



20 July 2011

Academic Insights**Harnessing the best ideas from academia****Welcome to our monthly Academic Insights report****Fresh insights from academia**

Quantitative investors often question the weight that fundamental managers place on company visits and access to senior management. Surely, they argue, these activities are just another opportunity for human biases to creep into the investment process? Maybe not – an interesting paper we highlight this month suggests that investors do profitably trade after broker-sponsored conferences and other events that bring buy-side investors and company management together.

Another interesting paper this month analyzes the causes of the current high correlation between different stock markets around the world. The authors conclude that investor sentiment, rather than greater economic integration, is the main culprit.

The ongoing sovereign debt saga, and the risk-on/risk-off type behavior it induces, is presenting major challenges for quant investors. One way to mitigate some of the impact is through more thoughtful portfolio construction. We flag two papers with some useful ideas on this front.

Key papers this month

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

- Do investors benefit from selective access to management?
- Excess comovement in international stock markets
- The cross-section of credit risk premia and equity returns
- Risk-based asset allocation: A new answer to an old question?
- The Sharpe ratio efficient frontier

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.

Team Contacts**Rochester Cahan, CFA**

Strategist
(+1) 212 250-8983
rochester.cahan@db.com

Miguel-A Alvarez

Strategist
(+1) 212 250-8983
miguel-a.alvarez@db.com

Jean-Robert Avettand-Fenoel

Strategist
(+44) 20 754-71684
jean-robert.avettand-fenoel@db.com

Zongye Chen

Strategist
(+1) 212 250-2293
john.chen@db.com

Javed Jussa

Strategist
(+1) 212 250-4117
javed.jussa@db.com

Khoi Le Binh

Strategist
(+852) 2203 6990
khoi.lebinh@db.com

Yin Luo, CFA

Strategist
(+1) 212 250-8983
yin.luo@db.com

Spyros Mesomeris, Ph.D

Strategist
(+44) 20 754-71684
spyros.mesomeris@db.com

Marco Salvini

Strategist
(+44) 20 754-71684
marco.salvini@db.com

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) 146/04/2011.

Table of Contents

Introduction	3
Welcome to <i>Academic Insights</i>	3
Five key papers this month.....	4
Paper 1: "Do investors benefit from selective access to management?"	4
Paper 2: "Excess comovement in international stock markets"	5
Paper 3: "The cross-section of credit risk premia and equity returns"	6
Paper 4: "Risk-based asset allocation: A new answer to an old question?"	7
Paper 5: "The Sharpe ratio efficient frontier"	8
Upcoming conferences	9
Europe.....	9
North America.....	9
Other papers of interest.....	10
Alpha generation and stock-selection signals	10
Optimization, portfolio construction, and risk management	12
Asset allocation and sector/style rotation	13
Trading and market impact	15
Finance theory and techniques	17
Derivatives and volatility	21

Introduction

Welcome to *Academic Insights*

The task of whittling down the deluge of academic papers that cross our desk every month is a difficult one – not because of a lack of quality, but rather because of it. Sometimes we wonder if we need a quant model just to help us pick which papers to “overweight” each month. Nonetheless, we do think we’ve picked five papers that are well worth reading.

Is there any value in talking to company management? It seems that there is

Kicking the tires

Generally speaking, quantitative and fundamental managers differ with respect to the value they place on meetings with company management. For fundamental managers, “kicking the tires” – e.g. meetings with senior executives, site visits, discussions with suppliers and customers – are an important part of the investment process. In contrast, quant managers tend to scoff at such activities as indicative of everything that is wrong with fundamental management. These activities, they argue, are just opportunities for human biases to creep into the investment decision. It turns out that both may be right. An interesting new paper by Bushee, Jung, and Miller [2011] examines the profitability of trades made after broker-dealer sponsored conferences that bring buy-side investors and senior company management together. The results suggest wins for both camps: fundamental managers do appear to trade profitably after such events, while at the same time quantitative managers could potentially use these events as a signal in their systematic models.

Credit risk is topical right now; this timely paper offers new insights into the pricing of such risk

The debt collectors are out in force

Watching the financial news these days is quite depressing; who would have thought the day would come when the straw polls would be picking between Greece and the United States as the first to default? On a more serious note, with credit risk at the top of investors’ minds, a new paper by Friewald, Wagner, and Zechneris [2011] is worth a read. The authors examine the relationship between a stock’s default risk and its equity risk premium, and derive a measure that they call the credit risk premium. They argue the information in this new metric is not fully captured by the traditional pricing models.

More thoughtful portfolio construction is not a magic bullet, but it can help mitigate downside risk

Risk on/risk off/risk back on yet again

Much has been written about the difficulties quant models have in navigating the current macro-driven environment. While there are no magic bullets, we do believe that more thoughtful portfolio construction techniques can help. Two papers we highlight are useful on this front. The first, by Lee [2011], surveys some of the latest portfolio construction techniques, including risk parity, maximum diversification, and minimum variance. The second, by Lopez de Prado [2011], proposes a new Sharpe ratio that better captures higher moments like skewness and kurtosis. Needless to say, both papers have useful insights for today’s challenging climate.

This paper argues that high correlation is being driven by investor sentiment rather than fundamentals

Is all correlation created equal?

No, if a new paper by Frijns, Verschoor and Zwinkels [2011] is to be believed. The authors argue that there are actually two types of correlation: that due to correlated fundamentals, and that due to investor sentiment. They show that the current elevated correlation is being driven by sentiment rather than greater economic integration. This has implications for anyone trying to forecast if and when correlations will mean revert.

Regards,
The Deutsche Bank Equity Quantitative Strategy Team

Five key papers this month

Paper 1: “Do investors benefit from selective access to management?”

- Brian Bushee, Michael Jung, and Gregory Miller
- SSRN, available at <http://ssrn.com/abstract=1880149>

Why it's worth reading

While Regulation Fair Disclosure (Reg FD) prohibits managers from disclosing selectively to investors and analysts, it does allow investors “selective access” to corporate managers. This interesting paper examines how stock prices react around selective access events, namely the invitation-only investor conferences that broker-dealers often organize for their buy-side clients. Typically these events involve presentations by the senior executives of listed companies, and often include the opportunity for buy-side portfolio managers to meet one-on-one with the executives. This paper suggests that investors do benefit from participating in such events, in the sense that trades conducted after the event appear to be more profitable.

