



Quant Models Performance Review

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Have our Quant Models Performed Since Inception?

Since our first report in January 2010 with which we launched the European Quantitative Strategy group, we have published a number of top-down/asset-allocation and stock selection reports in which we have introduced models to select among countries, sectors, and stocks alike. We take the opportunity at the start of a new year to quickly remind our readers of such published research and, in particular, update them regarding the performance of each of these models not only in 2012, but also since the model launch.

Top-Down Models

We briefly review our Macromomentum Country Rotation Model (MCRM), Industry Rotation Model (MIR), and Equity Risk Premium research. Out of sample performance of these models has been strong, particularly for the Industry Rotation Model.

Stock Selection/Event-Driven Models

Our stock selection research spans both factor-based and event-driven type modeling. In the latter family we find our work on Earnings Surprises, Share Buybacks, M&A news, and Insider Trades. Typically, the aforementioned signals are used to enhance "alpha" from factor-based models, but can also be used on a stand-alone basis, particularly as satellite strategies designed to enhance performance versus a benchmark. In the former category lies our sentiment stock selection model (ES), based on options, news sentiment, and short interest data, which has delivered an annualized Information Ratio of 1.4 since publication in March 2012.





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Top-Down Models

MCRM: Macromomentum Country Rotation

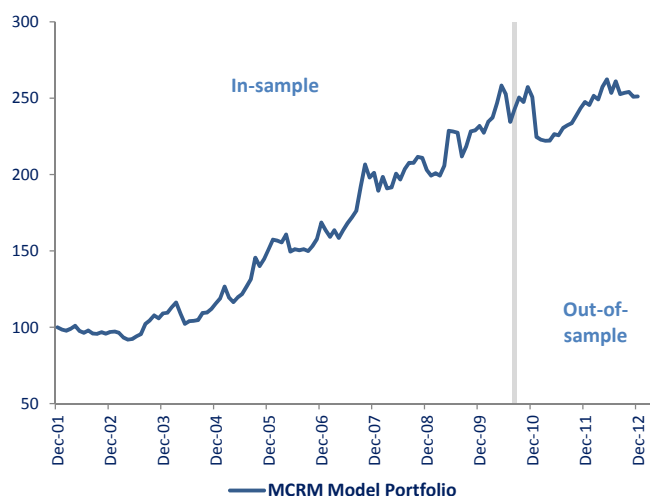
In August 2010 we launched our flagship Macromomentum Country Rotation Model, which has since generated substantial interest among our clients.¹ This, we believe, was underscored not only by the increasing importance of macroeconomic developments to stock returns - and in particular, country exposures - but also by the central building blocks of this model, which rely primarily on economic linkages between countries.

In developing our model, we focused on a relatively unexplored dataset that describes macro linkages between countries through trade. Our model is designed to exploit the slow diffusion of information between the stock market of countries along the trade chain. It employs a Vector Autoregression specification to estimate a more stable relationship over time between trading partners, but reduces monthly turnover and filters for statistical significance of the identified stock market trade links.

As a separate top-down alpha component, we have also examined whether net country fund flow has any predictive power in its own right. Combining the signals (equally-weighted) between the trade-filtered VAR and the active retail fund flow model produces superior results after conservative transaction costs have been taken into account.

Since launch in August 2010, the model has delivered out-of-sample positive returns for 18 out of the last 29 months, a monthly hit ratio of 62%. The monthly average spread between the long and short portfolios has been approximately 0.6% per month, or 6.7% per annum. In 2012, the top tertile of countries outperformed the bottom tertile by 4.9%

Figure 1: MCRM Model Portfolio – Wealth Curve



Source: Deutsche Bank Quant Strategy, Bloomberg Finance LP, Factset, IMF

Figure 2: Model Portfolio Statistics

	In Sample	Out-of-Sample	2012
CAGR	14.0%	6.6%	4.9%
Ann. Volatility	12.3%	9.9%	7.7%
Information Ratio	1.14	0.67	0.64
Avg. Monthly Turnover	25.6%	28.7%	27.4%
Max Drawdown	-11.6%	-12.7%	-3.1%

