Deutsche Bank

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Academic Insights

Harnessing the best ideas from academia

Welcome to our monthly Academic Insights report

Fresh insights from academia

Quantitative investors are, quite rightly, obsessed with data. Indeed the search for new and hopefully uncorrelated alpha sources has become one of the most frequently cited responses to the challenges quant managers have faced over the past few years. However, genuinely new data sources are few and far between. With this in mind, an interesting paper this month shows that often the key is not to find new data, but to become smarter in how we use the data we have. By harnessing new modeling techniques that go beyond the linear models that permeate our industry, one can often find new alpha in old data.

Another intriguing paper tackles the puzzling relationship between risk and return. Finance theory notwithstanding, empirical studies find time and time again that stocks with *lower* risk actually outperform on average. However, in this research the authors show that correlation on the downside is positively priced, i.e. investors want to be compensated for the risk that their stocks fall at the same time as everything else.

Key papers this month

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

- Nonlinear support vector machines can systematically identify stocks with high and low future returns
- Market cycles and the performance of relative-strength strategies
- Volatility strategies for global and country specific European investors
- Hybrid tail risk and expected stock returns: When does the tail wag the dog?
- Short interest vs. short selling

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 (p. 10ff) 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.

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Introduction

Welcome to *Academic Insights*

Finding new data sources is exciting; but the breadth of this pursuit is limited

Most quants, us included, have something of an obsession with finding new and uncorrelated sources of information. Call it the Holy Grail of quantitative research. Indeed, the papers that seem to get the most interest are inevitably those that dramatically pull back the curtain on an exciting new database. Trawling through the old CRSP/Compustat/Worldscope database for some sliver of overlooked alpha is not nearly as much fun as diving into something brand new and wholly unexplored.

Using new modeling techniques, even with old data, can often yield surprising returns

New models for old data

Alas, genuinely new data sources are few and far between. However, that doesn't mean one is consigned to backtesting the same old fundamental factors ad infinitum. An interesting new paper by Huerta, Corbacho, and Elkan [2011] shows that often the trick to finding new alpha is not to change the data, but instead to change the model. The authors propose the use of Support Vector Machines (SVM) as a way of harnessing traditional data sets like fundamental and technical factors. This is an intriguing idea, because it continues a shift away from the traditional, linear models that have always been a staple of the academic (think Fama-French) and practitioner (think the standard multifactor model) research.[1]

Momentum works best within-regime, not cross-regime

Momentum has momentum

Last month we reviewed three momentum papers, and this month we continue that trend. Stivers and Sun [2011] analyze the performance of momentum strategies in the context of market regimes, and find that momentum strategies work best when both the formation and trading period are within the same regime, rather than across regimes. It is precisely this difficulty around turning points that led us to propose a dynamic methodology for switching between longer-term and shorter-term momentum in our own research.[2]

One of the puzzles of finance is the negative empirical relationship between risk and returns; this paper finds a risk metric that is priced in the theoretical positive direction

When does the tail wag the dog?

Another topic that has been getting a lot of attention recently is the puzzling relationship between risk and return. As we all know, classic finance theory posits that investors should demand higher returns to compensate them for taking on higher risk; hence we should see a positive relationship between risk and future returns. However, time and time again empirical studies find the opposite, i.e., *lower* risk stocks outperform on average. A recent paper by Bali, Cakici, and Whitelaw [2011] sheds some new light on this conundrum. In their research, the authors find that a risk metric they call the Hybrid Tail Covariance (H-TCR) is in fact priced in the expected positive direction. The H-TCR essentially measures the correlation of a stock to the market, but only in the extreme negative tail of returns. In other words, the authors argue that the "risk" that investors care about is the chance that their assets will be highly correlated with the market when it is falling. With the ongoing turmoil in financial markets, most of us can probably sympathize with the idea that investors want extra returns for the risk of having everything in their portfolio plunge at the same time.

For the rest of this month's papers, please read on. As always, we welcome your feedback.

Regards,
The Deutsche Bank Equity Quantitative Strategy Team

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[1] See, for example, our review of Verbeist [2011] in last month's edition of *Academic Insights*.

[2] Alvarez et al., 2011, "Signal Processing: Reviving momentum – Mission impossible?", *Deutsche Bank Quantitative Strategy*, 6 July 2011

Five key papers this month

Paper 1: "Nonlinear support vector machines can systematically identify stocks with high and low future returns"

- Ramon Huerta, Fernando Corbacho, and Charles Elkan
- SSRN, available at http://ssrn.com/abstract=1930709

The use of machine learning methods to predict the stock returns is an interesting topic in quant area.

Why it's worth reading

Machine learning methods continue to be an interesting and popular topic in the quantitative arena. With more data availability and greater computational power, the interest surrounding machine learning methods and their efficacy in stock return prediction are gaining even greater attention. In this paper, the authors explore whether an interesting machine learning technique named Support Vector Machines (SVM) can exploit features in accounting and historical price information to help predict relative stock returns. The answer is affirmative; the authors show that SVM can be used effectively to build sector specific stock-selection models based on fundamental and technical factors. In addition, the paper demonstrates how to specify a stock selection problem as a classification problem, which provides a useful framework for future study.