Data and methodology

The authors obtain conference presentations data from the Thomson Financial Street Events database. The sample period is from 2003 to 2008 due to the database's limit. Only US companies with financial data in CRSP and Compustat are included. Presentation transcripts from Thomson Reuters are examined to identify whether top ranking officers presented, and whether there were off-line meetings after presentations.

The authors expect greater selective access advantages from one-on-one meetings based on three assumptions: 1) presentations with one-on-one meetings provide greater selective access advantages relative to companies with no formal off-line meetings; 2) investors obtain greater selective access advantages from companies providing break-out sessions relative to companies with no formal off-line meetings; and 3) presentations with CEOs in attendance provide selective access advantages over presentations with lower-ranked officers.

Results

There are two key empirical findings that will be of interest to quantitative investors. First, the authors find that abnormal buy and sell returns that occur shortly after the event are indeed profitable in a period three to 30 days later. Furthermore, these results are stronger when the presentations include an offline session, or when the CEO is in attendance. Second, average trade size and percent of large trades also increases, indicating more institutional trading.

Our take

We find this paper fascinating. Every year brokerage firms and sell-side analysts sponsor many conferences to bring buy-side clients and public traded companies together, and provide opportunities for investors to meet with management. Traditionally such conferences are disregarded by quantitative analysts, who prefer to follow a systematic approach instead of “kicking the tires” and meeting company management. However, this paper suggests a systematic way for quant managers to incorporate these types of events into an alpha strategy. It is, of course worth noting – as the authors point out – that their results do not automatically imply anything untoward is happening in terms of fair disclosure; the results could be explained, for example, by a limited attention hypothesis.

Is there any useful information in broker-sponsored conferences that bring buy-side portfolio managers and company management together?

This study analyzes the reaction of stock prices and volumes after such events

The results show that trades conducted shortly after these events are indeed more profitable

This research suggests an interesting new alpha strategy for quantitative managers

Paper 2: "Excess comovement in international stock markets"

- Bart Frijns, Willem Verschoor and Remco Zwinkels
- SSRN, available at <http://ssrn.com/abstract=1881006>

Why it's worth reading

As we highlighted in the introductory piece of our Macromomentum Country Rotation Model¹, the pairwise correlation among countries has been quite elevated for some time. This phenomenon has been reinforced with the onset of the financial crisis among developed countries, and strengthened with the sovereign debt crisis. In this paper, the authors dig into the roots of this rising comovement. Where does it come from? Is it for fundamental reasons? According to Frijns et al., the continuous increase in correlation among developed stock markets has actually been driven by investor sentiment.

Data and methodology

The breadth of the study is a bit poor as only five developed countries are used (the US, the UK, Japan, Australia and France). However, the dataset is appealing as it has a long history (for instance, the oldest dataset is the US index, going back to 1871 and the most recent is Japan, starting in 1949). The authors assume that the returns can be decomposed into a fundamental and a non-fundamental part, which they attribute to sentiment. The fundamental returns are calculated using a Gordon growth model, assessing the present value of all future dividends, and the sentiment returns are the difference between the actual and the fundamental returns. Then, the volatility of the decomposed returns is modeled using a BEKK specification of the GARCH model, which shows that the covariance between two markets can be driven by: the covariance between fundamentals, the covariance between changes in sentiment, or the covariance between fundamentals and changes in sentiment.

Results

The authors estimate the BEKK model for the raw returns, the fundamental returns and the sentiment returns over a unique sample period ranging from 1950 to 2009, for each foreign market versus the US. They find that the correlations of developed markets with the US have indeed been increasing (from 25% in the 1950s to 80% recently) but interestingly, the correlations of fundamental returns among countries merely oscillate above zero. On the other hand, the correlations of non-fundamental returns have been rising substantially over the years. In other words, the increased comovement between developed markets is not due to comovement in fundamental values and globalization/economic integration, but rather to correlated demand of sentiment-driven traders. To validate this last point, the authors introduce sentiment as an exogenous factor, specifically using the American Association of Individual Investors (AAII) sentiment index. The authors' intuition is confirmed, as the correlation between the AAII sentiment index and fundamental returns is close to nil, while it is strong and positive with non-fundamental returns.

Our take

While research often argues that investing globally helps investors diversify their portfolio exposures, this paper suggests that sentiment can drive correlations away from levels implied by the evolution of fundamentals. This argument makes sense; however, the paper does not deal with the increasing role of emerging markets in global portfolios. Indeed, our own research¹ suggests that expanding the scope to emerging markets is beneficial to a successful country rotation strategy. We would have liked to see whether the conclusions of this paper still hold when emerging markets are added to the mix.

Frijns et al., observing that international stock markets become increasingly correlated, find that this rising comovement has actually been driven by investor sentiment.

The study covers only five developed countries, but goes far back in time.

The returns are decomposed into a fundamental and a non-fundamental part, attributed to sentiment, in order to show what the source of the underlying comovement is.

The correlations of developed markets have been increasing but the correlations of fundamental returns among countries merely oscillate above zero.

The paper does not deal with the increasing role of emerging markets in global portfolios. We would have liked to see whether the conclusions hold when they are added to the mix.

¹ Mesomeris S. and Salvini M., 2010, "Introducing the Macromomentum Country Rotation Model", *DB European Quant Strategy*, 15 August 2010.

Paper 3: “The cross-section of credit risk premia and equity returns”

- Nils Friewald, Christian Wagner, and Josef Zechner
- SSRN, available at <http://ssrn.com/abstract=1883101>

Why it's worth reading

The relationship between equity risk and default risk has been the subject of an intense debate by academics and practitioners. While some studies conclude that default risk is reflected in higher equity risk, these authors analyze this issue from a novel angle. They demonstrate that the equity risk premium is not related to firms' real-world or risk-neutral default probabilities, but to a measure of their difference – defined as the credit risk premium.