Source: Deutsche Bank Quant Strategy, Bloomberg Finance LP, Factset, IMF

¹ See Mesomeris, S., Salvini, M., et al., 2010, "Introducing the MCRM: Macromomentum Country Rotation", Mesomeris et al., Deutsche Bank Quantitative Strategy, 15 August 2010



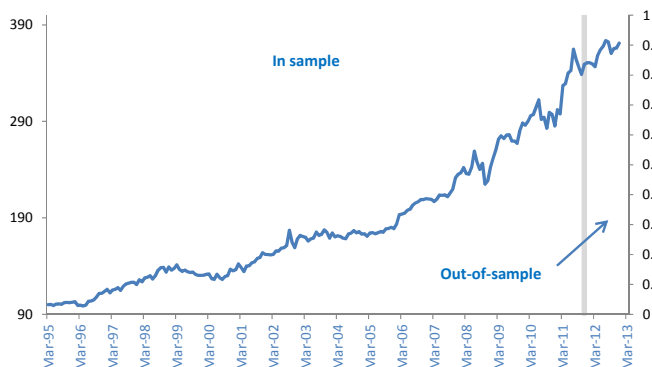
Industry Rotation Model (MIR)

In November 2011 we launched our European Industry Rotation model (MIR) which develops an innovative framework for industry allocation based on predictive information embedded in Macroeconomic, News Sentiment, and Earnings Momentum signals. To start with, our analysis evaluates, and rejects, the common wisdom hypothesis which expects certain industries to outperform during different stages of the business cycle. Instead, we present evidence to suggest that the relationship between macroeconomic conditions and sector leadership is dynamic and non-linear in nature. Using Principal Component Analysis to condense information from correlated variables in the Production & Income, Unemployment, Commodities, Consumption, Inflation, and Economic Sentiment categories, and considering, in addition, Interest Rates, Exchange Rates, and Credit Spreads, we find that the FOREST model delivers superior performance than other non-linear (as well as linear) model specifications of the relationship between sector/industry returns and macroeconomic data, with quarterly rebalancing.

Apart from fundamental economic relationships, academic research also suggests that momentum signals play a significant role in industry selection. We actually find that momentum in analyst earnings revisions is a superior metric for industry allocation relative to return-based momentum measures. Since analyst earnings revisions aggregated to the industry/sector level essentially capture the sentiment of a specific cohort of market participants, we additionally construct an orthogonal – to analyst sentiment – market-wide signal which uses textual information from the Reuters News database. In effect, we construct a News Sentiment Index aggregated to the industry level, filtering the database according to Sentiment score, Relevance, and Type of Article.

Equally-weighting the three uncorrelated alpha scores we investigate some simple portfolio construction techniques, including equally-weighted long-short portfolios, a long-only industry portfolio with fixed weighting scheme, and a long-only industry portfolio based on MVO optimization. Information Ratios of between 0.9 and 1.4 are achieved depending on the portfolio construction method and desired risk profile. Since launch in November 2011, the simple long-short portfolio (eight industries long, eight short) has delivered a return of 8.1% with an Information Ratio of 1.4%.

Figure 3: Industry Rotation Model Portfolio – Wealth Curve



Source: Deutsche Bank Quant Strategy, Thompson Reuters, Bloomberg, IBES, Factset

Figure 4: Model Portfolio Statistics

	In Sample	Out-of-Sample	2012
CAGR	7.6%	8.1%	5.8%
Ann. Volatility	9.0%	5.7%	5.6%
Information Ratio	0.84	1.43	1.02
Avg. Monthly Turnover	30.2%	31.3%	29.7%
Max Drawdown	-13.2%	-7.2%	-5.0%

