total return, 1D	Descending	2,988	(4.25)	2.02	2.94	4.96	7.18	0.69	15.52	(33.75)	0.00	308	2,873	77.60	1.64
28 Total return, 21D (1M)	Descending	2,987	0.70	2.12	1.49	1.85	10.90	0.17	29.03	(43.69)	0.00	308	2,873	58.12	0.42
29 Maximum daily return in last 1M (lottery factor)	Descending	2,983	1.30	1.29	2.74	5.08	14.92	0.34	39.13	(56.07)	0.00	308	2,745	64.29	54.23
30 21D volatility of volume/price	Descending	2,987	(1.32)	0.72	1.92	0.21	6.56	0.03	24.16	(16.78)	0.57	308	2,863	50.97	56.37
31 Total return, 252D (12M)	Ascending	2,880	0.60	1.53	2.66	3.24	14.07	0.23	39.62	(57.00)	0.00	308	2,792	64.61	89.93
32 12M-1M total return	Ascending	2,880	1.60	2.17	3.30	4.09	13.17	0.31	37.65	(49.06)	0.00	308	2,792	65.26	88.43
33 Price-to-52 week high	Ascending	2,879	5.47	0.75	2.46	3.16	17.75	0.18	49.63	(62.50)	0.00	308	1,946	62.01	83.27
34 Total return, 1260D (60M)	Ascending	2,509	8.18	(0.98)	1.96	1.13	10.94	0.10	25.63	(35.41)	0.08	296	2,236	56.76	97.47
4. Sentiment															
35 IBES LTG Mean EPS Revision, 3M	Ascending	1,952	(2.84)	0.16	1.08	0.86	3.75	0.23	11.16	(12.06)	0.00	308	2,123	61.69	59.70
36 IBES FY1 Mean EPS Revision, 3M	Ascending	2,753	(3.37)	0.58	1.92	2.91	8.44	0.34	29.96	(33.00)	0.00	308	2,477	66.56	75.29
37 IBES FY1 EPS up/down ratio, 3M	Ascending	2,738	(1.94)	0.61	1.83	3.07	7.85	0.39	27.54	(24.41)	0.00	308	2,340	67.53	79.52
38 Expectation gap, short-term - long-term	Descending	2,174	7.07	1.63	1.57	1.21	5.19	0.23	9.60	(19.91)	0.00	308	2,124	57.79	91.14
39 IBES FY1 Mean CFPS Revision, 3M	Ascending	1,523	(1.29)	1.29	1.97	2.01	15.95	0.13	69.38	(75.04)	0.04	277	694	62.09	64.41
40 IBES FY1 Mean SAL Revision, 3M	Ascending	2,714	(1.72)	1.11	2.11	1.08	7.84	0.14	27.43	(24.32)	0.05	207	2,171	59.90	71.48
41 IBES FY1 Mean FFO Revision, 3M	Ascending	147	(9.89)	(1.45)	2.73	2.87	21.03	0.14	71.43	(80.00)	0.02	280	84	57.50	69.50
42 IBES FY1 Mean DPS Revision, 3M	Ascending	1,282	8.68	1.45	1.32	0.73	5.19	0.14	14.91	(17.55)	0.11	132	999	58.33	62.49
43 IBES FY1 Mean ROE Revision, 3M	Ascending	38	0.76	(0.49)	1.04	0.67	6.60	0.10	23.70	(22.19)	0.25	132	1,715	59.09	66.09
44 Recommendation, mean	Descending	2,815	6.22	2.82	2.12	0.84	7.52	0.11	21.85	(19.41)	0.09	237	2,677	56.96	94.40