This paper uses SVM (Support Vector Machines) to classify the stock returns, and rank the stock according to the output of the classifier. Build a portfolio strategy by longing the highest ranked stocks and short the lowest ranked stocks.

Data and methodology

This paper uses data from the merged CRSP/COMPUSTAT database ranging from 1981 to 2010, and applies three filters based on liquidity, volume and price to form a set of tradable stocks. The author first classifies the universe into two categories: stocks with positive returns and negative returns. The SVM classifier is then trained on the group of stocks whose volatility-adjusted returns fall in the highest and lowest quintiles; while the evaluation for future stock selection runs over all tradable stocks. The *features* – the main ingredient in the SVM technique – comprise both technical data related to historical price information, and fundamental data related to accounting data. Portfolios are constructed by going long the highest ranked stocks and short the lowest ranked stocks based on the ranking determined by the SVM classifier output. One SVM classifier is trained every month on each sector and uses the latest data in order to adjust to changing market conditions. Each sector portfolio is subsequently tested out of sample and the authors are careful to avoid look-ahead bias.

The strategy achieved high Sharpe ratios for different sectors, it has an excess return over 13% with standard deviation of 8%. In addition, the correlation of the portfolio with the S&P 500 index is almost 0.

Results

The author implements the SVM on eight different sectors, resulting in portfolios with 30 long and 30 short positions. After accounting for realistic constraints on trading, all the sector portfolios show positive performance with Sharpe ratios ranging between 1 and 2. When combining all the sectors, the strategy has an excess return exceeding 13% with a standard deviation of only 8%. The authors also find that the performance of the technical features is more effective than fundamental features, and the best performance is achieved for the joint features. Finally, it is worthwhile to note that the correlation of the portfolio with the S&P 500 index is negligible.

Our take

This article provides an interesting machine learning technique that we find can be useful in future signal development – especially for sector specific models. We are eager to test this technique across our proprietary factor database, which consists of technical, fundamental and other alternative signals. We would also be interested in comparing SVM to other machine learning techniques that we have analyzed in the prior research.

Paper 2: "Market cycles and the performance of relative-strength strategies"

- Chris Stivers and Licheng Sun
- SSRN, available at http://ssrn.com/abstract=1940148

This paper analyzes the traditional momentum strategy in the context of market regime states.

Why it's worth reading

This paper takes a state-contingent approach to analyze relative-strength strategies (better known as medium-term momentum and long-term reversal) and their relationship with the trading horizon. Looking at the traditional momentum strategy in the context of market cycles not only assists us in understanding better the inherent rationale of why (or why not) it may work at different points, but also agrees with our view that the alpha from conventional quant strategies may come from more sophisticated timing.

Data and methodology

The authors first argue analytically that in a two-state market framework, relative-strength strategies' profit can be attributed to three sources: (1) the cross-sectional variance of unconditional expected returns, (2) the cross-sectional variance of regime-mean differences, and (3) the regime transition probabilities. They focus particularly on the second source and demonstrate empirically that relative-strength performance is largely conditional on regime.

An up-market (down-market) state is defined by a 15% move of the cumulative gross return from the previous trough (peak).

The data in the empirical section contains the U.S. individual stock returns from CRSP as well as industry-level data of the 30 value-weighted industry portfolios. A percentile-based measure is employed: individual stocks are ranked into deciles based on their previous ranking-period returns, and equally-weighted decile portfolios are formed. The strategy takes a long position in the previous winners and a short position in the previous losers, and holds for a horizon equivalent to the ranking period. To categorize an up-market or down-market state, they calculate the cumulative gross return of the CRSP value-weighted stock index, and once the cumulative return grows (declines) from the previous trough (peak) by more than 15%, they define the state to be up-market (down-market).

The authors show that relative-strength strategies' performance is substantially higher if ranking and trading periods are within the same state, while much lower if they are across-state.

Results

There are three main results in this paper. First, the relative-strength strategies' profit decreases in the length of the ranking and trading horizons; second, the reason for this negative relationship lies in the fact that the market regime is more inclined to switch whilst longer horizon holding periods are in operation. The authors show that relative-strength performance is substantially higher if ranking and trading periods are within the same state, rather than across-state. Returns are especially low when the market is moving into or out of a recession. Third, the cross-sectional return dispersion serves as a leading indicator of the market state in the sense that it tends to be high around bear markets and market transitions. Therefore, a higher cross-sectional dispersion is usually followed by lower relative-strength payoffs.

We would have liked to see more leading indicators being utilized to forecast a change-in-regime.

Our take

The result that relative-strength strategies work better within-state than across-state is intuitive; however, the time of switching is hard to predict. The authors suggest cross-sectional return dispersion to be a leading indicator of the transition point. However, this seems to be more pertinent for longer holding periods.[3] We would have liked to see more leading indicators being utilized to forecast a change-in-regime like implied volatility, the variance risk premium, or leading macroeconomic indicators.