Data and methodology

The daily CDS spreads for USD denominated contracts for US based companies are retrieved from Credit Market Analytics from the period between January 2004 and June 2010. They use the five CDS maturities (1, 3, 5, 7, and 10 years). To compute discount factors for fitting the survival curves and calculating the forward CDS spreads, US Libor rates and the swap rates are taken from Datastream. The term structure of CDS spread is used to calculate expected CDS excess returns and to extract expected credit risk premia. These risk premia are estimated using a single factor model in the spirit of Cochrane and Piazzesi [2005]. The authors compute monthly excess returns of value-weighted quintiles constructed by ranking firms using the distance-to-default (DD) probability (real-world default probability), the firm's 5-years CDS spread (risk-neutral default probability), the firm's CDS forward premia, the firm's realized risk premia, and the firm's expected risk premia. To gain additional insights about firm characteristics and the pricing of credit risk premia in equity portfolio, they also double sort portfolios, first using either size or book-to-market as control variables and subsequently expected credit risk premia.

Results

The results for the distance-to-default and CDS sorted portfolios are quite similar. They suggest that companies with the highest default probability (lowest DD) earn the lowest value-weighted excess returns and the highest DD firms earn the highest. The results for the CDS forward premia sorted portfolios show that firms with highest CDS premia earn higher stock returns than firms with the lowest forward premia. The portfolios sorted by expected risk premia document a monotonic decrease of excess returns on stocks from the portfolio of firms with highest risk premia (P1) to the one with the lowest risk premia (P5). It is interesting to note that, prior to the recession, P1 earns an annualized excess return of 14.5% whereas P5 is –6.9%. This pattern is even more pronounced during the crises with P1 and P5 excess returns of 10.8% and -64.4%, respectively. The double sorted portfolio based on size, book-to-market as control factors, show appealing results. All size portfolios are affected by expected risk premia, however this effect is more pronounced in the small cap stocks. In the book-to-market portfolios the expected risk premia affects more the excess return of the value firms. For the growth firms the excess returns are only marginally significant.

Our take

The relationship between credit risk and equity returns is an intriguing topic in finance. We think this paper examines this issue in a detailed and exhaustive way. The performance of extensive robustness and qualitative checks by the authors ensures that the results look solid not only on a monthly basis, but also on a weekly and daily basis. In our research we have long advocated the use of default probability models – like Merton's model for example – to help avoid danger stocks. This paper suggests useful extensions to such factors.

The relation between equity and default risks has been subject of an intense debate by academics and practitioners.

The term structure of CDS spread is used to calculate expected CDS excess returns and to extract expected credit risk premia.

The authors compute monthly excess returns of value-weighted quintile constructed by ranking firms on measures of default risk, CDS spread and expected risk premia

The results for the distance-to-default and CDS sorted portfolios are quite similar.

The double sorted portfolio based on size, book-to-market as control factors, show appealing results.

We think this paper examines this issue in a detailed and exhaustive way. It could be worth also run this analysis considering different regional indices.

Paper 4: “Risk-based asset allocation: A new answer to an old question?”

- Wai Lee
- *Journal of Portfolio Management*, forthcoming, available at <http://www.ijournals.com/doi/abs/10.3905/jpm.2011.2011.1.015>

Why it’s worth reading

Those who have been following recent trends in the quantitative investing literature will have surely noticed a significant increase in publications focused on risk-based allocation strategies. Investor interest seems to be following closely as many traditional quantitative funds begin to offer products based on some of the more popular versions of these strategies. The most conventional of these strategies is the minimum variance strategy, but a new up-and-comer in this group is risk parity allocation. This strategy simply allocates to the assets such that each has an equal contribution to risk in the portfolio. There are other strategies gaining ground along similar themes ranging from the Most Diversified Portfolio to the more esoteric Equally Weighted Browning Motions Portfolio. This paper describes many of these strategies in some detail and provides a simple but insightful empirical example to highlight some of their characteristics.

Data and methodology

Basically, the paper provides a general description and construction methodology behind four of these risk-allocation strategies: equal weighted, minimum variance, most diversified portfolio and risk contribution (aka risk parity). The paper does not focus on a detailed empirical analysis of any particular strategy; rather it implements each of the strategies to a 10-sector portfolio example and performs a comparison analysis across a few important risk statistics. There is slightly more emphasis on the analysis of the risk parity portfolio, which seems to be the more balanced strategy from both a composition and risk contribution perspective.

Results

A comparison of the 10-sector portfolio example constructed across the various risk-allocation strategies, yields a few interesting results. First the paper finds that the risk-parity strategy tends to be more balanced in its allocation relative to both the Minimum Variance (GMV) and Most Diversified Portfolio (MDP) strategy (this is in the case of the long-only versions of the strategies). A second interesting result is that the implied expected returns across each of the different strategies are very similar, which suggests that the differences between the strategies is indeed along the risk perspective. Another interesting finding is that the long-only versions of the GMV and MDP look no more diversified than the market portfolio when evaluated from a risk contribution perspective. In addition, they find that 90% of the risk across the MDP strategy is concentrated in only 5 of the 10 sectors, which seems very far from a well-diversified portfolio.

Our take

We really liked this paper because it set down all these topical risk-allocation strategies in one place with a good description of their methodology, theoretical underpinnings, and even provides a simple but insightful empirical analysis. We would have liked to see some of the results across the long/short versions of the strategies since these can take very different characteristics than the long-only versions. Indeed, we plan to focus some of our risk and portfolio construction research along a few of these strategies to provide more insight into their compositions and discover some of their advantages and disadvantages, as we did for the minimum variance portfolio strategy.

Risk-based allocation strategies are rapidly gaining ground; this paper provides a good overview of the space

The paper examines four alternative strategies: equally weighted, minimum variance, most diversified portfolio, and risk parity portfolio

An interesting finding is that implied alpha for the four portfolios are similar, which implies the differences are indeed along the risk dimension

This paper is an excellent overview of an increasingly popular and important space

Paper 5: “The Sharpe ratio efficient frontier”

- Marcos M. Lopez de Prado
- SSRN, available at <http://ssrn.com/abstract=1821643>

Why it’s worth reading

The use of the Sharpe ratio as a standard performance measurement assumes returns follow a normal distribution. However, we also know that the returns of many (if not most) portfolios are non-normal². In this paper, the author proposes a new metric called *PSR* (Probabilistic Sharpe ratio), which is easy to calculate and incorporates higher moments in the return distribution. More importantly, it allows us to establish the track record length needed for assessing a strategy’s performance under a certain confidence level.

