

28 June 2012

## Academic Insights

# Harnessing the best ideas from academia

### Welcome to our monthly Academic Insights report

#### Fresh insights from academia

Downside risk is understandably on the minds of investors and academics alike. This month we review an interesting paper that adds to the very popular topic of risk-based investment strategies. The so-called Minimax strategy is designed for those investors who are most risk averse, and seeks to build a portfolio that does best in the worst case scenario.

Another useful paper this month adds to a topic we have been researching recently: can we measure the crowdedness of a strategy or market? This particular paper devises a methodology for measuring the extent to which assets move together, or herd, during extreme market moves.

#### Key papers this month

This month we focus on five papers spanning a range of topics including alpha generation, portfolio construction, and risk management:

- Minimax: Portfolio choice based on pessimistic decision making
- When is herding not herding?
- Noise as information for illiquidity
- Regime shifts: Implications for dynamic strategies
- Investing with momentum: The past, present, and future

#### Upcoming events

We also highlight upcoming conferences and seminars in the quantitative investing space that may be of interest.

#### The best of the rest

At the back of this report we include abstracts from some additional papers that we think are also quite interesting. These are arranged by topic to make skimming the list quicker. If you need any further information on any of the papers in this report, please contact the Deutsche Bank Equity Quantitative Strategy team at (+1) 212 250 8983 or (+44) 20 754 71684, or email us at [DBEQS.Global@db.com](mailto:DBEQS.Global@db.com).

### Team Contacts

#### Rochester Cahan

rochester.cahan@db.com

#### Miguel-A Alvarez

miguel-a.alvarez@db.com

#### Jean-Robert Avettand-Fenoel

jean-robert.avettand-fenoel@db.com

#### Zongye Chen

john.chen@db.com

#### Javed Jussa

javed.jussa@db.com

#### Ada Lau

ada-cy.lau@db.com

#### Khoi Le Binh

khoi.lebinh@db.com

#### Yin Luo

yin.luo@db.com

#### Spyros Mesomeris

spyros.mesomeris@db.com

#### Marco Salvini

marco.salvini@db.com

#### Sheng Wang

sheng.wang@db.com

#### Yiyi Wang

yiyi.wang@db.com

North America: +1 212 250 8983

Europe: +44 20 754 71684

Asia: +852 2203 6990

Deutsche Bank Securities Inc.

Note to U.S. investors: US regulators have not approved most foreign listed stock index futures and options for US investors. Eligible investors may be able to get exposure through over-the-counter products. Deutsche Bank does and seeks to do business with companies covered in its research reports. Thus, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision. DISCLOSURES AND ANALYST CERTIFICATIONS ARE LOCATED IN APPENDIX 1.MICA(P) 072/04/2012.

## Table of Contents

<b>Introduction .....</b>	<b>3</b>
Welcome to <i>Academic Insights</i> .....	3
<b>Five key papers this month.....</b>	<b>4</b>
Paper 1: "Minimax: Portfolio choice based on pessimistic decision making" .....	4
Paper 2: "When is herding not herding?" .....	5
Paper 3: "Noise as information for illiquidity" .....	6
Paper 4: "Regime shifts: Implications for dynamic strategies" .....	7
Paper 5: "Investing with momentum: The past, present, and future" .....	8
<b>Upcoming conferences .....</b>	<b>9</b>
Europe.....	9
North America.....	9
Asia .....	9
<b>Other papers of interest.....</b>	<b>10</b>
Alpha generation and stock-selection signals .....	10
Optimization, portfolio construction, and risk management .....	12
Asset allocation and country/sector/style rotation .....	13
Trading and market impact.....	14
Finance theory and techniques .....	15
Derivatives and volatility .....	17

# Introduction

---

## Welcome to *Academic Insights*

***Understandably, downside risk is a focus of both market participants and academics right now***

Since the financial crisis there has understandably been a renewed focus on better ways to assess risk, with a particular emphasis on portfolio construction techniques that minimize downside risk. Indeed the meteoric rise in the popularity of risk-based portfolio construction techniques is testament to this new trend.

***The Minimax portfolio construction technique offers an alternative for the most risk-averse investors***

### **Minimax to the rescue**

One interesting paper that we review this month, by Schaarschmidt and Schanbacher [2012], adds a new low-risk strategy to the mix: the Minimax. As the name suggests, the idea is to minimize the maximum loss of a portfolio. At a high level, the goal is to find the portfolio (from the set of all possible portfolios) that performs the best under the worst case scenario. The authors illustrate their idea with an asset allocation example, and show the results compare favorably with strategies like minimum variance in terms of performance and more importantly downside risk.

***Measuring crowdedness is notoriously hard, but this paper has some innovative ideas***

### **Don't stand in front of a stampede**

Another interesting paper we highlight adds to a strand of literature we have been focusing on: how can we measure the crowdedness of a market or strategy? Galariotis, Rong, and Spyrou [2012] propose an innovative measure of crowdedness based on the Cross Sectional Absolute Deviation (CSAD) of stocks in an index. The idea is to look for a negative non-linear relationship between market returns and the size of CSAD; this would indicate that as market moves get bigger all stocks tend to move together at an increasing rate, i.e. stocks herd most during extreme market moves. One could easily extend the idea to factor portfolios, and indeed this methodology would be an interesting extension to our own research on the subject of factor crowding.<sup>1</sup>

***Regime-switching always sounds good in theory, but can it be made to work in the real world?***

### **A new regime?**

Like low risk strategies, dynamic models have also gained considerable popularity in today's macro-dominated world. One of the most frequently cited tools in this space is the regime-switching model. However, these models – while intuitive – are notoriously hard to use in real life. The problem is that the actual regime one is in is never observable, so one can at best make an educated guess about what regime one is living in at each point in time. Nonetheless, a new paper by Kritzman, Page, and Turkington [2012] is willing to tackle this difficult problem, and proposes looking for regimes in three variables: financial market turbulence, inflation, and economic growth. They then build a dynamic asset allocation model that recognizes assets will have different risk premia in different regimes, and show that such a model delivers good performance and risk properties over time.

For the rest of this month's interesting papers, read on.