[3] In our research we use cross-sectional dispersion in style factors to try and aid with identification of turning points (see Mesomeris S., Kassam A., Salvini M. and Avettand-Fenoel J.-R., "Introducing Quantitative Musing", *Deutsche Bank Quantitative strategy*, 8 February 2011)

Paper 3: "Volatility strategies for global and country specific European investors"

- Marie Briere, Jean-David Fermanian, Hassan Malongo, and Ombretta Signori
- SSRN, available at: http://ssrn.com/abstract=1945703

Volatility strategies have been exploited in the last few years by investors.

Why it's worth reading

Volatility strategies have been exploited in the last few years by investors. Due to the negative correlation between volatility and equity returns, adding the volatility asset to an equity portfolio could be a simple portfolio construction strategy to achieve long-term returns. The authors test one of the simplest ways to get exposure to volatility: investing in implied volatility futures such as VIX or VSTOXX futures. While the situation of the U.S. investor has been extensively investigated, the authors focus their attention to the European case.

The authors consider a European investor willing to have an exposure to volatility on his equity portfolio.

Data and methodology

The analysis covers the period between January 1999 and December 2010. The authors use the MSCI EMU Index for the European equity index and specific MSCI country indices for France, Germany, Portugal, Ireland, Greece, and Spain. The underlying futures used to implement the volatility strategy are the third next to expire VSTOXX and VIX futures contracts. The monthly prices of the equity and of the volatility indices are provided by Bloomberg and Datastream. The authors consider a European investor willing to have an exposure to volatility on his equity portfolio. The investor systematically hedges his equity risk by using futures on implied volatility. The log volatility strategy consists of rolling monthly the third nearest futures contract and it is investigated using both the VIX and the VSTOXX futures. The allocation between equity and volatility is computed by minimizing the Modified CVaR at the 95% threshold.

In the case of the European equity index, allocating around 45% of the portfolio to the long volatility strategies (45.47% for the VSTOXX and 42.77%) reduces more than half the modified CVaR of the equity-only portfolio.

Results

The results of the analysis look quite interesting. In the case of the European equity index, allocating around 45% of the portfolio to the long volatility strategies (45.47% for the VSTOXX and 42.77% for VIX) reduces more than half the modified CVaR of the equity-only portfolio. Moreover, both portfolios have much more attractive annualized returns (5.94% VSTOXX and 4.72% VIX) than the equity-only portfolio (1.76%). These results also highlight that while both volatility strategies are attractive for hedging a strategic equity exposure, the volatility strategy based on the VSTOXX futures offers better protection for a European investor than a similar strategy based on the VIX futures. In the single country case, the results are consistent with the previous one. The equity-VSTOXX country portfolios have much higher annualized returns than the equity-VIX country portfolios. For instance, in cases like Greece and Ireland, adding a VSTOXX strategy makes the portfolio's performances positive (1.07% and 0.01% respectively), whereas the inclusion of the VIX is not sufficient to counterbalance the strong negative performances of these equity markets (-7.16% and -9.97% respectively).

This research is a very good example on how a quant analyst could combine financial theory with the practical component.

Our take

We think this paper is very interesting, for three main reasons. First of all, it covers this important topic from the European investor perspective and this is something new in the academic literature. Second, the authors take into account the rolling costs in the analysis therefore the results are very solid. Last but not least, this research is a very good example of how a quant analyst could combine financial theory with the practical component.

Paper 4: "Hybrid tail risk and expected stock returns: When does the tail wag the dog?"

- Turan Bali, Nusret Cakici, and Robert Whitelaw
- SSRN, available at http://ssrn.com/abstract=1938606

The negative relationship between idiosyncratic risk and future stock returns is well documented, but contrary to classic finance theory

Why it's worth reading

This paper coincides with a few of our recently reviewed papers and our own research[4]. While the negative relationship between idiosyncratic risk and future stock returns is well documented and understood, it is contradictory to classic finance theory. This paper seems to suggest that the tail co-movement with the market is what really should be positively priced in and rewarded. The intuition is that most individual investors tend to hold a portfolio comprising two components: 1) a few concentrated positions; plus 2) a well-diversified portfolio, e.g., market index ETFs or diversified mutual funds. For these investors, therefore, the most important risk is the correlation with the market when the few stocks they own fall sharply (and the market also falls at the same time).

This paper shows that what investors really care about is co-movement in the negative tail, i.e. they view stocks that have a high correlation with the market when the market is falling as more risky

Data and methodology

The authors analyzed stocks listed on NYSE/AMEX/NASDAQ from July 1963 to December 2009 using from CRSP (with some simple liquidity filters). The authors first calculate three risk metrics: systematic, stock-specific, and hybrid tail covariance risk (H-TCR). H-TCR is defined as:

$$H-TCR=\sum_{R_i<h_i}(R_i-h_i)(R_m-h_m)$$

where R_i is the return for stock i, R_m is the return for the market, h_i is the threshold for tail risk (defined as the 10th percentile, i.e., the 25 days on which stock i fell the most in the past trailing one year).

This risk is actually priced in the expected direction, i.e. investors demand higher future returns for stocks with high tail covariance

Results

The authors found: 1) systematic risk has little explanatory power for future stock returns; 2) stock-specific risk has a negative relationship (i.e. in the opposite direction of that implied by theory); and more importantly 3) H-TCR has significant and positive predictive power for future returns. The results are robust to common known risk factors (e.g., Fama-French-Carhart four-factor model) and co-skewness, total volatility, and extreme positive returns. A simple long top decile/short bottom decile portfolio yields an average monthly return of 0.48% per month.