Data and methodology

After some mathematical manipulations, the *PSR* – with a predefined benchmark Sharpe ratio (SR^*) – is defined as:

$$\hat{PSR}(SR^*) = Z \left[\frac{\left(\hat{SR} - SR^* \right) \sqrt{n-1}}{\sqrt{1 - \hat{\gamma}_3 \hat{SR} + \frac{\hat{\gamma}_4 - 1}{4} \hat{SR}^2}} \right]$$

where Z is the *cdf* of the standard normal distribution. $\hat{PSR}(SR^*)$ increases with greater SR in the original sampling frequency (q), or longer track records (n), or positively skewed returns ($\hat{\gamma}_3$), and it decreases with fatter tails ($\hat{\gamma}_4$).

In practice, we need to estimate four parameters (mean, standard deviation, skewness, and kurtosis) of a strategy’s return time series and pre-specify one additional parameter (i.e., the benchmark Sharpe ratio, SR^*).

Results

The *PSR* approach has three practical applications. First, it can be used as a better performance measurement, taking into account the non-normality in return distribution. Second, it allows us to determine the length of track record required to assess a strategy’s performance at a given confidence level. The author further develops a new portfolio construction technique by building the Sharpe ratio efficient frontier (SEF). As shown in Luo et al. [2011], simply selecting the highest Sharpe ratio portfolio can be suboptimal because of non-normality in returns. The maximum *PSR* portfolio can be preferable.

Our take

We like the probabilistic version of Sharpe ratio, or *PSP*, and plan to add it as an additional performance measurement in our standard strategy backtesting. It would also be interesting to test portfolios constructed using the SEF and compare with other techniques (e.g., maximum Sharpe ratio or MVSK as presented in Luo et al. [2011]). Overall, this paper offers yet more evidence that managing a portfolio purely based on the traditional mean-variance framework is far from ideal. If the financial crisis has taught us one thing, it is that rare events – particularly on the downside – are not so rare at all. This paper offers useful new tools for taking this lesson to heart.

We all know standard performance measures have shortcomings, but what should we use instead?

This paper proposes and interesting new metric called the Probabilistic Sharpe Ratio (PSR)

This new measure gets away from the shortcomings of the traditional mean-variance framework

The PSR is useful because it can help determine the length of track record needed to confidently measure performance

This paper is useful for managers who are looking for better ways to measure performance in a non-normal world

² See detailed discussion in Luo, Y., Cahan, R., Alvarez, M., Jussa, J., and Chen, Z. [2011], “Tail risk in optimal signal weighting”, *Deutsche Bank Quantitative Strategy*, 7 June 2011.

Upcoming conferences

Europe

Figure 1: European event calendar

Date	Location	Conference
16-18 August 2011	Coventry	useR! http://www.warwick.ac.uk/statsdept/user-2011/
17-20 August 2011	Stockholm	38th European Finance Association Annual Meeting https://fisher.osu.edu/blogs/efa2011/
14-18 September 2011	Oxford	London Quant Group Annual Investment Seminar http://www.lqg.org.uk/
25-27 September 2011	Bristol	Inquire UK http://www.inquire.org.uk/
2-4 October 2011	Luxembourg	Inquire Europe http://www.inquire-europe.org/
7-9 November 2011	London	Quant Congress Europe http://www.quantcongresseurope.com/
29 November – 1 December 2011	Paris	Quant Invest 2011 http://www.terrapinn.com/2011/quant-invest/

Source: Deutsche Bank

North America

Figure 2: North American event calendar

Date	Location	Conference
14-15 September 2011	Chicago	CQA Annual Fall Conference 2011 http://www.cqa.org/events/2011/Fall_Conference_2011.php
17-19 October 2011	Toronto	Quant Invest Canada 2011 http://www.terrapinn.com/2011/quant-invest-canada/
19-22 October 2011	Denver	FMA Annual Meeting 2011 http://69.175.2.130/~finman/Denver/
6-8 January 2012	Chicago	American Finance Association Annual Meeting 2012 http://www.afajof.org/association/annualconf.asp

Source: Deutsche Bank

Other papers of interest

Alpha generation and stock-selection signals

News sensitivity and the cross-section of stock returns

- Michal Dzielinski
- SSRN, available at <http://ssrn.com/abstract=1889030>
- Abstract: "The paper is the first one outside the high-frequency domain to use sentiment - signed news to directly compare news and no - news stock returns. This is done by estimating whether returns on positive, neutral and negative news days are significantly different from the average daily return for a large sample of US stocks over the period from January 2003 to August 2010. The general results show that positive news days indeed have above-average returns and negative news days returns are below average, while the neutral news days are economically barely distinguishable from the average. The market also proves to be fast and accurate at pricing new information, as there are no signs of drift shortly after news days. On the contrary, a directionally correct and statistically significant movement can be found on the day before the news day. The cross-sectional analysis reveals significant differences in the strength of market reactions between stocks ranked on size, book-to-market or news coverage. The general results however hold across all sub-samples and are also not driven by earnings announcements or past stock returns. Moreover, the average news sensitivity is itself a priced source of risk. A portfolio of stocks with high sensitivity to news outperforms a portfolio of stocks with low sensitivity by a statistically and economically significant 0.84% per month. This news premium seems to primarily relate to the high impact of news in situations of general uncertainty."

Analysts' earnings forecast, recommendation and target price revisions

- Ronen Feldman, Joshua Livnat, and Yuan Zhang
- SSRN, available at <http://ssrn.com/abstract=1883819>
- Abstract: "This study examines the immediate and delayed market responses to revisions in analyst forecasts of earnings, target prices, and recommendations. Consistent with prior literature, revisions in earnings forecasts are positively and significantly associated with short-term market returns around the revisions. However, we show that short-term market returns around target price revisions and recommendation changes are even stronger. We also find superior future performance (return drift) for portfolios that use information from all three types of revisions to those using information from only one of the three types of revisions."

Analysts' forecasts: What do we know after decades of work?

- Mark Thomas Bradshaw
- SSRN, available at <http://ssrn.com/abstract=1880339>
- Abstract: "Sell-side analysts have been the subject of hundreds of academic studies. In this paper, I offer perspectives on the state of our understanding of analysts based on prior academic research. Additionally, several observations are offered, which question how descriptive certain widely held beliefs are in light of the evidence. These observations on the literature serve as both criticisms and suggestions for future research."