Source: Deutsche Bank Quant Strategy, Thompson Reuters, Bloomberg, IBES, Factset



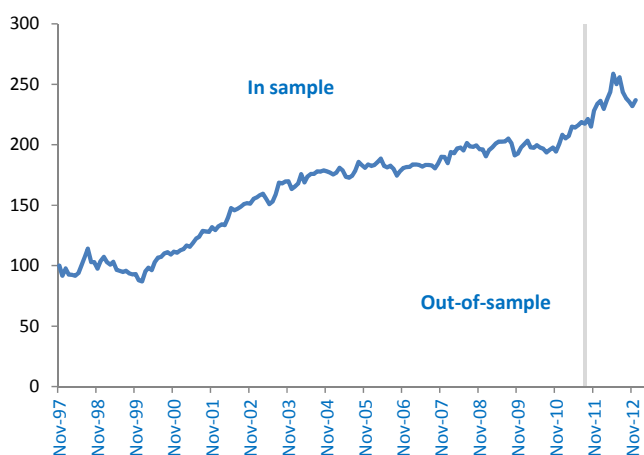
Road Map to the Equity Risk Premium

In August 2011 we analyzed one of the topics the investment community tends to be preoccupied with quite frequently, namely, the estimation of the Equity Risk Premium (ERP) in different markets. We analyzed two main approaches to determine the ERP: The Historical and Prospective ones: The Historical method, apart from the realized return premium of equities over bonds, additionally encompasses calculation of the ERP through bond default/CDS spreads and the relative volatility of equities over bonds. The Prospective Method is a forward-looking concept which we apply via a two-stage Dividend Discount Model (DDM), adjusting for realized analyst forecast error. The resulting number from the latter exercise is the Implied Adjusted ERP.

The Implied Adjusted ERP is a more consistent and stronger predictor of the realized ERP compared to both the Implied Unadjusted measure (which does not correct for realized analyst forecast error) and forecasts obtained with Historical methods. Nevertheless, Default spread-based methods which reflect market's perception of sovereign risk at a certain point in time are significantly (negatively) correlated with short-term future returns. We also decompose movements in the Implied Adjusted ERP across countries to global and country-specific drivers using Principal Component Analysis (PCA). We find that the relative contribution of global versus local factors to the total level of the ERP is time-varying.

To show how a portfolio manager can utilize the Implied Adjusted ERP measure, we investigate the performance of a dynamic strategy over time, which used both time-series and cross-sectional attributes of the Implied Adjusted ERP: First, we rank each country relative to the deviation of its current ERP from the historical average (i.e. time-series comparison), and go long (short) of the quintile of countries with the largest (smallest) negative deviation (i.e. cross-sectional comparison). The long leg outperforms the short portfolio over time, and comfortably beats an equally-weighted market portfolio. Since August 2012, such a strategy would have delivered a return of 8.3% with an Information Ratio of 0.74%.

Figure 5: Implied ERP Model Portfolio - Wealth Curve



Source: Deutsche Bank Quant Strategy, IBES, Factset, Bloomberg Finance LP

Figure 6: Model Portfolio Statistics

	In Sample	Out-of-Sample	2012
CAGR	5.9%	8.3%	1.2%
Ann. Volatility	9.5%	11.2%	11.3%
Information Ratio	0.62	0.74	0.11
Avg. Monthly Turnover	32.6%	33.7%	33.1%
Max Drawdown	-23.7%	-10.3%	-10.3%

Source: Deutsche Bank Quant Strategy, IBES, Factset, Bloomberg Finance LP



Bottom-Up/Event-Driven Stock Selection Models

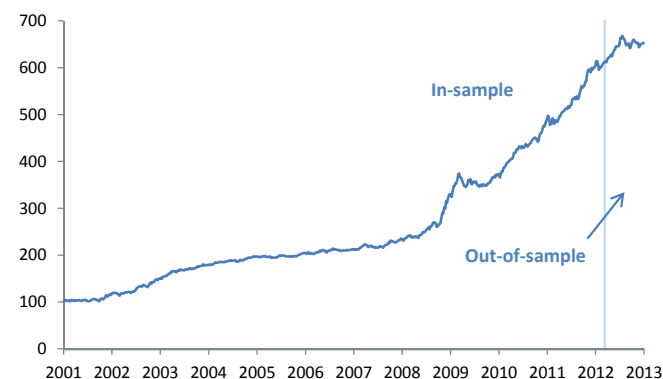
Introducing the 3S Model

In March 2012 we published our Sentiment Stock Selection Model (3S), which is based on three different data sources that measure different types of sentiment, namely, News Sentiment, Options data, Securities Lending Market data. Based on the STOXX 400 universe, we backtest a wide range of factors from the three data sources using a weekly rebalancing frequency. We find that nine signals stand out, most of them in line with what recent academic literature suggests, and decide to use those to build our composite sentiment score. The relatively weak correlation between the different signals provides for diversification opportunities within our composite “alpha” signal.