Interestingly, high H-TCR stocks are large cap, higher priced, and more liquid stocks on average. While small-cap stocks tend to have more extreme negative returns, these tails events are also more likely to be idiosyncratic (and therefore, negatively correlated with future returns). It is the larger stocks that are more likely to co-move with the market at tail events.

We find this factor appealing because it makes intuitive sense, and also helps reconcile one of the big puzzles in finance theory

Our take

H-TCR is intuitive and fairly easy to calculate. It is also appealing because it captures an intuitive asymmetry – tail risk matters a lot more to most investors when the market is falling. We plan to further backtest this signal with our own data across different markets.

[4] See Amaya, Christoffersen, Jacobs, and Vasquez [2011], "Do Realized Skewness and Kurtosis Predict the Cross-section of Equity Returns?", SSRN Working Paper, and Luo, Cahan, Alvarez, Jussa, and Chen [2011], "Tail risk in optimal signal weighting", *Deutsche Bank Quantitative Strategy*, June 7, 2011.

Paper 5: "Short interest vs. short selling"

- Benjamin Blau, Bonnie Van Ness, and Robert Van Ness
- SSRN, available at http://ssrn.com/abstract=1930997

The predictive power of securities lending transactions has been a topic of particular interest to us

Why it's worth reading

Our regular readers will be familiar with the two well received papers in which our team has discussed at great length the information content of stock lending data, and particularly its use in defining an interesting proxy for short interest as a stock selection tool in the US and in Asia.[5][6] This paper emphasizes the difference between short interest (which represents outstanding short positions) and short sale flows (that are eventually covered). Using a proprietary sample covering NASDAQ stocks, the authors provides further evidence to show that both monthly short interest and short sale flow are predictive of future stock returns, with a stronger discriminatory power for short selling. The authors also conduct a fairly unique study of short sellers trading behavior around short interest announcements.

This paper shows that short interest (the amount of shares that are currently held in uncovered short positions) and short selling (the amount of new shorts on a given day) contain different information

Data and methodology

The data come from CRSP for prices, volume, share outstanding and returns, from Compustat for monthly short-interest. Short sale transaction data is a combination of a dataset made available from January 2005 to December 2006 following Regulation SHO and "proprietary sources" from January 2007 to September 2009. The short sale transaction data is aggregated to the daily and monthly level. The universe is restricted to a sample of 861 NASDAQ-listed stocks. Short turnover and relative short interest are respectively defined as the percentage of shares outstanding that are shorted on a particular day and the number of shares in uncovered short positions as a percentage of shares outstanding. After comparing both metrics, two sets of analysis are run: one to uncover the information contents of these two indicators with a pooled regression based framework to control for size, volatility, turnover etc., and another event-like study to scrutinize daily short turnover patterns around short-interest announcements, the latter being split between "good" and "bad" news announcements according to the magnitude of the change in relative short interest.

In fact, the correlation is only 45%, and overall short turnover works better than short interest as a predictor of future negative returns

Results

Monthly short interest and short turnover do not contain the same information. The correlation stands at around 45%, hinting that many of the short sales are covered in the short term. In line with prior studies, monthly short turnover and short interest are negatively related to future returns, but there is more information about future negative returns in shorting flow, as shown by controlling for risk factors and by testing both variables simultaneously. The second analysis shows a spike in short turnover the day before short interest-announcement, particularly in "bad" days. Moreover, short sellers increase their profitability by front-running short interest announcements when short interest increases.

This article confirms our view that there is a lot more to securities lending than just short interest

Our take

It is unfortunate that the authors do not reveal their proprietary source for the short sale transaction data. Although some might feel that the study is limited in terms of history and universe, we find this article quite interesting as it clearly highlights some distinct properties of short interest and short selling.

[5] Cahan, R., et al., 2011, "Signal Processing: The Long and Short of It", Deutsche Bank Quantitative Strategy, 18 January 2011

[6] Le Binh, K. et al., 2011, "Quantiles: Launching Asian quantitative strategy", Deutsche Bank Quantitative Strategy, 18 July 2011

Upcoming conferences

Europe

Figure 1: European event calendar

Date	Location	Conference
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/
30 November – 2 December 2011	**London**	**Quantitative Equity Methods and Analysis**
		TBA

Source: Deutsche Bank

North America

Figure 2: North American event calendar

Date	Location	Conference
19-22 October 2011	**Denver**	**FMA Annual Meeting 2011**
		http://69.175.2.130/~finman/Denver/
10 November 2011	**New York**	**SQA Half-Day Conference: Quantitative Global Macro – Generating Alpha in Challenging Markets**
		https://m360.sqa-us.org/event.aspx?eventID=36384
6-8 January 2012	**Chicago**	**American Finance Association Annual Meeting 2012**
		http://www.afajof.org/association/annualconf.asp
March 2012	**New York**	**Battle of the Quants**
		http://www.battleofthequants.com/newyork_overview.html
1-4 April 2012	**Wesley Chapel, Florida**	**Q Group Spring Seminar**
		TBA