The earnings announcement premium around the globe

- Brad Barber, Emmanuel De George, Reuven Lehavy, and Brett Trueman
- SSRN, available at <http://ssrn.com/abstract=1872183>
- Abstract: "U.S. stocks have been shown to earn higher returns during earnings announcement months than during non-announcement months. We document that this earnings announcement premium exists across the globe. Using data from 46 countries, we find that the average stock return during earnings announcement months exceeds the return during non-announcement months by over 11 percent annually, after controlling for factors known to be associated with stock returns. The positive incremental return during earnings announcement months is not isolated to a few years; it is significant for 16 of the 20 years of our sample period. Moreover, it is not isolated to a few countries. Of the 20 countries with enough data to conduct a within-country analysis, nine exhibit a significantly positive premium. We also document that the premium for the smallest stocks exceeds that for the largest ones, by roughly 6 percent annually. As to potential explanations for the premium, we find evidence of an increase in the attention paid to firms around the time of earnings releases, creating upward pressure on stock prices. However, there is no evidence that higher levels of systematic or idiosyncratic risk around the time of earnings releases is a significant driver of the premium."

REIT performance and lines of credit

- David Harrison, Kimberly Luchtenberg, and Michael Joseph Seiler
- SSRN, available at <http://ssrn.com/abstract=1868598>
- Abstract: "Using a sample of equity REITs traded on major U.S. exchanges between 1990 and 2009, we investigate the relationship between REIT line of credit usage and subsequent firm profitability. Our results, which are robust across multiple accounting measures of firm operating performance, indicate enhanced liquidity is strongly associated with better firm performance. Furthermore, the benefits of enhanced liquidity appear to be strongest for those firms identified as being capital constrained. These results also provide insight into, and a rational economic justification for, the previously documented positive borrower wealth effects associated with bank loan announcements."

Optimization, portfolio construction, and risk management

Tracking portfolio optimization

- Valenty Khokhlov
- SSRN, available at <http://ssrn.com/abstract=1874646>
- Abstract: "This article introduces a new approach to the tracking portfolio composition. Unlike traditional approaches, it doesn't require benchmark composition to be known and works on any sets of assets. Models presented in the article allow deriving a portfolio composition that results in the optimal value of a tracking performance indicator for the given sets of assets. An S&P 500 tracking portfolio composed of 16 arbitrary selected blue chip stocks generated with the models had in 2010 the annualized TEV of about 4%. Tracking accuracy is significantly affected by frequency of rebalancing and number of assets in portfolio for ex-post tests. Ex-ante tests during the same time period show lower tracking accuracy with the annualized TEV of about 4.4% for the same portfolio, and indicate no benefit in frequent rebalancing."

Stock market crashes in 2007-2009: Were we able to predict them

- Sebastien Lleo and William Ziemba
- SSRN, available at <http://ssrn.com/abstract=1884081>
- Abstract: "We investigate the stock market crashes in China, Iceland, and the US in the 2007-2009 period. The bond stock earnings yield difference model is used as a prediction tool. Historically, when the measure is too high, meaning that long bond interest rates are too high relative to the trailing earnings over price ratio, then there usually is a crash of 10% or more within four to twelve months. The model did in fact predict all three crashes. Iceland had a drop of fully 95%, China fell by two thirds and the US by 57%."

FIX – The fear index: Measuring market fear

- Jan Dhaene, Julia Dony, Monika Forys, Daniel Linders, and Wim Schoutens
- SSRN, available at <http://ssrn.com/abstract=1888335>
- Abstract: "In this paper, we propose a new fear index based on (equity) option surfaces of an index and its components. The quantification of the fear level will be solely based on option price data. The index takes into account market risk via the VIX volatility barometer, liquidity risk via the concept of implied liquidity, and systemic risk and herd-behavior via the concept of comonotonicity. It thus allows us to measure an overall level of fear (excluding credit risk) in the market as well as to identify precisely the individual importance of the distinct risk components (market, liquidity or systemic risk). As a side result we also derive an upperbound for the VIX."

Hedging risk spillovers in international equity portfolios

- Matteo Bonato, Massimiliano Caporin, and Angelo Ranaldo
- SSRN, available at <http://ssrn.com/abstract=1887624>
- Abstract: "By defining risk spillover as the transmission of return variances and covariances from one asset to another, we propose a flexible model to perform various hedging strategies in an international equity portfolio. According to the risk management strategy, the portfolio risk is seen as a specific combination of realized variances / covariances based on high frequency data. Of particular interest are the risk spillovers of equities within the same sector (sector spillover) and from currencies to international equities (currency spillover). The forecasting analysis shows that hedging only sector and currency spillovers rather than full hedging is viable both in economic and statistical terms."

Asset allocation and sector/style rotation

Credit-informed tactical asset allocation

- David Klein
- SSRN, available at <http://ssrn.com/abstract=1872163>
- Abstract: "This paper outlines a tactical asset allocation (TAA) strategy that takes signals from the credit markets and applies them to the stock market. A power model is built using the Russell 2000 equity index and the Bank of America/Merrill Lynch High Yield B index. This model is then used in a tactical asset allocation strategy to judge whether equities are expensive or cheap relative to high yield bonds. Based on back-test results from 1997 to the present, the approach provides equity-like returns while lowering portfolio volatility."

When do improved covariance estimators enhance portfolio optimization? An empirical comparative study of nine estimators

- Ester Pantaleo, Michele Tumminello, Fabrizio Lillo, and Rosario Mantegna
- *Quantitative Finance*, Volume 11, Issue 7, available at <http://www.tandfonline.com/doi/abs/10.1080/14697688.2010.534813>
- Abstract: "The use of improved covariance matrix estimators as an alternative to the sample estimator is considered an important approach for enhancing portfolio optimization. Here we empirically compare the performance of nine improved covariance estimation procedures using daily returns of 90 highly capitalized US stocks for the period 1997–2007. We find that the usefulness of covariance matrix estimators strongly depends on the ratio between the estimation period T and the number of stocks N , on the presence or absence of short selling, and on the performance metric considered. When short selling is allowed, several estimation methods achieve a realized risk that is significantly smaller than that obtained with the sample covariance method. This is particularly true when T/N is close to one. Moreover, many estimators reduce the fraction of negative portfolio weights, while little improvement is achieved in the degree of diversification. On the contrary, when short selling is not allowed and $T > N$, the considered methods are unable to outperform the sample covariance in terms of realized risk, but can give much more diversified portfolios than that obtained with the sample covariance. When $T < N$, the use of the sample covariance matrix and of the pseudo-inverse gives portfolios with very poor performance."