45 Mean recommendation revision, 3M	Descending	2,796	(4.91)	0.46	0.46	1.22	4.09	0.30	19.86	(11.55)	0.00	234	2,663	62.82	59.94
46 Target price implied return	Ascending	2,756	0.10	2.68	0.89	0.08	16.78	0.00	60.74	(39.59)	0.95	173	2,461	53.18	80.00
47 Mean target price revision, 3M	Ascending	2,738	(0.86)	1.05	1.67	2.37	12.63	0.19	30.14	(41.94)	0.02	170	2,448	62.94	74.91
5. Quality															
48 ROE, trailing 12M	Ascending	2,834	9.49	2.93	3.16	3.88	10.04	0.39	33.42	(29.52)	0.00	232	2,863	64.66	96.47
49 Return on invested capital (ROIC)	Ascending	2,927	9.89	2.60	3.55	4.20	10.21	0.41	33.02	(31.24)	0.00	232	2,855	68.97	98.21
50 Sales to total assets (asset turnover)	Ascending	2,900	8.42	3.01	2.40	1.63	8.68	0.19	22.78	(22.02)	0.00	308	2,814	56.17	99.45
51 Operating profit margin	Ascending	2,896	4.40	(1.11)	0.48	1.21	5.47	0.22	16.98	(14.17)	0.00	308	2,718	59.74	98.44
52 Current ratio	Descending	2,293	(2.10)	2.09	1.05	1.84	10.19	0.18	31.95	(38.66)	0.00	308	2,239	54.22	97.91
53 Long-term debt/equity	Ascending	2,855	(4.67)	2.35	1.64	0.78	9.59	0.08	35.65	(28.14)	0.16	308	2,747	48.38	98.52
54 Altman's z-score	Ascending	2,228	8.47	(0.53)	1.39	0.32	9.17	0.03	31.74	(30.44)	0.54	308	2,159	49.35	98.35
55 Merton's distance to default	Ascending	2,468	10.85	(0.34)	2.32	3.34	11.77	0.28	33.03	(41.45)	0.00	308	2,336	65.58	95.05
56 Ohlson default model	Descending	2,238	6.77	(0.36)	1.53	2.31	6.34	0.36	16.95	(18.63)	0.00	271	2,125	68.27	98.29
57 Accruals (Sloan 1996 def)	Descending	2,206	(3.48)	(0.23)	(0.24)	0.54	4.17	0.13	12.07	(15.48)	0.02	308	2,138	55.19	88.51
58 Firm-specific discretionary accruals	Descending	2,173	(3.40)	(0.72)	(0.28)	0.47	3.19	0.15	7.82	(10.87)	0.02	248	2,120	55.65	80.06
59 Hist 5Y operating EPS stability, coef of determination	Ascending	2,865	6.15	0.55	0.26	0.84	5.02	0.17	20.01	(12.27)	0.01	220	2,733	52.73	96.89
60 IBES 5Y EPS stability	Descending	2,439	6.85	0.46	1.11	1.21	8.60	0.14	25.00	(34.33)	0.01	308	2,298	54.22	98.96
61 IBES FY1 EPS dispersion	Descending	2,802	0.93	0.26	2.65	1.57	9.08	0.17	31.67	(25.17)	0.00	308	2,539	60.06	84.20
62 Payout on trailing operating EPS	Ascending	2,242	(15.50)	(3.44)	(0.83)	0.71	13.51	0.05	38.55	(30.91)	0.36	308	2,211	49.35	99.23