While equally-weighting the nine signals yields attractive risk-adjusted returns, the post-transaction cost results are impacted by a prohibitive degree of turnover. We therefore moved on to model the alpha more carefully, taking into account the decay rates of the signals, as well as their correlation and risk. This allows us to reduce the overall turnover rate of the strategy while not decreasing materially its pre-cost performance, recovering a substantial part of the post-cost alpha. One technique we have evaluated to reduce turnover is parametric, and consists of imposing the auto-correlation of the signal. The second one is a simple portfolio construction technique, which consists of rebalancing not one but four portfolios, not every week but every four weeks. We call it the overlapping portfolio technique, and it is our preferred turnover reduction technique.

In this report we also demonstrate four practical applications of the 3S model, three of which are stand-alone strategies: long vs. market, long-only active versus the STOXX 200 benchmark, long-short market-neutral. The fourth involves adding the 3S model signals into a basic multi-factor model. All cases suggest that our Sentiment model is able to generate significant alpha after accounting for transaction costs. The Figures below refer to the “raw” alpha (long versus short Quintile from the STOXX 400 universe)

Figure 7: 3S Model Portfolio - Wealth Curve



Source: Deutsche Bank

Figure 8: Model Portfolio Statistics

	In Sample	Out-of-Sample	2012
CAGR	17.6%	8.8%	8.2%
Ann. Volatility	7.5%	5.1%	5.5%
Information Ratio	2.33	1.73	1.50
Avg. Weekly Turnover	32.1%	29.5%	29.0%
Max Drawdown	-7.8%	-3.9%	-3.9%

Source: Deutsche Bank



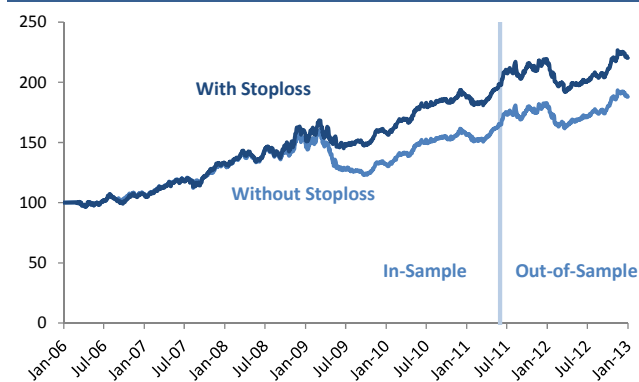
Earnings Surprises: It's all about Beat or Miss

Over time, the post earnings announcement drift has largely been arbitrated away. As a consequence, research efforts have more recently focused on predicting which companies will surprise analysts, to take advantage of the preannouncement drift. However, this has not been easy to exploit in Europe historically on a systematic basis due to the limited breadth arising from the practice of reporting results on an annual basis. With a move towards higher transparency and more companies reporting results on a quarterly basis, the opportunity set has expanded. In June 2011, we have published a probabilistic model which can help us forecast earnings surprises.

Departing from the traditional Standard Unexpected Earnings (SUE) measure, we focus on a categorical metric to assess the likelihood of a company beating or missing the consensus over the next two quarters. Our event studies demonstrate that consistently beating the consensus is more valuable information than the company periodically outperforming analysts' estimates strongly. Indeed, the drift associated with the Beat/Miss metric appears to be persistent throughout the event period, even following the t+1 quarterly announcement, in contrast with the post-announcement drift of the SUE.

In order to predict whether a company will beat or miss the consensus estimate, we use a set of twenty variables, some of which proxy for management's ability and incentives to steer earnings toward the target. We employ a multivariate ordinal logistic regression to predict, for each stock, the probability of beating the consensus over the next two quarters. The model is estimated over a rolling period of 3 years. Our strategy generates an annualized return of 9.7% with an information ratio of 1.15, which can be increased to about 13.5% and an information ratio of 1.52 using simple risk management tools. Since publication, the model has returned 8.4% with an Information Ratio of 1.12.