Regards,  
The Deutsche Bank Quantitative Strategy Team

---

<sup>1</sup> Cahan et al., 2012, "Standing out from the crowd", *Deutsche Bank Quantitative Strategy*, 1 February 2012

# Five key papers this month

## Paper 1: “Minimax: Portfolio choice based on pessimistic decision making”

- Steffen Schaarschmidt and Peter Schanbacher
- SSRN, available at <http://ssrn.com/abstract=2078861>
- Reviewed by Miguel Alvarez

### Why it’s worth reading

Risk is traditionally defined as the standard deviation of returns. This definition of risk is analytically convenient and fits nicely when investors have a quadratic utility function or when returns are normally distributed. However, it is well established that many investment return distributions deviate from normality and that investors do not religiously follow a quadratic utility function when making investment decisions. In this spirit, there is an abundance of papers exploring and analyzing portfolio selection techniques based on alternative risk measures and utility functions. This paper investigates the Minimax portfolio selection strategy, which aims to minimize the likelihood of the worst possible scenario (finds the portfolio that performs the best under the worst case scenario). This “pessimistic” portfolio strategy is aimed at highly risk-averse investors and lends itself as a useful addition to the burgeoning field of low-risk investing strategies.

### Data and methodology

The authors test their Minimax portfolio selection procedure in an asset allocation exercise using four asset classes: stocks (S&P 500), bonds (Barclays Aggregate Bond Index), real estate (Datastream US real estate index) and commodities (S&P GSCI Index). The technique is implemented using the daily returns of each index spanning January 1990 to December 2010 and the portfolio rebalancing period is annual. To demonstrate some of the more salient features of the Minimax strategy, the authors begin by implementing the strategy using two asset classes (equity and bonds). The authors then proceed to compare the Minimax strategy to a number of more traditional portfolio selection strategies including minimum variance, mean-variance, fixed weights and the naïve 1/N strategy. The strategies are compared across traditional risk and return measures (e.g. Sharpe ratio) as well as other alternative measures such as Certainty Equivalence and value at risk (VaR). The authors also compare the turnover of each strategy, which we find missing in many asset allocation studies.

### Results

At a high level, the results show that the Minimax strategy is quite effective at generating superior performance while simultaneously minimizing extreme losses. In terms of Sharpe ratio, it outperforms all other strategies with exception to mean-variance, which requires more turnover and possesses significantly more downside risk. However, given its low risk nature, the more insightful comparison is with the minimum variance strategy. While the realized volatility of the Minimax strategy is slightly higher than that of the minimum variance, the Minimax strategy obtains better return performance and less downside risk.

### Our take

The results in this paper show that Minimax portfolio selection can be another useful technique for generating low risk investing strategies. While useful at the asset allocation level, we question the efficacy and efficiency of this technique for problems involving significantly larger number of assets and how it compares to other low-risk strategies such as risk parity and maximum diversification.

*Since the financial crisis there has been considerable interest in expanding the measurement of risk beyond the traditional mean-variance framework*

*This paper investigates the Minimax portfolio construction technique, which aims to find the portfolio that does best under the worst case scenario*

*In an asset allocation example, the Minimax strategy is quite effective at generating good performance while minimizing losses*

*Given the interest in low risk strategies right now, the Minimax could be a useful addition to the toolbox*

## Paper 2: “When is herding not herding?”

- Emilios C. Galariotis, Wu Rong and Spyros I. Spyrou
- SSRN, available at <http://ssrn.com/abstract=2083201>
- Reviewed by Jean-Robert Avettand-Fenoël

### Why it’s worth reading

The stock market’s opportunity set has been an oft-discussed topic over the last couple of months<sup>2</sup>, along with pairwise correlations and cross-sectional volatility. Underlying all these concepts is the notion of herding, which characterizes a market behavior where agents all buy or sell the same stocks at the same time. Quants take this phenomenon particularly seriously, especially since the summer of 2007. In Galariotis et al.’s paper, the authors try to bridge the gap between market-wide herding and common risk factors, arguing the latter actually explain rationally herding behaviors.

### Data and methodology

For this study, the authors use all S&P 100 constituent stocks between October 1989 and April 2011, which represent approximately 45% of the market capitalization of the US equity market. Even though usual herding metrics make use of holdings or volumes data, this is not the case here. Instead, Galariotis et al. first compute on each day the Cross Sectional Absolute Deviation (CSAD) as the average absolute difference between each stock’s return and the market return. Then, they estimate a non-linear regression in which the dependant variable CSAD is explained by the absolute market return and the squared market return. If herding occurs, the coefficient of the squared market return should be negative and statistically significant. The intuition is that in normal times, CSAD should be proportional to the absolute market return, but in case of large price movements leading to herding behaviors the relation should not hold anymore, and instead the CSAD should non-linearly decrease. They estimate the regression for the full sample as well as sub-samples of stocks (Small/Large, Value/Growth) and sub-periods (pre/during/post crisis), and later include the common HML and SMB risk factors from Fama-French as explanatory variables in the regression to try and explain herding.

### Results

Initially estimated without the HML and SMB factors, the regression shows a statistically significant and negative coefficient for the squared market return, indicating herding behavior. However, this is only the case during the crisis sub-period and in up days, but not in other sub-periods. What is more, in the sub-samples of Large and Value stocks, the herding effect seems to be more pronounced compared to the Small and Growth sub-samples. Interestingly, once the HML and SMB factors are added as explanatory variables in the regression, the coefficient for the squared market return is not statistically different from zero anymore. This suggests that the non-linear effect due to herding disappears in favor of a linear investor reaction to fundamental risk factors.

### Our take

The concept of herding is among the hardest ones to harness in the quantitative investment space, but also among the most important ones as portfolio managers need to avoid “going with the flow” if they want to find pockets of pure alpha which are not overcrowded at the same time. Various measures to detect herding have been proposed in the literature, and the one used in this paper could prove a useful additional tool for investors to monitor their own portfolio. Its ease of use and its meaningful intuition makes further investigation worthwhile.

***In this paper, the authors try to bridge the gap between market-wide herding and common risk factors, arguing the latter actually explain rationally herding behaviors.***

***The analysis is based on the S&P 100 universe between 1989 and 2011.***

***Herding occurs when the Cross Sectional Absolute Deviation is not proportional to the absolute market return anymore, but instead non-linearly decreases with the squared market return.***

***Herding is significant in the crisis sub-period and in up days, and more so among Large and Value stocks. However, the Fama-French HML and SMB factors absorb all herding effects.***

***Detecting herding and avoiding overcrowding ranks high on the to-do list of the quant portfolio manager. This metric could be useful in that regard***

<sup>2</sup> See for instance Alvarez, M., Luo, Y., Cahan, R., Jussa, J., Chen, Z. and Wang S., 2012, “Portfolios Under Construction: Correlation & Consequences”, *Deutsche Bank Equity Quantitative Strategy*, 24<sup>th</sup> January 2012.