Source: Deutsche Bank

Asia

Figure 3: Asian event calendar

Date	Location	Conference
24-25 November 2011	**Bali**	**Asia Finance Forum 2011**
		http://www.asianfinanceforum.com/
7-9 December 2011	**Shanghai**	**Quant Invest & HFT Summit APAC 2011**
		www.quantinvestasia.com
12-13 December 2011	**Sydney**	**QMF 2011 Practitioner Workshops**
		http://datasearch2.uts.edu.au/qfrc/news-events/events-detail.cfm?ItemId=26538
14-15 December 2011	**Hong Kong**	**Battle of the Quants**
		http://www.battleofthequants.com/hongkong_overview.html
14-17 December 2011	**Sydney**	**Quantitative Methods in Finance Conference (QMF) 2011**
		http://datasearch2.uts.edu.au/qfrc/news-events/events-detail.cfm?ItemId=26264

Source: Deutsche Bank

Other papers of interest

Alpha generation and stock-selection signals

Daily stock market swings and investor reaction to firm-specific news

- Huseyin Gulen and Byoung-Hyoun Hwang
- SSRN, available at http://ssrn.com/abstract=1934873
- Abstract: "We find that abnormal returns associated with good corporate news (e.g., positive earnings surprises) are substantially more positive when the market return on the day of the announcement is high than when the market return is low; analogously, abnormal returns associated with bad corporate news (e.g., negative earnings surprises) are substantially less negative when the market return is high than when the market return is low. This difference reverses within weeks of the announcement, and cannot be explained by corporate event characteristics or market - and industry conditions. Together, the evidence suggests that investors sometimes under - or overreact to corporate news announcements based on the overall market performance on the announcement day."

Optimization, portfolio construction, and risk management

Advances in cointegration and subset correlation hedging methods

- Marcos M. Lopez de Prado
- SSRN, available at http://ssrn.com/abstract=1931736
- Abstract: "After reviewing some well-known hedging algorithms, we introduce two new procedures, called DFO and MMSC. The former is a cointegration method that estimates the hedging weights that are most likely to deliver a hedging error absent of unit root. The latter studies the geometry of the hedging errors and estimates a hedging vector such that its subsets are as orthogonal as possible to the error. Results indicate that DFO produces estimates similar to the ECM method, but more stable. Likewise, MMSC estimates are similar to PCA but more stable. BTCD estimates cannot be related to any of the aforementioned methodologies."

Can internet search queries help predict stock market volatility?

- Thomas Dimpfl and Stephan Jank
- SSRN, available at http://ssrn.com/abstract=1941680
- Abstract: "This paper studies the dynamics of stock market volatility and retail investor attention measured by internet search queries. We find a strong co-movement of stock market indices' realized volatility and the search queries for their names. Furthermore, Granger causality is bi-directional: high searches follow high volatility, and high volatility follows high searches. Using the latter feedback effect to predict volatility we find that search queries contain additional information about market volatility. They help to improve volatility forecasts in-sample and out-of-sample as well as for different forecasting horizons. Search queries are in particular useful to predict volatility in high-volatility phases."

Do high-frequency measures of volatility improve forecasts of return distributions?

- John Maheu and Thomas McCurdy
- SSRN, available at http://ssrn.com/abstract=1939398
- Abstract: "Many finance questions require the predictive distribution of returns. We propose a bivariate model of returns and realized volatility (RV), and explore which features of that time-series model contribute to superior density forecasts over horizons of 1 to 60 days out of sample. This term structure of density forecasts is used to investigate the importance of: the intraday information embodied in the daily RV estimates; the functional form for log(RV) dynamics; the timing of information availability; and the assumed distributions of both return and log(RV) innovations. We find that a joint model of returns and volatility that features two components for log(RV) provides a good fit to S&P 500 and IBM data, and is a significant improvement over an EGARCH model estimated from daily returns."

Mean-variance efficient portfolios with many assets: 50% short

- Moshe Levy and Ya'acov Ritov
- *Quantitative Finance*, Volume 11, Issue 10, available at http://www.tandfonline.com/doi/abs/10.1080/14697688.2010.514282
- Abstract: "Any given set of asset parameters yields a specific mean–variance optimal tangency portfolio. Yet, when the number of assets is large, there are some general characteristics of optimal portfolios that hold 'almost surely'. This paper investigates these characteristics. We analytically show that the proportion of assets held short converges to 50% as the number of assets grows. This is a fundamental and robust property of mean–variance optimal portfolios, and it does not depend on the parameter estimation method, the investment horizon, or on a special covariance structure. While it is known that optimal portfolios may all have positive weights in some special situations

(e.g. uncorrelated assets), the analysis shows that these cases occupy a zero measure in the parameter space, and therefore should not be expected to be observed empirically. Thus, our analysis offers a general explanation for the empirical finding of many short positions in optimal portfolios."