Figure 9: Earnings Surprises Model Portfolios – Wealth Curve



Source: Deutsche Bank

Figure 10: Model Portfolios Statistics

	BM Strategy		BM Strategy with Stop Loss			
	In Sample	Out-of-Sample	2012	In Sample	Out-of-Sample	2012
CAGR	9.7%	8.4%	2.9%	13.5%	6.8%	0.5%
Ann. Volatility	8.5%	7.5%	7.1%	8.9%	7.5%	7.0%
Information Ratio	1.15	1.12	0.42	1.52	0.91	0.08
Max Drawdown	-23.4%	-11.5%	-11.4%	-13.8%	-12.5%	-12.4%

Source: Deutsche Bank



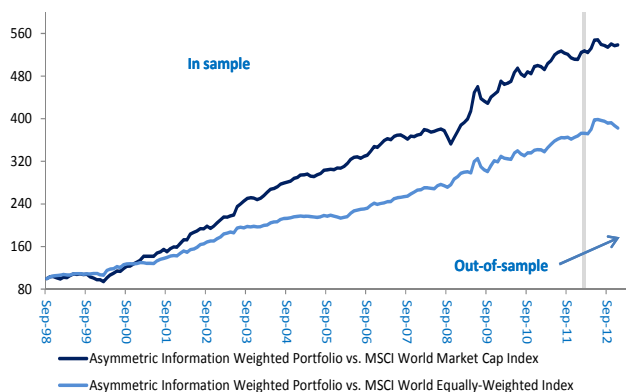
Share Buybacks: Is it Worth It?

Corporate actions are an integral feature of capital markets. All corporate actions have implications for the sustainability of an investment's performance. Examples include stock splits, share buybacks, dividends, M&A, rights issues and spin offs. In a report published in March 2012 we investigate to what extent share buyback programs affect stock returns, and how a portfolio manager can implement a systematic strategy around buyback announcements. Event studies for the period 1998 to 2011 show that, on average, at the global level, during the 60 days after the announcement date shares repurchased deliver positive excess returns of 1.6% and 2.4% relative to MSCI Equal and Market Cap-Weighted Indices, respectively. At the regional level, for the same period, all regions show a positive drift. During a window of three years after the announcement date, the shares repurchased deliver positive excess-returns of 11.97% and 25.18%, relative to the MSCI World Equal and Market Cap-Weighted benchmarks respectively, which is in line with academic studies. The buyback anomaly seems to be strongest in North America.

According to the academic literature, the degree of information asymmetry between the company and the market should be a useful predictor of performance post events like buyback and dividend announcements. We create an Asymmetric Information Score (AIS) using a number of inputs that proxy for the degree of information asymmetry embedded in buyback announcements. All the inputs of the AIS seem useful to select stocks that could significantly outperform the basic buyback portfolio.

We show how we can utilize, on a monthly basis, and in a systematic way the Asymmetric Information Score (AIS) to pick the best performing stocks in the stock buyback universe. We investigate three different portfolio construction techniques: Quantile Ranking, weighting by the AIS, and a concentrated top-20 Stock portfolio according to the AIS. On a risk-adjusted basis the best portfolio is the Asymmetric Information Weighted portfolio with an IR of 1.3 relative to the MSCI World Market Cap-Weighted Index and an IR of 1.5 relative to the MSCI World Equally-Weighted Index, respectively. Since publication, the AIS weighted portfolios have delivered a return of 3.3% (IR of 0.7) relative to the MSCI World Market Cap-Weighted Index and a return of 3% (IR of 0.6) relative to the MSCI World Equally-Weighted Index.

Figure 11: Asymmetric Information Index-Weighted Portfolio – Wealth Curves



Source: Deutsche Bank Quantitative Strategy, Bloomberg Finance LP, Factset

Figure 12: Model Portfolio Statistics

	AIS-Weighted Portfolio vs. MSCI World Mkt Cap Index		AIS-Weighted Portfolio vs. MSCI World Eqly-Wgt Index	
	In Sample	Out-of-sample	In Sample	Out-of-sample
CAGR	12.1%	3.3%	9.9%	3.0%
Ann. Volatility	9.4%	4.5%	6.8%	4.8%
Information Ratio	1.3	0.7	1.5	0.6
Max Drawdown	-13.5%	-2.6%	-7.4%	-4.0%