### Paper 3: “Noise as information for illiquidity”

- Grace Xing Hu, Jun Pan and Jiang Wang
- MIT working paper, available at <http://www.mit.edu/~junpan/Noise.pdf?version=1>
- Reviewed by Ada Lau

***Liquidity is becoming an important topic in the academic literature, and indeed in our own work***

***This paper suggests a new market-wide liquidity measure, which is derived from US Treasuries***

***The paper shows that this new measure of liquidity is somewhat uncorrelated with more traditional measures***

***This new metric could be a useful new tool in understanding liquidity***

#### Why it's worth reading

This paper proposes a general, market-wide liquidity measure using the deviations of the market yield from the model yield of Treasuries, notes and bonds, where the model yield is calculated from the zero-coupon yield curve implied by the US Treasury bond market data. This deviation, also denoted as the ‘noise measure’, spikes up during past market crisis, showing that it could be a good proxy for market-wide liquidity risk. This is an interesting alternative to the market-wide liquidity factor that we studied recently in the Asia market, which is derived from the popular Amihud measure<sup>3</sup>.

#### Data and methodology

End-of-day bond prices from 1987-2011 are obtained from CRSP Daily Treasury database, where bonds with maturity shorter than 1 month and longer than 10 years are excluded. The Svensson model is used to estimate the zero-coupon yield curve from the Treasury securities, which is then used to obtain model-implied yields. The noise measure is calculated as the root mean squared errors between the market yield and the model-implied yield for each day using all the treasuring bonds with maturity between 1 to 10 years. Monthly changes of the noise measure is regressed on other measures of liquidity including the level, slope and volatility of Treasury bonds, US stocks market returns and CBOE VIX index. Fama-MacBeth cross-sectional regressions are used to regress monthly excess hedge fund returns on the noise measure and the excess return of CRSP value weighted portfolio. Hedge fund data from 1994-2011 is obtained from the Lipper TASS database, and only funds with over 10 million USD assets under management are included. For each hedge fund, the previous 24 months returns are used to estimate the beta corresponding to the noise measure. These pre-ranking betas are sorted into 10 portfolios. The equal-weighted return of each portfolio is then regressed on the noise measure and the excess return of CRSP value weighted portfolio in order to study the impact of exposure of liquidity risk to hedge fund returns.

#### Results

The regression of monthly changes of the noise measure on various other measures of liquidity shows that over 50% of uncertainties in this noise measure are not explained by other liquidity measures. Fama-MacBeth regressions of hedge fund returns with the noise measure of liquidity risk show that the noise measure is priced. The noise risk premium is negative and statistically significant, and provides explanatory power that is not demonstrated in other liquidity-related risk factors obtained from equity, corporate bonds and equity options markets.

#### Our take

This paper provides another facet of liquidity by considering price deviations in US Treasuries. We think it would be interesting to compare this market-wide noise measure of liquidity risk with other market specific liquidity measures, such as price impact in equity markets. Besides hedge funds, which are more sensitive to liquidity risk, one would also like to investigate if the above market-wide noise measure of liquidity risk is priced in other asset classes.

<sup>3</sup> Le Binh, K. et. al, 2012, “Liquid Liquid”, Asia Quantitative Strategy, 5 June 2012

## Paper 4: “Regime shifts: Implications for dynamic strategies”

- Mark Kritzman, Sebastien Page, and David Turkington
- *Financial Analysts Journal*, Vol. 68, No. 3, available at <http://www.cfapubs.org/doi/abs/10.2469/faj.v68.n3.3>
- Reviewed by Yiyi Wang

### Why it’s worth reading

Regime-switching models have been an interesting yet difficult topic. Interesting because the investors do witness the market has been oscillating between a “steady” state and a “turbulent” state – especially in recent years after the 08’ financial crisis, yet difficult because what people are able to observe is the noisy signal emitted by the latent data generating process, while the true regime variable is invisible and can only be inferred with certain probability. The authors show a way to apply Markov-switching models to forecast regimes in market turbulence, inflation and economic growth, and their results are particularly useful for dynamic asset allocation.

### Data and methodology

The authors try to model regimes in three variables: financial market turbulence, inflation and economic growth. They define financial market turbulence as a condition in which asset prices behave in an uncharacteristic fashion given their historical pattern of behavior. Specifically, they use the squared Mahalanobis distance on daily returns of the 10 S&P 500 sector indices and on G-10 FX returns against USD. It is relatively easier to measure inflation and economic growth, the former being the monthly percentage changes in the seasonally adjusted US CPI for All Urban Consumers and the latter the quarter-over-quarter percentage growth in the seasonally adjusted US real GDP.

The authors calibrate a two-regime Markov-switching model for turbulence, inflation and economic growth individually using the EM (Expectation-Maximization) algorithm. To apply the information from regime forecasting on dynamic asset allocation, they first classify the risk premiums on the basis of how they should relate to regimes.<sup>4</sup> For instance, turbulence would affect almost all risk premiums. Inflation would have a large impact on gold and the yield curve. In the next step, the authors design a dynamic allocation to implement defensive tilts as impending “event” (i.e., turbulent, high inflation risk, recession) regimes. Each risk premium starts with a default exposure, and when the event regime is simultaneously predicted for more than one variable, the relevant tilts on the risk premium are positioned.

### Results

The dynamic strategy has a meaningful impact in reducing downside risk, and the information ratio has significantly outperformed the static strategy.

### Our take

In a previous study, we have tested an alternative approach<sup>5</sup> - though technically different, nonetheless with the similar intuition - aiming at rotating styles with the Variance Risk Premium as an exogenous signal indicating upcoming shifts in risk appetite. Regime shifts place a big challenge to traditional asset/style allocation, demanding a more adaptive but not over-fitting system. This paper offers a good example of how to apply a Hidden-Markov Model setting in the context of asset allocation and suggests avenues for future research.

**The authors show a way to apply Markov-switching models to forecast regimes in market turbulence, inflation and economic growth.**

**The financial market turbulence is defined using the squared Mahalanobis distance.**

**The authors design a dynamic risk premium allocation to implement defensive tilts as impending “event” regimes.**

**The dynamic asset allocation based on the regime-switching model outperforms the static allocation.**

**We have tested an alternative approach, also aiming at rotating styles to capture shifts in risk appetite.**

<sup>4</sup> The underlying assets in this case are various risk premiums, as the financial literature finds the diversification across risk premiums is more effective than diversification across asset classes.

<sup>5</sup> See Alvarez, M., Luo, Y., Cahan, R., Jussa, J., Chen, Z. and Wang, S., 2012, “Uncertainty and Style Dynamics”, *Deutsche Bank Equity Quantitative Strategy*, 18<sup>th</sup> April 2012.