63 YoY change in # of shares outstanding	Descending	2,898	3.30	3.34	2.86	2.62	8.86	0.30	19.53	(46.21)	0.00	308	2,769	61.04	94.29
64 YoY change in debt outstanding	Descending	2,186	(6.32)	(0.30)	(0.35)	0.28	4.07	0.07	13.07	(10.40)	0.23	308	2,220	55.84	89.89
65 Net external financing/net operating assets	Ascending	2,971	0.15	2.66	2.28	2.46	8.43	0.29	44.61	(21.76)	0.00	308	2,836	61.36	94.68
66 Piotroski's F-score	Ascending	2,988	(2.32)	2.85	2.82	2.92	8.07	0.36	29.20	(27.83)	0.00	308	2,875	67.53	88.23
67 Mohanram's G-score	Ascending	550	9.17	(1.64)	1.23	2.64	10.56	0.25	35.27	(32.14)	0.00	220	385	56.82	95.46
6. Technicals															
68 # of days to cover short	Descending	2,960	2.84	2.32	2.41	2.18	7.30	0.30	33.80	(25.16)	0.00	308	2,023	58.44	91.39
69 CAPM beta, 5Y monthly	Descending	2,983	3.08	(2.77)	(0.63)	1.01	13.74	0.07	40.19	(42.70)	0.25	249	2,908	51.41	97.70
70 CAPM idosyncratic vol, 1Y daily	Descending	2,839	(4.48)	1.43	4.08	5.13	18.09	0.28	42.60	(60.80)	0.00	296	2,880	61.82	99.18
71 Realized vol, 1Y daily	Descending	2,880	(2.18)	0.63	3.50	4.98	18.71	0.27	42.69	(59.63)	0.00	308	2,792	61.04	99.16
72 Skewness, 1Y daily	Descending	2,880	(2.44)	(0.59)	0.45	1.22	5.33	0.23	13.93	(22.86)	0.00	308	2,792	56.82	89.75
73 Kurtosis, 1Y daily	Descending	2,880	(7.15)	(0.02)	1.14	1.38	5.49	0.25	15.28	(15.82)	0.00	308	2,792	62.01	91.51
74 Idiosyncratic vol surprise	Descending	2,796	4.15	1.78	1.63	2.86	7.98	0.36	22.66	(33.71)	0.00	295	2,861	66.78	87.82
75 Normalized abnormal volume	Ascending	2,964	2.86	2.33	2.76	2.25	6.37	0.35	23.10	(16.38)	0.00	308	2,866	65.58	64.21
76 Float turnover, 12M	Descending	2,820	(6.02)	(1.40)	(0.43)	0.24	10.72	0.02	23.53	(26.97)	0.70	297	2,784	48.15	99.77
77 Moving average crossover, 15W-36W	Ascending	2,885	1.46	1.53	0.60	2.21	13.16	0.17	46.29	(55.07)	0.00	308	2,529	60.39	90.76
78 Log float-adj capitalization	Ascending	2,985	4.58	2.79	3.65	3.47	10.96	0.32	29.53	(40.68)	0.00	308	2,870	61.36	99.41
79 # of month in the database	Ascending	2,988	(3.84)	0.98	1.35	2.18	8.79	0.25	35.61	(23.86)	0.00	308	2,873	57.14	99.99
80 DB composite options factor	Ascending	2,026	0.93	(0.07)	1.14	1.44	3.65	0.39	13.99	(13.88)	0.00	145	2,025	66.21	23.29