A quantile Monte Carlo approach to measuring extreme credit risk

- David Allen, Ray Boffey, and Robert Powell
- SSRN, available at http://ssrn.com/abstract=1948311
- Abstract: "We apply a novel Quantile Monte Carlo (QMC) model to measure extreme risk of various European industrial sectors both prior to and during the Global Financial Crisis (GFC). The QMC model involves an application of Monte Carlo Simulation and Quantile Regression techniques to the Merton structural credit model. Two research questions are addressed in this study. The first question is whether there is a significant difference in distance to default (DD) between the 50% and 95% quantiles as measured by the QMC model. A substantial difference in DD between the two quantiles was found. The second research question is whether relative industry risk changes between the pre-GFC and GFC periods at the extreme quantile. Changes were found with the worst deterioration experienced by Energy, Utilities, Consumer Discretionary and Financials; and the strongest improvement shown by Telecommunication, IT and Consumer goods. Overall, we find a significant increase in credit risk for all sectors using this model as compared to the traditional Merton approach. These findings could be important to banks and regulators in measuring and providing for credit risk in extreme circumstances."

Asset allocation and sector/style rotation

Tactical allocation by credit quality

- Martin Fridson and Camille Mclead-Salmon
- *Journal of Portfolio Management*, forthcoming, available at http://www.iijournals.com/doi/abs/10.3905/jpm.2011.2011.1.018
- Abstract: "Tactical asset allocators operate on the assumption that if risk premiums increase, higher-rated bonds will outperform lower-rated bonds and that if risk premiums decrease, the reverse will happen. Empirical testing shows, however, that about 30% of the time, these expected relationships break down. Drawing on a classic debate among corporate bond market participants, investors might hypothesize that tactical asset allocators can improve their results by classifying bonds according to market-based risk premiums rather than agency-generated ratings. In the context of tactical asset allocation, however, we do not find the market to be a shrewder judge of credit risk than the rating agencies. The solution to the problem of perverse outcomes in credit-oriented tactical asset allocation may be to combine top-down sector selection techniques with bottom-up security selection."

Markov-switching asset allocation: Do profitable strategies exist?

- Jan Bulla, Sascha Mergner, Ingo Bulla, André Sesboüé and Christophe Chesneau
- *Journal of Asset Management*, Volume 12, Issue 5, available at http://www.palgrave-journals.com/jam/journal/v12/n5/full/jam201027a.html
- Abstract: "This article proposes a straightforward Markov-switching asset allocation model, which reduces the market exposure to periods of high volatility. The main purpose of the study is to examine the performance of a regime-based asset allocation strategy under realistic assumptions, compared to a buy-and-hold strategy. An empirical study, utilizing daily return series of major equity indices in the United States, Japan and Germany over the past 40 years, investigates the performance of the model. In an out-of-sample context, the strategy proves profitable after taking transaction costs into account. For the regional markets under consideration, the volatility reduces on average by 41 per cent. In addition, annualized excess returns attain 18.5 to 201.6 basis points."

Dynamic strategic asset allocation: Risk and return across the business cycle

- Pim van Vliet and David Blitz
- *Journal of Asset Management*, Volume 12, Issue 5, available at http://www.palgrave-journals.com/jam/journal/v12/n5/full/jam201112a.html
- Abstract: "We propose a practical investment framework for dynamic asset allocation across different phases in the business cycle, which we illustrate using a sample of US data from 1948 to 2007. We identify four phases in the business cycle and find that these capture pronounced time variation in the risk and return properties of asset classes. Time variation is also observed in the risk of a traditional, static strategic asset mix. In order to stabilize risk across the business cycle, we propose a dynamic strategic asset allocation approach, which has the potential to enhance expected return as well. The proposed investment framework is found to be robust to variations in the variable composition of the business cycle indicator and can easily be extended with different economic variables and/or additional assets."

(R)Evolution of asset allocation

- Fabian Dori, Frank Haeusler, and David Stefanovits
- SSRN, available at http://ssrn.com/abstract=1939963

- Abstract: "Asset allocation is at the heart of every portfolio construction process and crucial to its success. Though as diverse as they are innovative, the approaches used to pinpoint the optimal mix of assets mostly have common roots. In the following paper, we address this commonality in depth. First, we outline the portfolio construction process and highlight empirically the importance of asset allocation with respect to a portfolio's return. Second, the evolution of portfolio theory is put into a historical perspective. Third, we present a unified optimization framework for asset allocation and show that most well-known asset allocation techniques fit exactly in that framework. Finally, an illustrative example brings to light the similarities and differences of three prevalent approaches and highlights implications for practitioners."

Trading and market impact

Frontier market diversification and transaction costs

- Ben Marshall, Nhut Nguyen, and Nuttawat Visaltanachoti
- SSRN, available at http://ssrn.com/abstract=1942592
- Abstract: "Frontier markets, sometimes referred to as "emerging emerging markets," have high transaction costs, but these do not subsume the diversification benefits of these countries. We form comprehensive measures of transaction costs using tick data for 19 frontier markets that are readily accessible to foreign investors. The average cost of trading is over three times that in the US, but the low correlations of these markets allow for diversification benefits that, on average, outweigh transaction costs from 2002 to 2010. However, frontier market diversification benefits disappeared during the global financial crisis."