## Paper 5: “Investing with momentum: The past, present, and future”

- John B. Guerard, Jr., Ganlin Xu, and Mustafa Gultekin
- *Journal of Investing*, Volume 21, Number 1, available at <http://www.ijournals.com/doi/abs/10.3905/joi.2012.21.1.068>
- Reviewed by Rochester Cahan

### Why it’s worth reading

This review is not so much targeted at one paper, but rather an entire issue of the *Journal of Investing*, namely Volume 21 published earlier this year. Thoughtfully collated by guest editor John Guerard, the volume targets applied quantitative investing, and as such contain a host of relevant papers for practitioners, some of which we’ve already highlighted in past editions of *Academic Insights*. The introduction, by none other than Harry Markowitz, will also be of interest to many of our readers. In this review, we focus on one paper that examines one of the most popular – but recently most problematic – factors of all: price momentum.

### Data and methodology

The first part of the paper outlines the basics of a quant model that incorporates price momentum as one of 10 linear factors in a cross-sectional regression model designed to forecast month-ahead stock returns. The authors refer to this as the United States Expected Returns (USER) model. This model, which is representative of a “typical” quant process, is the test bed from which the authors examine various facets of the momentum factor. Perhaps the most interesting angle is the use of a formal data mining test to evaluate whether the strong returns generated by the USER model over time could be due to random chance and hence unlikely to persist in the future. The methodology used is that proposed in Markowitz and Xu [1994], and is designed to measure the chance that an investor could have generated similar performance with other models instead.<sup>6</sup>

### Results

An interesting result is that, after the data mining correction, the authors find that one could expect around 74% of the outperformance of the USER model to be continue into the future. In other words, even after correcting for data mining bias, an investor could still have confidence that the USER model’s performance is not just the result of data mining over a particular time frame. This demonstrates one of the appealing features of this test: the output is quite intuitive in the sense that it tells us what percent of the backtested outperformance we can expect to persist in the future. This is a more appealing prospect than using the usual heuristic rules like “take your backtested performance and divide by 2”.

### Our take

For those new to the basics of quantitative investing, this paper – and indeed the other papers in this issue of *Journal of Investing* – provides an excellent introduction. For experienced quants, the data mining bias test could be a useful edition to the toolbox as a means for quantifying the extent to which the backtested performance of a factor is due to data mining. One question that the paper does not answer is what to do about the recent struggles of the momentum factor (the authors are upfront that this is outside the scope of this research). Hence some of our recent research may be of interest as an extension; we have proposed various techniques for improving the performance of momentum, including neutralizing the beta exposure of the factor or timing the term-structure.<sup>7</sup>

**A recent issue of *Journal of Investing*, specifically targeting quant investing, has a host of interesting papers**

**One paper that we found interesting tackles one of the favorite – but also recently problematic – quant factors: price momentum**

**An interesting part of the paper is the use of Markowitz and Xu’s [1994] data mining adjustment, to assess the likelihood that backtested performance persists in the future**

<sup>6</sup> Markowitz, H. M. and G. L. Xu, 1994, “Data mining corrections”, *Journal of Portfolio Management*, Volume 21, Number 1

<sup>7</sup> Alvarez et al., 2011, “Reviving momentum: Mission impossible?”, *Deutsche Bank Quantitative Strategy*, 6 July 2011

# Upcoming conferences

## Europe

**Figure 1: European event calendar**

Date	Location	Conference
27-30 June 2012	Barcelona	European Financial Management Association Annual Meeting 2012 <a href="http://www.efmaefm.org/0EFMAMEETINGS/EFMA%20ANNUAL%20MEETINGS/2012-Barcelona/2012meetings.shtml">http://www.efmaefm.org/0EFMAMEETINGS/EFMA%20ANNUAL%20MEETINGS/2012-Barcelona/2012meetings.shtml</a>
28-30 June 2012	Samos Island, Greece	9th International Conference on Applied Financial Economics <a href="http://www.ineag.gr/AFF/index.php">http://www.ineag.gr/AFF/index.php</a>
15-18 August 2012	Copenhagen	39th European Finance Association Annual Meeting 2012 <a href="http://www.efa2012.org/">http://www.efa2012.org/</a>
10-11 September 2012	London	Battle of the Quants <a href="http://www.battleofthequants.com">www.battleofthequants.com</a>
18-19 October 2012	Prague	Fifth Annual CFA European Investment Conference <a href="http://eic.cfainstitute.org/">http://eic.cfainstitute.org/</a>

Source: Deutsche Bank

## North America

**Figure 2: North American event calendar**

Date	Location	Conference
12 July 2012	Boston	CQA Academic Review Session <a href="http://www.cqa.org/">http://www.cqa.org/</a>
23-27 July 2012	Chicago	CFA Financial Analysts Seminar <a href="http://www.cfainstitute.org/learning/products/events/Pages/07232012_63954.aspx">http://www.cfainstitute.org/learning/products/events/Pages/07232012_63954.aspx</a>
13-18 August 2012	New York	Advanced Risk and Portfolio Management Bootcamp <a href="http://symmys.com/arpm-bootcamp">http://symmys.com/arpm-bootcamp</a>
12-13 September 2012	Chicago	CQA Fall Conference <a href="http://www.cqa.org/">http://www.cqa.org/</a>

Source: Deutsche Bank

## Asia

**Figure 3: Asian event calendar**

Date	Location	Conference
24 October 2012	Hong Kong	CQA Asia Fall Conference <a href="http://www.cqa.org/">http://www.cqa.org/</a>
19-22 May 2013	Singapore	66 <sup>th</sup> Annual CFA Institute Annual Conference <a href="http://www.cfainstitute.org/learning/products/events/Pages/05192013_66150.aspx">http://www.cfainstitute.org/learning/products/events/Pages/05192013_66150.aspx</a>

Source: Deutsche Bank

# Other papers of interest

---

## Alpha generation and stock-selection signals

### Exploiting option information in the equity market

- Guido Baltussen, Bart van der Grient, Wilma de Groot, Erik Hennink, and Weili Zhou
- *Financial Analysts Journal*, Volume 68, Number 4, available at <http://www.cfapubs.org/doi/abs/10.2469/faj.v68.n4.1>
- Abstract: "Public option market information contains exploitable information for equity investors for an investable universe of liquid large-cap stocks. Strategies based on several option measures predict returns and alphas on the underlying stock. Transaction costs are an important factor given the high turnover of these strategies, but significant net alphas can be obtained when using a simple approach that reduces transaction costs. These findings suggest that information diffuses gradually from the option market into the underlying stock market."

### Asset growth and future stock returns: International evidence

- Xi Li, Ying Becker, and Didier Rosenfeld
- *Financial Analysts Journal*, Volume 68, Number 4, available at <http://www.cfapubs.org/doi/abs/10.2469/faj.v68.n3.4>
- Abstract: "The authors found strong return predictive power for measures related to asset growth in the MSCI World Universe. The predictive power applies to abnormal returns for up to four years after the initial measurement period, is particularly strong for two-year total asset growth rates, and is robust to size and book-to-market adjustments. It is also robust for various sample periods, various geographic regions, and both large- and small-cap stocks."