Note:

1 Direction indicates how the factor scores are sorted. Ascending order means higher factors scores are likely to be associated with higher subsequent stock returns, and vice versa for descending order.

2 P-value indicates the statistical significance of the factor's performance. A smaller p-value suggests that is it more likely the factor's performance is different from zero.

3 This is the autocorrelation of the factor scores over time. Higher serial correlation indicates lower portfolio turnover based on the factor.

Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 46: Global factor performance, measured as rank IC (S&P BMI World universe)

		Current	Average IC (%)			Since Inception									
Factor Name	Direction[1]	# of Stocks	Last M	12M Avg	3Y Avg	Avg	Std Dev	Avg / Std Dev	Max	Min	p-value[2]	# of Months	Avg # of Stocks	Hit Rate (%)	Serial Corr (%)[3]
1. Value															
1 Dividend yield, trailing 12M	Ascending	9,739	3.50	1.47	3.00	4.26	10.53	0.40	36.88	(23.89)	0.00	284	8,009	64.79	97.98
2 Dividend yield, FY1	Ascending	7,584	1.89	0.90	2.65	4.31	10.86	0.40	32.17	(22.90)	0.00	227	5,241	63.88	98.17
3 Dividend yield, FY2	Ascending	7,542	2.98	0.89	2.45	4.20	10.91	0.38	33.19	(24.39)	0.00	217	5,200	63.59	98.16
4 Price/Earnings	Descending	8,006	2.64	0.09	0.17	4.02	13.11	0.31	39.66	(50.73)	0.00	277	6,299	61.73	96.30
5 Price-to-FY0 EPS	Descending	7,751	8.00	0.61	(0.65)	2.90	10.29	0.28	28.98	(37.08)	0.00	284	6,025	62.32	96.38
6 Earnings yield, FY0	Ascending	8,911	6.90	2.28	1.41	4.01	9.18	0.44	31.67	(18.68)	0.00	284	7,007	64.79	96.30
7 Earnings yield, forecast FY1 mean	Ascending	8,223	6.54	2.46	2.02	4.72	10.87	0.43	35.35	(22.20)	0.00	284	6,457	63.73	95.67
8 Earnings yield, forecast FY2 mean	Ascending	8,120	7.95	1.88	0.97	4.33	11.88	0.36	37.31	(31.50)	0.00	284	6,282	62.68	95.71
9 Cash flow yield, FY0	Ascending	6,964	5.59	1.42	0.98	4.07	6.36	0.64	26.42	(11.80)	0.00	160	4,952	75.63	97.10
10 Cash flow yield, FY1 mean	Ascending	5,846	9.47	0.85	(0.60)	2.04	9.72	0.21	31.42	(32.01)	0.00	216	4,474	58.33	96.01
11 Price/Sales	Descending	9,231	7.86	0.95	0.04	1.48	9.56	0.16	26.48	(31.59)	0.01	284	7,487	55.99	99.23
12 Price/Book	Descending	9,361	6.36	(1.35)	(1.63)	1.16	10.49	0.11	31.56	(37.54)	0.06	284	7,535	56.69	98.34
13 Est Book-to-price, median	Ascending	7,224	6.82	(1.06)	(2.21)	1.15	9.88	0.12	30.37	(26.29)	0.13	168	5,401	52.38	98.07
14 EBITDA to EV	Ascending	7,258	(3.40)	5.29	5.64	4.00	10.84	0.37	36.69	(26.20)	0.00	284	4,668	62.68	95.59
15 Sales/EV	Ascending	9,183	8.83	2.09	1.40	1.98	7.88	0.25	24.81	(20.06)	0.00	284	7,454	61.27	98.98
2. Growth															
16 IBES 5Y EPS growth	Ascending	8,226	(1.90)	0.26	1.42	1.10	6.14	0.18	19.09	(21.86)	0.00	284	6,210	58.80	98.06
17 EPS Growth	Ascending	8,735	(7.93)	1.64	1.31	2.05	6.88	0.30	29.72	(28.97)	0.00	268	6,883	63.81	88.39
18 IBES LTG EPS mean	Descending	5,140	3.13	(0.64)	0.29	1.34	12.11	0.11	28.22	(40.36)	0.06	284	4,168	53.17	96.75
19 IBES FY1 mean EPS growth	Ascending	7,903	(4.32)	0.17	0.39	0.37	6.06	0.06	14.44	(20.10)	0.30	284	6,365	54.58	88.52