Source: Deutsche Bank Quantitative Strategy, Bloomberg Finance LP, Factset



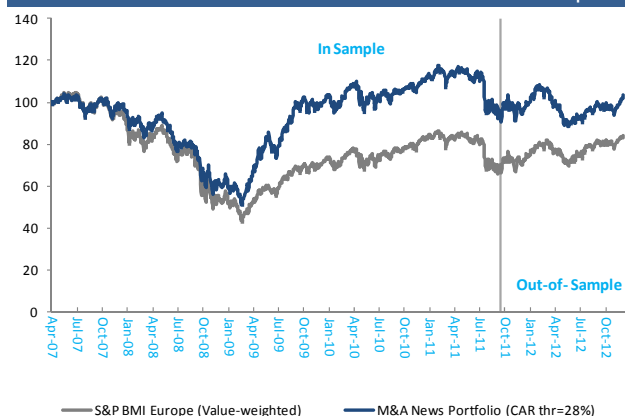
Targeting M&A News

Predicting takeover targets has always been a hot topic both in academic and practitioner circles, thanks to the substantial positive price jumps upon formal bid announcements. Departing from traditional target prediction approaches, in this report published in October 2011 we exploit the information contained in daily emails communicated by the Deutsche Bank Special and Relative Value Strategy team since April 2007 (which summarize event-driven news in Europe) to build profitable trading strategies on the back of M&A news regarding potential takeover activity. By evaluating the “abnormal price” action before the news is released and carefully choosing threshold criteria, we show that significant excess returns from such a strategy can be realized.

Not all news items in the DB SRVS: RELATIVE VALUE NEWS SUMMARY daily email relate to takeover activity. Benefitting from the clear and consistent structure of the email which simplifies pattern recognition, we first extract the relevant text. Next we filter the text using specific keywords which reflect the standard wording used by our strategists when summarizing M&A news to flag those items related to potential M&A action. For each piece of news we set a “life expectancy” (3 months) to balance the significance of fresh versus recycled – for the most part - information. We argue that excess returns up to the day prior to M&A news entering the public domain can reveal information about the (statistical) credibility of the embedded information. Indeed, the Cumulative Abnormal Return (CAR) of stocks with successful M&A news (for which a takeover happens within the life expectancy of the news) is significantly higher compared to the CAR associated with the unsuccessful news sample (for which a takeover does not materialize). The CAR of - eventually - successful takeover news items continues to be significantly higher for months after the event date (news publication date).

We propose an investment strategy to practically take advantage of our findings. Starting with a portfolio fully invested in the market, we gradually adjust our exposure to tilt the portfolio towards M&A news-related stocks that pass certain CAR threshold criteria. The resulting strategy portfolio has underperformed the S&P BMI Europe benchmark since we published the paper, partly due to the fact that M&A activity has been quite subdued over 2012.

Figure 13: Wealth Curve of the Outperformance of the M&A News Portfolio Relative to the S&P BMI Europe



Source: Deutsche Bank Quantitative Strategy, Bloomberg Finance LP, Factset

Figure 14: Model Statistics of the Outperformance of the M&A News Portfolio Relative to the S&P BMI Europe

	In Sample		Out-of-Sample		2012	
	S&P BMI Europe	M&A Portfolio	S&P BMI Europe	M&A Portfolio	S&P BMI Europe	M&A Portfolio
CAGR	-3.0%	0.6%	17.4%	7.6%	14.7%	5.3%
Ann. Volatility	23.3%	21.2%	17.9%	17.4%	15.3%	14.6%
Information Ratio	-0.1	0.0	1.0	0.4	1.0	0.4
Max Drawdown	-58.8%	-50.4%	-14.6%	-18.5%	-14.6%	-18.5%

Source: Deutsche Bank Quantitative Strategy, Bloomberg Finance LP, Factset



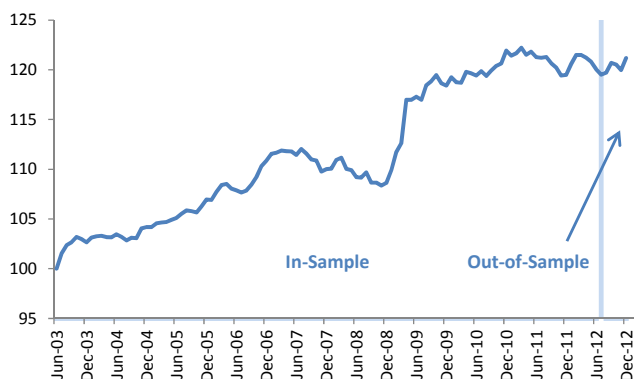
Are Insiders Alpha Generators?