### Factoring sentiment risk into quant models

- Peter Ager Hafez and Junqiang Xie
- SSRN, available at <http://ssrn.com/abstract=2071142>
- Abstract: "The stock market is affected by sentiment. The question is, however, how to quantify this effect on asset prices. By utilizing the unique RavenPack Sentiment Index, a news-based proxy for market sentiment, this paper intends to address this issue empirically by exploring the pricing implications of a stock's exposure to market sentiment. We also explore a concept we coined as "news beta" or the sensitivity of stock returns to changes in market sentiment as reported by the media. After controlling for traditional factors, news beta is found to have strong return predictability over 6 and 12 month horizons. The evidence from this research suggests that market sentiment data is still an untapped source of alpha in financial markets."

### Share issuance effects in the cross-section of stock returns

- David Lancaster and Graham Bornholt
- SSRN, available at <http://ssrn.com/abstract=2080759>
- Abstract: "Previous research describes the net share issuance anomaly in U.S. stocks as pervasive, both in size-based sorts and in cross-section regressions. As a further test of its pervasiveness, this paper undertakes an in-depth study of share issuance effects in the Australian equity market. The anomaly is observed in all size stocks except micro stocks. For example, equal weighted portfolios of non-issuing big stocks outperform portfolios of high issuing big stocks by an average of 0.84% per month over 1990–2009. This outperformance survives risk adjustment and appears to subsume the asset growth effect in Australian stock returns."

**Dynamic conditional beta is alive and well in the cross-section of daily stock returns**

- Turan G. Bali, Robert F. Engle, and Yi Tang
- SSRN, available at <http://ssrn.com/abstract=2089636>
- Abstract: "Using the intertemporal capital asset pricing model with dynamic conditional correlations, this paper investigates the significance of dynamic conditional beta in predicting the cross-sectional variation in expected stock returns. The results indicate that the time-varying conditional beta is alive and well in the cross-section of daily stock returns. Portfolio-level analyses and firm-level cross-sectional regressions indicate a positive and significant relation between dynamic conditional beta and future returns on individual stocks. An investment strategy that goes long stocks in the highest conditional beta decile and shorts stocks in the lowest conditional beta decile produces average returns and alphas of 8% per annum. These results are robust to controls for size, book-to-market, momentum, short-term reversal, liquidity, co-skewness, idiosyncratic volatility, and preference for lottery-like assets."

**The global relation between financial distress and equity returns**

- Pengjie Gao, Christopher Parsons, and Jianfeng Shen
- SSRN, available at <http://ssrn.com/abstract=2086475>
- Abstract: "Recent studies conflict sharply about the stock returns of financially distressed firms. This applies to both the basic empirical patterns as well as their interpretation. We assemble a dataset of returns and failure probabilities several times larger than previous studies, covering over 15,000 firms in 39 countries. Among roughly 3.4 million firm-month observations, we document a robust, worldwide distress anomaly - whereby elevated failure probabilities predict low equity returns - but primarily among small firms. We then use cross-country variation to test two competing hypotheses for this finding. First, the distress anomaly is not related to a country's creditor protection environment, inconsistent with shareholder expropriation. Second, the returns of distressed firms are especially low in countries ranking high in "individualism," where other asset pricing anomalies such as momentum are strongest."

## Optimization, portfolio construction, and risk management

### Balanced hedging and trading baskets

- David Bailey and Marcos M. Lopez de Prado
- SSRN, available at <http://ssrn.com/abstract=2066170>
- Abstract: "A basket is a set of instruments that are held together because its statistical profile delivers a desired goal, such as hedging or trading, which cannot be achieved through the individual constituents or even subsets of them. Multiple procedures have been proposed to compute hedging and trading baskets, among which balanced baskets have attracted significant attention in recent years. Unlike Principal Component Analysis (PCA) style methods, balanced baskets spread risk or exposure across their constituents without requiring a change of basis. Practitioners typically prefer balanced baskets because their output can be understood in intuitive terms. We review three methodologies for determining balanced baskets, analyze the features of their respective solutions and provide Python code for their calculation. We also introduce a new method for reducing the dimension of a covariance matrix, called Covariance Clustering, which addresses the problem of numerical ill-conditioning without requiring a change of base."

### New method to estimate risk and return of non-traded assets from cash flows: The case of private equity funds

- Joost Driessen, Tse-Chun Lin, and Ludovic Phalippou
- SSRN, available at <http://ssrn.com/abstract=2065940>
- Abstract: "We develop a new methodology to estimate abnormal performance and risk exposure of non-traded assets from cashflows. Our methodology extends the standard internal rate of return approach to a dynamic setting. The small-sample properties are validated using a simulation study. We apply the method to a sample of 958 private equity funds. For venture capital funds, we find a high market beta and underperformance before and after fees. For buyout funds, we find a relatively low market beta and no evidence for outperformance. We find that self-reported net asset values significantly overstate fund values for mature and inactive funds."

### Examining what best explains corporate credit risk: Accounting-based versus market-based models

- Antonio Trujillo-Ponce, Reyes Samaniego-Medina, and Clara Cardone-Riportella
- SSRN, available at <http://ssrn.com/abstract=2072176>
- Abstract: "Using a sample of 2,186 credit default swap (CDS) spreads quoted in the European market during the period 2002-2009, this paper empirically analyzes which model – accounting- or market-based – better explains corporate credit risk. We find that there is little difference in the explanatory power of the two approaches. Our results suggest that both accounting and market data complement one other and thus that a comprehensive model that includes both types of variables appears to be the best option for explaining credit risk. We also show that the explanatory power of accounting- and market-based variables for measuring credit risk is particularly strong during periods of high uncertainty, as experienced in the recent financial crisis, and that it decreases as the CDS contract matures. Finally, the comprehensive model continues to show the best results when using the credit rating as the proxy for credit risk, but accounting variables currently appear to have a more important role than the market variables."

## Asset allocation and country/sector/style rotation

### Balanced hedging and trading baskets

- David Bailey and Marcos M. Lopez de Prado
- SSRN, available at <http://ssrn.com/abstract=2066170>
- Abstract: "A basket is a set of instruments that are held together because its statistical profile delivers a desired goal, such as hedging or trading, which cannot be achieved through the individual constituents or even subsets of them. Multiple procedures have been proposed to compute hedging and trading baskets, among which balanced baskets have attracted significant attention in recent years. Unlike Principal Component Analysis (PCA) style methods, balanced baskets spread risk or exposure across their constituents without requiring a change of basis. Practitioners typically prefer balanced baskets because their output can be understood in intuitive terms. We review three methodologies for determining balanced baskets, analyze the features of their respective solutions and provide Python code for their calculation. We also introduce a new method for reducing the dimension of a covariance matrix, called Covariance Clustering, which addresses the problem of numerical ill-conditioning without requiring a change of base."