20 IBES FY1 mean CFPS growth	Descending	5,304	(0.05)	0.99	1.09	1.75	4.22	0.42	7.47	(11.39)	0.00	160	3,907	65.00	91.75
21 IBES FY2 mean DPS growth	Ascending	7,520	0.94	0.33	(0.20)	2.42	11.00	0.22	38.85	(31.49)	0.00	226	5,082	59.29	88.05
22 Asset growth	Descending	9,164	4.32	2.54	1.92	0.67	8.52	0.08	21.57	(27.36)	0.19	284	7,279	52.46	93.66
3. Price Momentum and Reversal															
23 Total return, 1D	Descending	9,756	(1.69)	1.96	3.79	3.61	7.44	0.49	21.94	(41.58)	0.00	284	8,122	70.77	2.01
24 Weekly Total Return	Descending	9,756	(2.53)	(0.17)	3.12	2.96	8.72	0.34	30.60	(33.64)	0.00	284	8,121	64.44	1.42
25 Total return, 21D (1M)	Ascending	9,750	3.64	1.55	0.19	0.14	11.44	0.01	27.69	(44.07)	0.84	284	8,116	53.17	4.15
26 Total return, 252D (12M)	Ascending	9,592	(5.43)	6.13	5.64	4.42	14.53	0.30	41.64	(46.50)	0.00	284	7,924	66.55	90.65
27 12M-1M total return	Ascending	9,592	(6.45)	6.12	6.16	5.03	14.00	0.36	40.96	(42.52)	0.00	284	7,924	68.66	88.73
28 Total return, 1260D (60M)	Ascending	8,567	(8.29)	0.88	1.95	1.44	14.07	0.10	40.32	(44.84)	0.09	284	6,421	58.10	97.79
4. Sentiment															
29 IBES LTG Mean EPS Revision, 1M	Ascending	5,128	2.30	0.67	0.67	0.67	2.57	0.26	7.26	(8.59)	0.00	284	4,130	63.03	0.57
30 IBES LTG Mean EPS Revision, 3M	Ascending	5,085	0.46	0.96	0.90	0.86	3.33	0.26	11.05	(10.26)	0.00	284	4,074	61.62	60.10
31 IBES FY1 EPS up/down ratio, 1M	Ascending	5,011	(1.11)	3.02	3.58	3.69	5.43	0.68	17.76	(13.76)	0.00	284	4,347	76.41	34.72
32 IBES FY1 EPS up/down ratio, 3M	Ascending	7,543	(5.37)	3.67	3.85	3.65	5.82	0.63	17.92	(12.36)	0.00	284	5,831	75.00	78.46
33 IBES FY1 Mean EPS Revision, 1M	Ascending	8,045	(4.28)	2.48	2.85	2.89	5.08	0.57	16.50	(12.79)	0.00	284	6,309	72.18	24.13
34 IBES FY1 Mean EPS Revision, 3M	Ascending	7,930	(6.41)	3.31	3.79	3.37	6.65	0.51	19.37	(20.12)	0.00	284	6,218	73.24	74.15
35 IBES FY1 Mean CFPS Revision, 3M	Ascending	5,508	(3.67)	2.10	2.52	2.49	5.56	0.45	15.81	(23.83)	0.00	206	4,296	76.70	63.91
36 IBES FY1 Mean DPS Revision, 1M	Ascending	6,003	(5.26)	2.09	2.73	1.75	4.39	0.40	12.65	(16.63)	0.00	225	4,338	71.56	10.97
37 IBES FY1 Mean DPS Revision, 3M	Ascending	5,955	(3.43)	3.27	3.65	2.20	5.86	0.38	19.08	(24.51)	0.00	223	4,279	72.20	65.65
38 IBES FY1 Mean FFO Revision, 1M	Ascending	5,136	(3.44)	3.25	3.42	2.26	4.07	0.55	11.73	(8.89)	0.00	152	4,042	76.97	13.54
39 IBES FY1 Mean FFO Revision, 3M	Ascending	4,989	(8.68)	4.02	4.29	2.82	5.81	0.49	16.27	(14.53)	0.00	149	3,948	73.83	67.77
40 IBES FY1 Mean ROE Revision, 1M	Ascending	8,065	(1.53)	1.59	1.98	1.76	4.08	0.43	13.70	(10.51)	0.00	204	5,370	69.12	14.31
41 IBES FY1 Mean ROE Revision, 3M	Ascending	7,923	(4.11)	1.68	2.20	2.14	5.02	0.43	13.57	(13.58)	0.00	202	5,239	68.81	68.44
42 Target price implied return	Descending	8,263	0.23	1.27	1.17	0.95	14.61	0.06	55.58	(36.25)	0.40	168	6,283	53.57	82.31
43 Recommendation, mean	Descending	8,435	(0.82)	2.58	2.23	1.76	6.82	0.26	17.41	(16.84)	0.00	237	7,192	64.98	94.46
44 Mean recommendation revision, 3M	Descending	8,405	0.98	0.87	1.40	1.87	2.91	0.64	10.01	(10.13)	0.00	234	7,170	75.21	60.10
5. Quality															