Does information content of options prices add value for asset allocation?

- Vladimir Zdrovenin and Jacques Pezier
- SSRN, available at <http://ssrn.com/abstract=1881738>
- Abstract: "The aim of this paper is to determine whether forward-looking option-implied returns forecasts lead to better out-of-sample portfolio performance than conventional time series models. We consider a simple two-asset setting with a risk-free asset and the S&P 500 index the risky asset with monthly allocation revisions. We carry out a comprehensive analysis with a wide range of time-series models, two risk-neutral density inference methods, two utility functions, and several performance metrics. Portfolios are compared over the period of January 1994 to April 2010. Our main contribution is to compare the merits of implied volatility smoothing and maximum entropy risk-neutral density estimation techniques. By using bid/ask quotes in place of the closing prices, we obtain smooth probability densities using the maximum entropy principle that outperform the probability densities obtained using the implied volatility smoothing method. We also identify which moments of the option-implied probability densities contribute most to portfolio performance."

Volatility behavior and structure of dependence between commodity futures and stocks

- Lin Gao and Lu Liu
- SSRN, available at <http://ssrn.com/abstract=1872523>
- Abstract: "This paper finds substantial risk diversification potential between certain commodity groups and stocks by exploring the dependence between their regime shifts patterns. None of the commodity groups share a common volatility regime with stocks, nor are regime switching patterns of grains, industrials, metals, or softs dependent on that of stocks. Moreover, due to their quick supply adjustment, most commodity futures exhibit shorter durations and lower frequencies of the volatile regimes compared to stocks. In addition, in spite of financial contagion, animals, grains, and softs typically demonstrate very low correlations with stocks even in the mutual volatile regime."

REITS and underlying real estate markets: Is there a link?

- Andrey Pavlov and Susan Wachter
- SSRN, available at <http://ssrn.com/abstract=1879968>
- Abstract: "This paper utilizes the Carlson, Titman, and Tiu (2010) model of REIT returns to estimate the strength of the relationship between REIT and underlying real estate returns. Our work further offers an innovative method for computing the returns of the real estate properties underlying each REIT using the Moody's/REAL commercial property price indices by region and property type. We find a statistically significant relationship between REIT and real estate returns only in the office sector. Other property types offer only very weak and insignificant relationships. This finding suggests that direct real estate investment or investment through the property price index derivatives cannot be replicated using REITs."

Trading and market impact

Algorithmic trading usage patterns and their costs

- Ian Domowitz and Henry Yegerman
- *Journal of Trading*, Volume 6, Number 3, available at <http://www.ijournals.com/doi/abs/10.3905/jot.2011.6.3.009>
- Abstract: "Using algorithmic trading data across seven strategy types over 2009 and 2010, we examine usage patterns and performance for a sample of buy-side firms served by a multiplicity of brokers. Strategy usage is categorized by demand for liquidity, volatility, and concentration of orders traded. The data suggest employment of dominant strategies for the majority of firms, and shifts in strategy use are marginal across time and market conditions. In terms of performance, dominant strategies constitute a sensible approach at two ends of a spectrum: for easy orders and for situations that are extremely demanding in terms of liquidity and volatility. Performance matters, but does not distinguish individual strategy types in either regime. In all other circumstances, strategy shifts are possible and potentially profitable, given performance differences."

Is the trading of inverse ETFs a bearish signal?

- Benjamin Blau and Tyler Brough
- *Journal of Trading*, Volume 6, Number 3, available at <http://www.ijournals.com/doi/abs/10.3905/jot.2011.6.3.032>
- Abstract: "In this study, we examine the trading activity of inverse ETFs in an attempt to explain whether inverse ETF volume contains bearish information about future market prices. Our two main results are, first, inverse ETF trading activity occurs after periods of negative returns suggesting that traders of those funds are not contrarian traders and are instead momentum traders. Second, we find that inverse ETF trading activity does not contain any predictive ability about future index price movements. Combined with our first finding, the second result indicates that there is little, if any, information contained in the trading of inverse ETFs. These conclusions hold when we condition on whether the ETF is leveraged and unleveraged."

Informed trading in dark pools

- Mahendrarajah Nimalendran and Sugata Ray
- SSRN, available at <http://ssrn.com/abstract=1880070>
- Abstract: "Using a proprietary high frequency data set, we examine the information in trades originated by different types of traders. We find that the prevalence of informed trading in crossing networks is highest for illiquid stocks traded using algorithms against members of the crossing network, as measured by increased spreads and price impact measures on the quoting exchanges following crossing network transactions. Signed trades on the crossing networks for this particular subset of firms also show the highest momentum going forward over the next 15 to 120 minutes. In contrast, trades for liquid stocks, trades by the crossing network brokerage desk, and members trading large blocks in negotiated crosses contain less information. These results suggest that while crossing networks provide a venue for large block trades to transact with little price impact, they also provide a venue for informed traders to trade, and this information appears to also spill over and provide price discovery on the quoting exchanges."

Market liquidity: Does insider trading matter?

- Chrisoph Rosch and Christoph Kaserer
- SSRN, available at <http://ssrn.com/abstract=1885014>
- Abstract: "We examine the impact of reported insider trading on market liquidity, as measured by an order-size-dependent volume-weighted spread measure, which is called Xetra liquidity measure (XLM). This relationship is scrutinized for the German market both

in an event study framework and through a panel data analysis. Overall, we see that insiders seem to trade on days that are very active, most likely to hide their information based trading in higher trading volumes. We discover that the liquidity impact of an insider transaction is highly dependent on the type of the transaction. Insider purchases impair market liquidity on and after the day of the insider transaction, whereas insider sales improve market liquidity on and after the day of the insider transaction. This liquidity impact is due to informational effects as uniformed market participants price protect against the adverse selection generated by informed investors. Uniformed market participants proxy the level of information asymmetry induced by insiders by the share of insider ownership. Hence, the price protection is therefore reflected in the market liquidity on and after the day of insider purchases. As a consequence insider sales therefore alleviate the information asymmetry as the share of insider holdings is decreased and therefore market liquidity is improved on and after the day of insider sales.”