In this report published in September 2012, we investigate whether information contained in insider trades is valuable to investors using a new database covering more than 20 European countries from the early 2000s onwards. We find that not all trades are equally informative. Instead, we uncover a number of metrics which help us to detect high conviction trades. A simple systematic portfolio implementation of directors' high conviction trades generates significantly positive abnormal returns.

Unconditional backtest analysis of insider trade performance, either via event studies or more practical portfolio construction exercises, show that insiders outperform in the long term, but "following" all trades might be costly and not sufficiently rewarding. For that reason, we investigate a number of metrics which prove useful in selecting directors' trades. These characteristics revolve around four main ideas, namely: the limited attention hypothesis, insider trade dynamics, information asymmetry, and confirmatory/contrarian trading, and include insider seniority level, transaction size relative to the director's current holdings, net insider volume and count ratio, isolated versus sequenced trades, R&D intensity, level and change in short interest etc. Event studies show that, over both the short- and the long-term, the metrics we study can help differentiate between future outperformers and underperformers. We further use a machine learning algorithm called FOREST to assess whether our findings appear robust once the threshold used to split the data by each metric is not predetermined. Finally, we look at whether diversification benefits accrue to combining the various metrics together.

Directors' deals cannot be implemented as traditional alpha signals, due to their event-driven nature. Moreover, only a small proportion of companies have insider trading activity in any given month. Therefore, we propose a simple portfolio implementation consisting of a satellite portfolio that tracks insider trades alongside a core benchmark portfolio. In particular, the weight allocated to the insider portfolio can be fine-tuned to target a given tracking error to the benchmark. Being selective on insider trades allows us to generate twice the Information Ratio compared to a portfolio that does not filter trades by the degree of conviction. We further show our trade selection process is not the consequence of randomness, and that the final portfolio has no unintended exposure to traditional risk factors. The Insider Trading Model Portfolio has delivered risk-adjusted returns of more than 1.5 (annualized) in the last few months since publication.

Figure 15: Insider Trading Model Portfolio – Excess Return over the S&P BMI Europe benchmark



Source: Deutsche Bank Quantitative Strategy

Figure 16: Model Statistics – Excess Return over the S&P BMI Europe benchmark

	In Sample	Out-of-Sample	2012
CAGR	2.0%	3.4%	1.4%
Ann. Volatility	2.2%	2.2%	2.1%
Information Ratio	0.92	1.58	0.68
Avg. Monthly Turnover	2.4%	2.3%	2.3%
Max Drawdown	-3.3%	-0.6%	-1.6%

Source: Deutsche Bank Quantitative Strategy



Deutsche Bank European Style Baskets

In June 2011 we launched our European Style Baskets (see Figure 17 below). Each style has long and short baskets separately, and can be accessed via Bloomberg.² The style portfolios contain 50 liquid stocks each, optimized to minimize the tracking error of the tradable baskets to the “raw” portfolios, which typically consist of 20% of the MSCI Europe universe (about 100 stocks). Since inception, Quality, Low Risk, Momentum and Earnings Revisions long-only strategies have outperformed the market. In 2012, all of the long-only baskets have had strong performance, resulting in an equally-weighted long-only portfolio outperforming the benchmark with an Information Ratio of 2.1, and very trivial drawdown (-1%).