High frequency trading and price discovery

- Terrence Hendershott and Ryan Riordan
- SSRN, available at http://ssrn.com/abstract=1928510
- Abstract: "We examine the role of high-frequency traders (HFT) in price discovery. Overall HFT play a positive role in price efficiency by trading in the direction of permanent price changes and in the opposite direction of transitory pricing errors on average days and the highest volatility days. This is done through their marketable orders. In contrast, HFT passive non-marketable orders are adversely selected in terms of the permanent and transitory components as these trades are in the opposite direction as permanent price changes and in the same direction as transitory pricing errors. HFT marketable orders' informational advantage is sufficient to overcome the bid-ask spread and trading fees to generate positive trading revenues. Non-marketable limit orders also result in positive revenues as the costs associated with adverse selection are smaller than the bid-ask spread and liquidity rebates. HFT predicts price changes over short horizons measured in the tens of seconds."

Do informed traders prefer automated electronic markets?

- Timothy Perry
- *Journal of Trading*, Volume 6, Number 4, available at http://www.iijournals.com/doi/abs/10.3905/jot.2011.6.4.034
- Abstract: "This study investigated the differences in the probability of informed trading (PIN), separately, in the two components of the modern hybrid market structure: the newer automated, electronic market and the traditional open-outcry floor market. Using transaction level data, I compared Eurodollar futures contracts exchanged on the floor of the Chicago Mercantile Exchange with those exchanged on the CME's Globex from January 3, 2000, through December 29, 2006. The findings in this study indicate that annual PINs tended to be higher in the automated market in every year. This difference decreased over the sample period and by 2006, the difference in PIN estimates between the two markets was very small in the transacting of contracts with near term expirations."

An algorithm for portfolio trades with transaction costs

- Thomas Rhee
- *Journal of Trading*, Volume 6, Number 4, available at http://www.iijournals.com/doi/abs/10.3905/jot.2011.6.4.053

- Abstract: "Optimal portfolio weights must be computed against the total committed wealth net of all transaction costs. Consequently, portfolio weights normally computed without regard to transaction costs may not be optimal and result in wrong trade recommendations. In particular, when portfolios are rebalanced, an increase (decrease) in portfolio weights may not necessarily mean that a security ought to be bought or sold. This would be so, especially if one considers the investors' desire to hold a certain amount of cash in their portfolio. This article considers explicitly the trading costs of the portfolio and develops a simple trading rule consistent with the investors' desired cash requirement."

Finance theory and techniques

Cheaper than value

- Denis Chaves, Jason Hsu, Vitali Kalesnik, and Yoseop Shim
- SSRN, available at http://ssrn.com/abstract=1940504
- Abstract: "Value strategies appear to provide an extra source of return. Academic literature provides two competing theories on what drives the value premium: exposure to risk factors or mispricing of the securities. Existing empirical studies have not conclusively rejected one in support of the other. Using Fama and MacBeth (1973) regressions and extensions of the portfolio tests based on Daniel and Titman (1997), we provide evidence that the book-to-market characteristic largely subsumes the loading on the value factor (HML) as a variable that explains the cross-section of stock returns. We improve the power of these tests by using daily data for estimating factor loadings and by using data from 23 developed countries going back more than 30 years. Given these results, we conclude mispricing is likely a more significant portion of the value premium. There appears to be a free lunch after all."

Exact fit for a mixture of two Gaussians – The EF3M algorithm

- Marcos M. Lopez de Prado
- SSRN, available at http://ssrn.com/abstract=1931734
- Abstract: "Estimation of the parameters of a Mixture of Gaussians is predominantly done through the EM algorithm. The EM algorithm searches for the parameter estimates that maximize the posterior conditional distribution function of the entire sample. This means that higher moments for which the researcher may have no theoretical interpretation or confidence (typically beyond the 4th moment) are impacting the parameter estimates, thus moving away from the solution that exactly fits parameters on which the modeler has greater confidence and theoretical understanding. A number of reasons have motivated our proposal for a new answer to this century-long question. The algorithm introduced in this paper, which we call EF3M (Exact Fit of 3 Moments), presents the advantage of exactly fitting the first 3 moments, for which estimate the researcher typically has some degree of confidence or theoretical interpretation. The 4th moments is not exactly matched, due to its sampling error, although it guides the convergence of the mixing probability. Finally, the 5th moment is only used to assess the goodness of the fit when alternative solutions exist. We believe this framework is more representative of the problem faced by Quantitative Finance researchers. As an application, we estimate the probability that a sequence of observations may not have been drawn from a reference distribution, a measure we call "Probability of Departure" or PD. For example, PD will inform an investor regarding the probability that a sequence of returns may be inconsistent with the previously observed track record for that investment, which should trigger her decision to review her capital allocation."