Finance theory and techniques

The aggregate earnings-return relationship: A global perspective

- Andrew Vivian and Xiaoquan Jiang
- SSRN, available at <http://ssrn.com/abstract=1787332>
- Abstract: "This article examines the relationship between aggregate earnings and returns (ERC) in a global context. We examine a broad international sample of countries which encompass markets with different levels of stock market development, shareholder protection and legal origin. Recent literature finds a puzzlingly negative relationship between aggregate earnings and aggregate returns in the US (Kothari, Lewellen and Warner, 2006; Sadka and Sadka, 2009). Our first main finding is that this puzzlingly negative relationship is not universal. The relationship between aggregate earnings and each return component (Campbell, 1991) is examined. Empirical results suggest each of these three components play a role in explaining the overall ERC. In particular, we find that cash flow news and discount rate news are both individually important determinants of the earnings-return relationship but they generally offset each other. The expected earnings-return relation also contributes to the aggregate earnings-return coefficient; this effect varies substantially across countries. The dispersion of aggregate ERC across countries is weakly associated with stock market development, shareholder protection and legal origin."

Beyond the disposition effect: Do investors really like realizing gains more than losses?

- Itzhak Ben-David and David Hirshleifer
- SSRN, available at <http://ssrn.com/abstract=1876594>
- Abstract: "The disposition effect (greater realization of winners than losers) is often taken as proof that investors have an inherent preference for realizing winners over losers. In contrast, we find that the disposition effect is not primarily driven by realization preference. The probability of selling as a function of profit is V-shaped, so that at short holding periods investors are much more likely to sell big losers than small ones. There is little indication of a jump discontinuity in selling probability at zero profits, as implied by an investor concern for the sign of realized returns. In a placebo test, there is a reverse disposition effect for the probability of buying additional shares. The speculative motive for trade potentially helps explain these findings."

Econophysics review I: Empirical facts

- Anirban Chakraborti, Ioane Muni Toke, Marco Patriarca, and Frederic Abergel
- *Quantitative Finance*, Volume 11, Issue 7, available at <http://www.tandfonline.com/doi/abs/10.1080/14697688.2010.539248>
- Abstract: "This article and the companion paper aim at reviewing recent empirical and theoretical developments usually grouped under the term Econophysics. Since the name was coined in 1995 by merging the words 'Economics' and 'Physics', this new interdisciplinary field has grown in various directions: theoretical macroeconomics (wealth distribution), microstructure of financial markets (order book modeling), econometrics of financial bubbles and crashes, etc. We discuss the interactions between Physics, Mathematics, Economics and Finance that led to the emergence of Econophysics. We then present empirical studies revealing the statistical properties of financial time series. We begin the presentation with the widely acknowledged 'stylized facts', which describe the returns of financial assets—fat tails, volatility clustering, autocorrelation, etc.—and recall that some of these properties are directly linked to the way 'time' is taken into account. We continue with the statistical properties observed on order books in financial markets. For the sake of illustrating this review, (nearly) all the stated facts are reproduced using our own high-frequency financial database. Finally, contributions to the study of correlations of assets such as random matrix theory and

graph theory are presented. The companion paper will review models in Econophysics from the point of view of agent-based modeling.”

Econophysics review II: Agent-based models

- Anirban Chakraborti, Ioane Muni Toke, Marco Patriarca, and Frederic Abergel
- *Quantitative Finance*, Volume 11, Issue 7, available at <http://www.tandfonline.com/doi/abs/10.1080/14697688.2010.539249>
- Abstract: “This article is the second part of a review of recent empirical and theoretical developments usually grouped under the heading Econophysics. In the first part, we reviewed the statistical properties of financial time series, the statistics exhibited in order books and discussed some studies of correlations of asset prices and returns. This second part deals with models in Econophysics from the point of view of agent-based modeling. Of the large number of multi-agent-based models, we have identified three representative areas. First, using previous work originally presented in the fields of behavioral finance and market microstructure theory, econophysicists have developed agent-based models of order-driven markets that we discuss extensively here. Second, kinetic theory models designed to explain certain empirical facts concerning wealth distribution are reviewed. Third, we briefly summarize game theory models by reviewing the now classic minority game and related problems.”

Put-call parity violations and return predictability: Evidence from the 2008 short sale ban

- George Nishiotis and Leonidas Rompolis
- SSRN, available at <http://ssrn.com/abstract=1884119>
- Abstract: “Using the put-call parity no-arbitrage relation we empirically investigate the link between stock and options markets for the period around the 2008 short sale ban in the US. We document a significant increase in the magnitude of put-call parity violations in the direction of short sale constraints during the ban period relative to both the pre- and post-ban periods. More importantly, we find that the magnitude of these put-call parity violations is a significant predictor of stock returns during the short selling ban period. A portfolio formed on the trading signal that the put-call parity violation is in the top 10% quintile under performs the financial sector index by an average of 3.5% on a daily basis during the ban period. We also show that the short sale ban period is characterized by a rapidly increasing stock implied volatility and higher options market bid-ask spreads, which are accompanied by higher trading volume and open interest. The ratio of put to call open interest increases during the ban period and peaks in the post-ban period, consistent with an increase in the demand for puts relative to calls. Our findings indicate that the implementation of the short sale ban is associated with a decoupling of the stock and options markets, resulting in unintended and undesirable market inefficiencies.”

Bayesian model averaging in multi-factor markets

- Markus Franke
- SSRN, available at <http://ssrn.com/abstract=1869047>
- Abstract: “The Bayesian mechanism can be applied to update information on return forecasts derived from multi-factor models. An out-of-sample backtest reveals distinct features of Bayesian model averaging for return forecasting: (1) the methodology accounts for model uncertainty and estimation risk; (2) the model is flexible enough to incorporate information from different factor models; (3) prior information on factor returns can be incorporated. A comparison of forecast errors of Bayesian model averaging versus non-Bayesian methods reveals that Bayesian versions of the tested models are more precise in terms of predictive performance.”