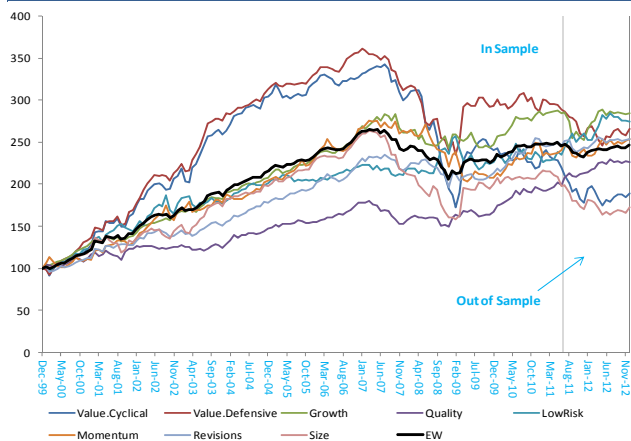
Figure 17: Long Style Baskets and Short the MSCI Europe - Statistics

Style Basket	In Sample				Out of Sample				2012			
	CAGR	Ann. Information Volatility	Ratio	Max Drawdown	CAGR	Ann. Information Volatility	Ratio	Max Drawdown	CAGR	Ann. Information Volatility	Ratio	Max Drawdown
Cyclical Value	6.5%	14.4%	0.5	-49.6%	-11.7%	14.5%	-0.8	-20.7%	7.1%	15.1%	0.5	-11.9%
Defensive Value	8.9%	11.5%	0.8	-34.9%	-6.5%	9.3%	-0.7	-15.0%	3.9%	10.3%	0.4	-8.6%
Growth	8.7%	7.5%	1.2	-14.3%	-0.9%	10.4%	-0.1	-11.8%	13.9%	7.8%	1.8	-2.4%
Quality	5.4%	8.2%	0.7	-16.9%	7.5%	5.7%	1.3	-2.1%	6.3%	4.6%	1.4	-2.1%
Low Risk	6.9%	10.6%	0.6	-15.7%	9.7%	9.0%	1.1	-3.7%	5.6%	8.7%	0.6	-3.5%
Momentum	6.8%	11.0%	0.6	-26.1%	4.6%	7.7%	0.6	-6.2%	5.6%	7.8%	0.7	-2.4%
Earnings Revision	7.3%	8.2%	0.9	-16.1%	1.0%	5.6%	0.2	-5.7%	4.6%	4.0%	1.1	-2.4%
Size (Small Cap)	5.6%	12.1%	0.5	-39.9%	-11.8%	11.2%	-1.1	-17.9%	1.2%	11.1%	0.1	-9.6%
EW Portfolio	7.3%	7.3%	1.0	-22.2%	-1.0%	4.4%	-0.2	-6.2%	6.3%	3.0%	2.1	-1.0%

Source: Deutsche Bank Quantitative Strategy, Bloomberg Finance LP, Factset, Axioma

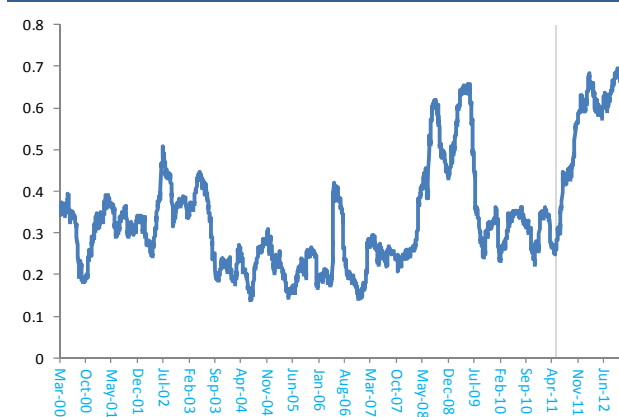
The average absolute pair-wise correlation of long-short strategies has surged since the inception of the style indices, which would have been a concern for investors seeking diversification. However, as we can see from Figure 19, there has been a significant reduction in the absolute level of the pair-wise correlation recently, creating new opportunities for factor-based investing and stock picking.

Figure 18: Long Style Baskets - Short the MSCI Europe – Wealth Curve



Source: Deutsche Bank Quantitative Strategy, Bloomberg Finance LP, Factset, Axioma

Figure 19: Average Absolute Pair-wise Correlation of Long-short Strategies



Source: Deutsche Bank Quantitative Strategy, Bloomberg Finance LP, Factset, Axioma

² Our style indices can be found on the DBCU page on Bloomberg, under category “Quantitative – EMEA/Global”.



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Appendix 1

Important Disclosures

Additional information available upon request

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