### New method to estimate risk and return of non-traded assets from cash flows: The case of private equity funds

- Joost Driessen, Tse-Chun Lin, and Ludovic Phalippou
- SSRN, available at <http://ssrn.com/abstract=2065940>
- Abstract: "We develop a new methodology to estimate abnormal performance and risk exposure of non-traded assets from cashflows. Our methodology extends the standard internal rate of return approach to a dynamic setting. The small-sample properties are validated using a simulation study. We apply the method to a sample of 958 private equity funds. For venture capital funds, we find a high market beta and underperformance before and after fees. For buyout funds, we find a relatively low market beta and no evidence for outperformance. We find that self-reported net asset values significantly overstate fund values for mature and inactive funds."

### Examining what best explains corporate credit risk: Accounting-based versus market-based models

- Antonio Trujillo-Ponce, Reyes Samaniego-Medina, and Clara Cardone-Riportella
- SSRN, available at <http://ssrn.com/abstract=2072176>
- Abstract: "Using a sample of 2,186 credit default swap (CDS) spreads quoted in the European market during the period 2002-2009, this paper empirically analyzes which model – accounting- or market-based – better explains corporate credit risk. We find that there is little difference in the explanatory power of the two approaches. Our results suggest that both accounting and market data complement one other and thus that a comprehensive model that includes both types of variables appears to be the best option for explaining credit risk. We also show that the explanatory power of accounting- and market-based variables for measuring credit risk is particularly strong during periods of high uncertainty, as experienced in the recent financial crisis, and that it decreases as the CDS contract matures. Finally, the comprehensive model continues to show the best results when using the credit rating as the proxy for credit risk, but accounting variables currently appear to have a more important role than the market variables."

## Trading and market impact

### High frequency trading and long-term investors: A view from the buy-side

- Nataliya Bershova and Dmitry Rakhlin
- SSRN, available at <http://ssrn.com/abstract=2066884>
- Abstract: "With proliferation of high-frequency trading (HFT) it is important to understand effect of HFT on market quality and opportunities that HFTs create for long-term (LT) investors to build an efficient regulatory framework. This paper demonstrates an approach that allows us to estimate HFT impact on market quality using information on daily aggregate volumes traded by HFT and LT provided by a bulge-bracket broker in two different trading environments in terms of electronic liquidity: evolving Tokyo equity market and mature London equity market. Our results suggest that at least in liquid names, HFT is mostly involved in opportunistic liquidity provisioning rather than engaging in predatory strategies. While HFT market making activity increases short-term intraday volatility, thus adversely impacting the transaction costs, this impact is more than offset by significant compression of bid-ask spreads leading to a net reduction of trading costs for LT investors."

### Effective trade execution

- Riccardo Cesari, Massimiliano Marzo, and Paolo Zagaglia
- SSRN, available at <http://ssrn.com/abstract=2088800>
- Abstract: "This paper examines the role of algorithmic trading in modern financial markets. Additionally, order types, characteristics, and special features of algorithmic trading are described under the lens provided by the large development of high frequency trading technology. Special order types are examined together with an intuitive description of the implied dynamics of the order book conditional to special orders (iceberg and hidden). The chapter provides an analysis of the transaction costs associated with trading activity and examines the most common trading strategy employed in the market. It also examines optimal execution strategy with the description of the Efficient Trading Frontier. These concepts represent the tools needed to understand the most recent innovations in financial markets and the most recent advances in microstructures research."

### Cluster analysis for evaluating trading strategies

- Jeff Bacidore, Kathryn Berkow, Ben Polidore, and Nigam Saraiya
- *Journal of Trading*, forthcoming, available at <http://www.iiijournals.com/doi/abs/10.3905/jot.2012.2012.1.017>
- Abstract: "In this article, we introduce a new methodology to empirically identify the primary strategies used by a trader using only post-trade fill data. To do this, we apply a well-established statistical clustering technique called k-means to a sample of "progress charts," representing the portion of the order completed by each point in the day as a measure of a trade's aggressiveness. Our methodology identifies the primary strategies used by a trader and determines which strategy the trader used for each order in the sample. Having identified the strategy used for each order, trading cost analysis (TCA) can be done by strategy. We also discuss ways to exploit this technique to characterize trader behavior, assess trader performance, and suggest the appropriate benchmarks for each distinct trading strategy."

## Finance theory and techniques

### Market risk premium used in 82 countries in 2012: A survey with 7,192 answers

- Pablo Fernandez, Javier Aguirreamalloa, and Luis Corres Avandano
- SSRN, available at <http://ssrn.com/abstract=2084213>
- Abstract: "This paper contains the statistics of the Equity Premium or Market Risk Premium (MRP) used in 2012 for 82 countries. We got answers for 93 countries, but we only report the results for 82 countries with more than 5 answers. Most previous surveys have been interested in the Expected MRP, but this survey asks about the Required MRP. The paper also contains the references used to justify the MRP, comments from persons that do not use MRP, and comments from persons that do use MRP."

### Short-sellers and the informativeness of stock prices with respect to future earnings

- Michael S. Drake, James N. Myers, Linda A. Myers, and Michael D. Stuart
- SSRN, available at <http://ssrn.com/abstract=2085019>
- Abstract: "Prior research suggests that short sellers are sophisticated investors who improve market efficiency by selling stocks when fundamental analysis suggests that future returns will be negative. Alternatively, critics suggest that aggressive short selling is responsible for driving stock prices away from fundamental values. We add to the research examining the role of short sellers in the capital markets by investigating whether short sellers trade on information about future earnings, and the cash flow and accrual components of those earnings. We also examine whether short sellers influence the extent to which current period changes in stock prices reflect future earnings information; that is, we investigate whether short interest levels and changes are associated with the informativeness of changes in stock prices (returns). Using a large sample of observations from 1988 through 2007, we find a negative association between our short interest variables and future earnings, and we find that this negative association is driven by the accrual (rather than cash flow) component of earnings. We also provide evidence that current returns better reflect future earnings when firms are more heavily targeted by short sellers. Finally, we explore the influence of market expectations for future earnings growth on the informativeness of current returns to better understand why short sellers play a role in improving stock price informativeness. We find that the amount of future earnings information in current period returns is greater only when analysts' long-term earnings growth forecasts are high, suggesting that short seller trades impound information about negative future news that is omitted by optimistic analysts. Overall, our results support the view that short sellers provide credible information to the market by trading on information about future earnings that is yet to be reflected in security prices."