Do corporate bond rating revisions convey information about earnings?

- Steven Anderson, Gurmeet Bhabra, Harjeet Bhabra, and Asjeet Lamba
- SSRN, available at <http://ssrn.com/abstract=1878254>
- Abstract: "We study the information content that corporate bond rating revisions convey regarding future earnings. Consistent with previous findings, we find that rating downgrades are associated with negative abnormal stock returns, while rating upgrades appear to be nonevents. For rating downgrades, earnings decline in the two years prior to and in the year of the rating downgrade announcement but increase in the year following the rating downgrade. While rating upgrades follow a period of rising earnings, they do not signal any increase in future earnings. These results, in conjunction with our multivariate regression results, indicate that rating agencies respond more to permanent changes in cash flows and provide little information, if any, about future cash flows."

The three-pass regression filter: A new approach to forecasting using many predictors

- Brian Kelly and Seth Pruitt
- SSRN, available at <http://ssrn.com/abstract=1868703>
- Abstract: "We forecast a single time series using many predictor variables with a new estimator called the three-pass regression filter (3PRF). It is calculated in closed form and conveniently represented as a set of ordinary least squares regressions. 3PRF forecasts converge to the infeasible best forecast when both the time dimension and cross section dimension become large. This requires only specifying the number of relevant factors driving the forecast target, regardless of the total number of common (and potentially irrelevant) factors driving the cross section of predictors. We derive inferential theory in the form of limiting distributions for estimated relevant factors, predictive coefficients and forecasts, and provide consistent standard error estimators. We explore two empirical applications that exemplify the many predictor problem: Forecasting macroeconomic aggregates with a large panel of economic indices, and forecasting stock market aggregates with many individual assets' price-dividend ratios. These, combined with a range of Monte Carlo experiments, demonstrate the 3PRF's forecasting power."

Liquidity, liquidity risk and the cross section of mutual fund returns

- Andrew Lynch
- SSRN, available at <http://ssrn.com/abstract=1874128>
- Abstract: "This paper examines the impact of liquidity and liquidity risk on the cross-section of mutual fund returns. I find that funds with the most illiquid equity holdings outperform those with the most liquid holdings by as much as 4.44 percent annually. While funds with high liquidity beta only marginally outperform those with low liquidity beta, this outperformance is significantly stronger after excluding periods of extreme market illiquidity. A one standard deviation increase in liquidity beta increases annualized fund returns by as much as 2.04 percent. Testing the two liquidity effects jointly reveals that both independently influence fund returns. Overall, I find that the liquidity level and liquidity risk of fund holdings are both important determinants of mutual fund returns."

Ambiguous language in analyst reports

- Gus Franco, Ole-Kristian Hope, Dushyantkumar Vyas, and Yibin Zhou
- SSRN, available at <http://ssrn.com/abstract=1873424>
- Abstract: "Using an extensive database of 356,463 sell-side equity analysts' reports from 2002 to 2009, this study is one of the first to analyze the readability of analysts' reports. We first test the relation between analysts' report readability and stock trading volume reactions and then analyze the determinants of variation in report readability. We find that trading volume reactions are increasing in the readability of analysts' text, consistent with theoretical models that predict that more precise information (and hence more

informative signals) causes investors to initiate trades. Second, we show that reports are more readable when issued by “high-ability” analysts. Last, our tests provide little support for the idea that report readability is less important for institutional investors. These results support the notion that the readability of analysts’ reports is important to analysts and capital market participants.”

Benchmarking low-volatility strategies

- Pim Van Vliet and David Blitz
- SSRN, available at <http://ssrn.com/abstract=1873985>
- Abstract: “In this paper we discuss the benchmarking of low-volatility investment strategies, which are designed to benefit from the empirical result that low-risk stocks tend to earn high risk-adjusted returns. Although the minimum-variance portfolio of Markowitz is the ultimate low-volatility portfolio, we argue that it is not a suitable benchmark, as it can only be determined with hindsight. This problem is overcome by investable minimum-variance strategies, but because various approaches are equally effective at minimizing volatility it is ambiguous to elevate the status of any one particular approach to benchmark. As an example we discuss the recently introduced MSCI Minimum Volatility indices and conclude that these essentially resemble active low-volatility investment strategies themselves, rather than a natural benchmark for such strategies. In order to avoid these issues, we recommend to simply benchmark low-volatility managers against the capitalization-weighted market portfolio, using risk-adjusted performance metrics such as Sharpe ratio or Jensen’s alpha.”

Derivatives and volatility

Implied volatility surface: Construction methodologies and characteristics

- Cristian Homescu
- SSRN, available at <http://ssrn.com/abstract=1882567>
- Abstract: "The implied volatility surface (IVS) is a fundamental building block in computational finance. We provide a survey of methodologies for constructing such surfaces. We also discuss various topics which can influence the successful construction of IVS in practice: arbitrage-free conditions in both strike and time, how to perform extrapolation outside the core region, choice of calibrating functional and selection of numerical optimization algorithms, volatility surface dynamics and asymptotics."

The implied volatility of ETF and index options

- Stoyu Ivanov, Jeff Whitworth, and Yi Zhang
- SSRN, available at <http://ssrn.com/abstract=1879583>
- Abstract: "We examine the option-implied volatility of the three most liquid ETFs (Diamonds, Spiders, and Cubes) and their respective tracking indices (Dow 30, S&P 500, and NASDAQ 100). We find that volatility smiles for ETF options are more pronounced than for index options, primarily because deep-in-the-money ETF options have considerably higher implied volatility than deep-in-the-money index options. The observed difference in implied volatility is not due to a difference between the realized return distributions of the underlying ETFs and indices. Differences in implied volatility for ETF and index options also do not appear to be explained by discrepancies in net buying pressure, as theorized by Bollen and Whaley (2004)."

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 discussed on page 10 herein and after 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: This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act.

EU countries: Disclosures relating to our obligations under MiFiD can be found at <http://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. 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" is specifically designated in the name of the entity.

New Zealand: This research is not intended for, and should not be given to, "members of the public" within the meaning of the New Zealand Securities Market Act 1988.

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.

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 © 2011 Deutsche Bank AG**