45 Return on Equity	Ascending	8,964	(1.75)	2.71	3.34	4.20	10.13	0.41	30.68	(34.69)	0.00	236	7,672	66.53	97.10
46 return on capital	Ascending	9,050	0.83	2.09	3.01	4.44	12.28	0.36	49.47	(34.02)	0.00	284	6,964	64.79	97.95
47 Return on Assets	Ascending	9,310	(4.52)	4.53	5.28	4.78	13.26	0.36	44.20	(30.31)	0.00	284	7,065	63.73	98.15
48 Asset Turnover	Ascending	9,273	(5.05)	4.64	4.68	2.69	16.31	0.16	44.64	(51.55)	0.01	284	7,549	58.10	99.84
49 Gross margin	Ascending	8,546	(0.89)	1.95	2.33	1.87	5.84	0.32	16.60	(13.45)	0.00	284	6,864	63.03	98.88
50 EBITDA margin	Ascending	9,263	(11.84)	3.41	4.03	4.01	13.80	0.29	42.97	(41.30)	0.00	284	7,568	59.51	96.80
51 Berry Ratio	Ascending	7,103	1.92	0.30	0.70	2.85	9.28	0.31	29.57	(20.79)	0.00	284	5,307	59.51	97.70
52 IBES FY1 EPS dispersion	Descending	8,223	(7.33)	2.14	3.38	0.48	9.56	0.05	32.68	(25.37)	0.40	284	6,457	50.70	87.91
53 IBES 5Y EPS growth/stability	Ascending	8,226	(1.38)	0.55	1.77	1.44	5.98	0.24	18.66	(20.47)	0.00	284	6,209	58.45	98.30
54 YoY change in debt outstanding	Descending	7,625	0.63	0.78	0.52	0.27	3.92	0.07	11.51	(11.34)	0.25	284	6,287	53.87	91.46
55 Current ratio	Descending	7,670	(1.28)	0.14	0.35	0.60	8.90	0.07	27.86	(27.01)	0.26	284	6,153	49.30	98.50
56 Long-term debt/equity	Ascending	9,197	(5.54)	2.05	1.17	0.77	6.46	0.12	22.37	(18.17)	0.05	284	7,461	54.23	98.88
57 Merton's distance to default	Ascending	8,053	4.76	2.28	3.71	2.66	11.14	0.24	31.19	(31.18)	0.00	284	6,465	60.21	93.26
58 Capex to Dep	Descending	7,623	(3.36)	4.12	3.15	1.52	6.50	0.23	22.38	(19.93)	0.00	284	5,133	61.27	96.91
6. Technicals															
59 Realized vol, 1Y daily	Descending	9,595	0.12	3.60	4.56	5.11	15.34	0.33	29.45	(44.64)	0.00	284	7,932	61.27	98.96
60 Skewness, 1Y daily	Descending	9,595	(1.59)	1.22	2.19	1.65	5.33	0.31	15.03	(32.98)	0.00	284	7,932	63.73	90.00
61 Moving average crossover, 15W-36W	Ascending	9,316	(7.48)	3.67	1.92	2.98	14.58	0.20	37.15	(45.46)	0.00	284	6,926	62.32	91.36
62 Normalized abnormal volume	Ascending	9,719	1.09	2.79	3.08	2.26	6.54	0.35	20.47	(14.71)	0.00	284	7,885	60.92	66.25

Note:

1 Direction indicates how the factor scores are sorted. Ascending order means higher factors scores are likely to be associated with higher subsequent stock returns, and vice versa for descending order.

2 P-value indicates the statistical significance of the factor's performance. A smaller p-value suggests that is it more likely the factor's performance is different from zero.

3 This is the autocorrelation of the factor scores over time. Higher serial correlation indicates lower portfolio turnover based on the factor.

Source: Bloomberg Finance LLP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Appendix 1

Important Disclosures

Additional information available upon request

For disclosures pertaining to recommendations or estimates made on securities other than the primary subject of this research, please see the most recently published company report or visit our global disclosure look-up page on our website at http://gm.db.com/ger/disclosure/DisclosureDirectory.eqsr

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