### Inflation hedging with international equities

- Maximilian Roedel
- SSRN, available at <http://ssrn.com/abstract=2070899>
- Abstract: "Existing research discards domestic equities as inflation hedge, yet, to the best of my knowledge, overlooks international equities. I show that international equities hedge against inflation level and inflation changes more effectively than domestic equities. The protection is stronger for country-specific inflation shocks and for weak domestic currencies. International equities thus protect investors who need it the most, but remain an insufficient hedge for investors in the monetary most stable countries. The analysis bases on 24 advanced economies between 1971 and 2010. It tests broad domestic and international equity indices as well as country portfolios based on inflation comovement. Data on 21 emerging economies confirms these findings."

**Tail risk and hedge fund returns**

- Bryan Kelly and Hao Jiang
- SSRN, available at <http://ssrn.com/abstract=2019482>
- Abstract: "We document large, persistent exposures of hedge funds to downside tail risk. For instance, the hardest hit hedge funds in the 1998 crisis also suffered predictably worse returns than their peers in 2007-2008. Using the conditional tail risk factor derived by Kelly (2012), we find that tail risk is a key driver of hedge fund returns in both the time-series and cross-section. A positive one standard deviation shock to tail risk is associated with a contemporaneous decline of 2.88% per year in the value of the aggregate hedge fund portfolio. In the cross-section, funds that lose value during high tail risk episodes earn average annual returns more than 6% higher than funds that are tail risk-hedged, controlling for commonly used hedge fund factors. These results are consistent with the notion that a significant component of hedge fund returns can be viewed as compensation for selling disaster insurance."

**Liquidity and liquidity risk in the cross-section of stock returns**

- Volodymyr Vovchak
- SSRN, available at <http://ssrn.com/abstract=2078295>
- Abstract: "This paper examines the relative importance of liquidity level and liquidity risk for the cross-section of stock returns. A portfolio analysis is implemented to make inferences about the pricing ability of liquidity as a characteristic or as a risk. I find that the ratio of absolute returns-to-volume, the Amihud liquidity measure, is able to explain more variance in stock returns than a battery of liquidity risk measures. My results suggest that trading cost and frictions impact financial markets more than the systemic components of liquidity."

**Equity duration of the S&P 500: Latest updates**

- David M. Blitzler, Frank Luo, and Aye M. Soe
- SSRN, available at <http://ssrn.com/abstract=2085954>
- Abstract: "Annually, S&P Indices publishes an updated report and history of duration for the S&P 500. We acknowledge that equity duration estimation is an evolving science. We also believe that a regularly available and updated source of equity duration data will make this important metric more accessible for further research and practitioner use. Based on our model, we estimate the duration of the S&P 500 to be 25 years as of year-end 2011. This estimated duration has retreated substantially from the previous peak of 45 years in 2008, but has risen from the low of 21 years in 2010."

---

## Derivatives and volatility

### What drives option prices?

- Frédéric Abergel and Riadh Zaatour
- *Journal of Trading*, forthcoming, available at <http://www.ijournals.com/doi/abs/10.3905/jot.2012.2012.1.018>
- Abstract: "We rely on high frequency data to explore the joint dynamics of underlying and option markets. In particular, high frequency data make observable the realized variance process of the underlying, so its effects on option price dynamics are tested. Empirical results are confronted with the predictions of stochastic volatility models. The study reveals that while the modeling of stochastic volatility gives more robust models, the market does not process information on the realized variance to update option prices."

# Appendix 1

## Important Disclosures

Additional information available upon request

**For disclosures pertaining to recommendations or estimates made on a security mentioned in this report, 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>.**

## Analyst Certification

The views expressed in this report accurately reflect the personal views of the undersigned lead analyst(s). In addition, the undersigned lead analyst(s) has not and will not receive any compensation for providing a specific recommendation or view in this report. Yin Luo/Rochester Cahan/Javed Jussa/Spyros Mesomeris/Jean-Robert Avettand-Fenoel/Miguel-A Alvarez/Marco Salvini/Khoi Le Binh/Zongye Chen

## Hypothetical Disclaimer

Backtested, hypothetical or simulated performance results have inherent limitations. Unlike an actual performance record based on trading actual client portfolios, simulated results are achieved by means of the retroactive application of a backtested model itself designed with the benefit of hindsight. Taking into account historical events the backtesting of performance also differs from actual account performance because an actual investment strategy may be adjusted any time, for any reason, including a response to material, economic or market factors. The backtested performance includes hypothetical results that do not reflect the reinvestment of dividends and other earnings or the deduction of advisory fees, brokerage or other commissions, and any other expenses that a client would have paid or actually paid. No representation is made that any trading strategy or account will or is likely to achieve profits or losses similar to those shown. Alternative modeling techniques or assumptions might produce significantly different results and prove to be more appropriate. Past hypothetical backtest results are neither an indicator nor guarantee of future returns. Actual results will vary, perhaps materially, from the analysis.

## Regulatory Disclosures

### 1. Important Additional Conflict Disclosures

Aside from within this report, important conflict disclosures can also be found at <https://gm.db.com/equities> under the "Disclosures Lookup" and "Legal" tabs. Investors are strongly encouraged to review this information before investing.

### 2. Short-Term Trade Ideas

Deutsche Bank equity research analysts sometimes have shorter-term trade ideas (known as SOLAR ideas) that are consistent or inconsistent with Deutsche Bank's existing longer term ratings. These trade ideas can be found at the SOLAR link at <http://gm.db.com>.

### 3. Country-Specific Disclosures

**Australia & New Zealand:** This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act and New Zealand Financial Advisors Act respectively.

**EU countries:** Disclosures relating to our obligations under MiFiD can be found at <http://www.globalmarkets.db.com/riskdisclosures>.

**Japan:** Disclosures under the Financial Instruments and Exchange Law: Company name - Deutsche Securities Inc. Registration number - Registered as a financial instruments dealer by the Head of the Kanto Local Finance Bureau (Kinsho) No. 117. Member of associations: JSDA, Type II Financial Instruments Firms Association, The Financial Futures Association of Japan, Japan Securities Investment Advisers Association. Commissions and risks involved in stock transactions - for stock transactions, we charge stock commissions and consumption tax by multiplying the transaction amount by the commission rate agreed with each customer. Stock transactions can lead to losses as a result of share price fluctuations and other factors. Transactions in foreign stocks can lead to additional losses stemming from foreign exchange fluctuations. "Moody's", "Standard & Poor's", and "Fitch" mentioned in this report are not registered credit rating agencies in Japan unless "Japan" or "Nippon" is specifically designated in the name of the entity.

**Russia:** This information, interpretation and opinions submitted herein are not in the context of, and do not constitute, any appraisal or evaluation activity requiring a license in the Russian Federation.

## Deutsche Bank Securities Inc.

### International Locations

---

#### Deutsche Bank Securities Inc.

60 Wall Street  
New York, NY 10005  
United States of America  
Tel: (1) 212 250 2500

---

#### Deutsche Bank AG London

1 Great Winchester Street  
London EC2N 2EQ  
United Kingdom  
Tel: (44) 20 7545 8000

---

#### Deutsche Bank AG

Große Gallusstraße 10-14  
60272 Frankfurt am Main  
Germany  
Tel: (49) 69 910 00

---

#### Deutsche Bank AG

Deutsche Bank Place  
Level 16  
Corner of Hunter & Phillip Streets  
Sydney, NSW 2000  
Australia  
Tel: (61) 2 8258 1234

---

#### Deutsche Bank AG

Filiale Hongkong  
International Commerce Centre,  
1 Austin Road West, Kowloon,  
Hong Kong  
Tel: (852) 2203 8888

---

#### Deutsche Securities Inc.

2-11-1 Nagatacho  
Sanno Park Tower  
Chiyoda-ku, Tokyo 100-6171  
Japan  
Tel: (81) 3 5156 6770

## Disclaimer

The information and opinions in this report were prepared by Deutsche Bank AG or one of its affiliates (collectively "Deutsche Bank"). The information herein is believed to be reliable and has been obtained from public sources believed to be reliable. Deutsche Bank makes no representation as to the accuracy or completeness of such information.

Deutsche Bank may engage in securities transactions, on a proprietary basis or otherwise, in a manner **inconsistent** with the view taken in this research report. In addition, others within Deutsche Bank, including strategists and sales staff, may take a view that is **inconsistent** with that taken in this research report.

Deutsche Bank may be an issuer, advisor, manager, distributor or administrator of, or provide other services to, an ETF included in this report, for which it receives compensation.

Opinions, estimates and projections in this report constitute the current judgement of the author as of the date of this report. They do not necessarily reflect the opinions of Deutsche Bank and are subject to change without notice. Deutsche Bank has no obligation to update, modify or amend this report or to otherwise notify a recipient thereof in the event that any opinion, forecast or estimate set forth herein, changes or subsequently becomes inaccurate. Prices and availability of financial instruments are subject to change without notice. This report is provided for informational purposes only. It is not an offer or a solicitation of an offer to buy or sell any financial instruments or to participate in any particular trading strategy. Target prices are inherently imprecise and a product of the analyst judgement.

As a result of Deutsche Bank's March 2010 acquisition of BHF-Bank AG, a security may be covered by more than one analyst within the Deutsche Bank group. Each of these analysts may use differing methodologies to value the security; as a result, the recommendations may differ and the price targets and estimates of each may vary widely.

In August 2009, Deutsche Bank instituted a new policy whereby analysts may choose not to set or maintain a target price of certain issuers under coverage with a Hold rating. In particular, this will typically occur for "Hold" rated stocks having a market cap smaller than most other companies in its sector or region. We believe that such policy will allow us to make best use of our resources. Please visit our website at <http://gm.db.com> to determine the target price of any stock.

The financial instruments discussed in this report may not be suitable for all investors and investors must make their own informed investment decisions. Stock transactions can lead to losses as a result of price fluctuations and other factors. If a financial instrument is denominated in a currency other than an investor's currency, a change in exchange rates may adversely affect the investment.

All prices are those current at the end of the previous trading session unless otherwise indicated. Prices are sourced from local exchanges via Reuters, Bloomberg and other vendors. Data is sourced from Deutsche Bank and subject companies.

Past performance is not necessarily indicative of future results. Deutsche Bank may with respect to securities covered by this report, sell to or buy from customers on a principal basis, and consider this report in deciding to trade on a proprietary basis.

Derivative transactions involve numerous risks including, among others, market, counterparty default and illiquidity risk. The appropriateness or otherwise of these products for use by investors is dependent on the investors' own circumstances including their tax position, their regulatory environment and the nature of their other assets and liabilities and as such investors should take expert legal and financial advice before entering into any transaction similar to or inspired by the contents of this publication. Trading in options involves risk and is not suitable for all investors. Prior to buying or selling an option investors must review the "Characteristics and Risks of Standardized Options," at <http://www.theocc.com/components/docs/riskstoc.pdf> If you are unable to access the website please contact Deutsche Bank AG at +1 (212) 250-7994, for a copy of this important document.

The risk of loss in futures trading, foreign or domestic, can be substantial. As a result of the high degree of leverage obtainable in futures trading, losses may be incurred that are greater than the amount of funds initially deposited.

Unless governing law provides otherwise, all transactions should be executed through the Deutsche Bank entity in the investor's home jurisdiction. In the U.S. this report is approved and/or distributed by Deutsche Bank Securities Inc., a member of the NYSE, the NASD, NFA and SIPC. In Germany this report is approved and/or communicated by Deutsche Bank AG Frankfurt authorized by the BaFin. In the United Kingdom this report is approved and/or communicated by Deutsche Bank AG London, a member of the London Stock Exchange and regulated by the Financial Services Authority for the conduct of investment business in the UK and authorized by the BaFin. This report is distributed in Hong Kong by Deutsche Bank AG, Hong Kong Branch, in Korea by Deutsche Securities Korea Co. This report is distributed in Singapore by Deutsche Bank AG, Singapore Branch, and recipients in Singapore of this report are to contact Deutsche Bank AG, Singapore Branch in respect of any matters arising from, or in connection with, this report. Where this report is issued or promulgated in Singapore to a person who is not an accredited investor, expert investor or institutional investor (as defined in the applicable Singapore laws and regulations), Deutsche Bank AG, Singapore Branch accepts legal responsibility to such person for the contents of this report. In Japan this report is approved and/or distributed by Deutsche Securities Inc. The information contained in this report does not constitute the provision of investment advice. In Australia, retail clients should obtain a copy of a Product Disclosure Statement (PDS) relating to any financial product referred to in this report and consider the PDS before making any decision about whether to acquire the product. Deutsche Bank AG Johannesburg is incorporated in the Federal Republic of Germany (Branch Register Number in South Africa: 1998/003298/10). Additional information relative to securities, other financial products or issuers discussed in this report is available upon request. This report may not be reproduced, distributed or published by any person for any purpose without Deutsche Bank's prior written consent. Please cite source when quoting. **Copyright © 2012 Deutsche Bank AG**