Federal market information technology in the post flash crash era: Roles for supercomputing

- Wes Bethel, David Leinweber, Oliver Ruebel, and Kesheng Wu
- SSRN, available at http://ssrn.com/abstract=1939522
- Abstract: "This paper describes collaborative work between active traders, regulators, economists, and supercomputing researchers to replicate and extend investigations of the Flash Crash and other market anomalies in a National Laboratory HPC environment. Our work suggests that supercomputing tools and methods will be valuable to market regulators in achieving the goal of market safety, stability, and security. Research results using high frequency data and analytics are described, and directions for future development are discussed. Currently the key mechanism for preventing catastrophic market action are "circuit breakers." We believe a more graduated approach, similar to

the "yellow light" approach in motorsports to slow down traffic, might be a better way to achieve the same goal. To enable this objective, we study a number of indicators that could foresee hazards in market conditions and explore options to confirm such predictions. Our tests confirm that Volume Synchronized Probability of Informed Trading (VPIN) and a version of volume Herfindahl-Hirschman Index (HHI) for measuring market fragmentation can indeed give strong signals ahead of the Flash Crash event on May 6, 2010. This is a preliminary step toward a full-fledged early-warning system for unusual market conditions."

Jumps and information flow in financial markets

- Suzanne Lee
- SSRN, available at http://ssrn.com/abstract=1933551
- Abstract: "This paper investigates the predictability of jump arrivals in U.S. stock markets. Using a new test that identifies jump predictors up to the intraday level, I find that jumps are likely to occur shortly after macroeconomic information releases such as Fed announcements, nonfarm payroll reports, and jobless claims as well as market index jumps. I also find firm-specific jump predictors related to earnings releases, analyst recommendations, past stock jumps, and dividend dates. Evidence suggests that distinguishing systematic jumps from idiosyncratic jumps is possible using the characteristics of jump predictors. Finally, I present a short-term jump size clustering."

The equity risk premium across European markets: An analysis using the implied cost of capital

- Christoph Jackel and Katja Muhlhauser
- SSRN, available at http://ssrn.com/abstract=1945311
- Abstract: "Using a large data set of companies from 16 European countries over the period between January 1994 and May 2011, we estimate the equity risk premiums applying an implied cost of capital approach. We find estimates that are consistently larger than those in previous studies, ranging from 4.4% to 6.9% across countries. Our main conclusion is that a positive trend over our sample period is responsible for the high estimates in comparison to previous studies. The trend is accompanied by declining risk-free rates over our estimation period, suggesting a much greater stability in the absolute return on equity than often assumed by classical asset pricing models."

Tagging the triggers: An empirical analysis of information events prompting sell-side analyst reports

- Oscar Anselm Stolper, Alexander Gabriel Kerl, and Andreas Walter
- SSRN, available at http://ssrn.com/abstract=1938150
- Abstract: "In order to fulfill their function as information intermediaries in capital markets, sell-side equity analysts regularly issue updated forecasts on the stocks they cover. Quite often, the publication of (revised) analysts' reports is subject to certain trigger events such as the publication of annual figures or the announcement of an upcoming merger. In this exploratory study, we develop a two-step procedure to identify the core events that trigger the release of analysts' reports on companies that constitute the Dow Jones EuroStoxx50 index during the three-year period from 2004 to 2006. These can be grouped into Financial Disclosures, Corporate Management, Corporate Strategy, Business Activity, Operating Environment and Shares. The results suggest that sell-side analysts attach great importance to non-financial information events when transforming their earnings estimates into valuation forecasts and stock recommendations. Additionally, we link the information events identified as reasons of issuance to the summary measures disclosed in the reports in order to investigate the relationship between the report trigger and associated analyst reaction. Our findings indicate that the forecasting activity of sell-side analysts is greatly influenced by forward-looking statements made by management, strategy-related news flow, and non-company-specific information relating to the covered firm's operating environment."

On REIT price delay

- Benjamin Blau, Jared Egginton, and Matthew Hill
- SSRN, available at http://ssrn.com/abstract=1937598
- Abstract: "We examine the Hou and Moskowitz (2005) parsimonious measure of friction, which proxies investors' difficulty in incorporating market-wide information into security prices. Our comparison of REITs and matched non-REIT stocks shows a statistical and economically higher level of friction for REIT securities. This finding suggests that REIT securities react more slowly to new information. Thus, our evidence does not support the view that REITs are more transparent than non-REITs, at least with respect to price delay. Further results indicate that the primary drivers for the REIT-delay differential include differences in size, turnover, volatility, and price level. Examining within-REIT differences in delay, we find a positive and significant relation between delay and whether the REIT is part of an operating partnership. We find only marginal differences in delay across property focus."

Equity premia around the world

- Elroy Dimson, Paul Marsh, and Mike Staunton
- SSRN, available at http://ssrn.com/abstract=1940165
- Abstract: "We update our global evidence on the long-term realized equity risk premium, relative to both bills and bonds, in 19 different countries. Our study now runs from 1900 to the start of 2011. While there is considerable variation across countries, the realized equity risk premium was substantial everywhere. For our 19-country World index, over the entire 111 years, geometric mean real returns were an annualized 5.5%; the equity premium relative to Treasury bills was an annualized 4.5%; and the equity premium relative to long-term government bonds was an annualized 3.8%. The expected equity premium is lower, around 3% to 3½% on an annualized basis."

Is size dead? A review of the size effect in equity returns

- Mathijs van Dijk
- *Journal of Banking and Finance*, Volume 35, Issue 12, available at http://www.sciencedirect.com/science/article/pii/S0378426611001701
- Abstract: "Beginning with Banz (1981), I review 30 years of research on the size effect in equity returns. Since Fama and French (1992), there has been a vigorous, ongoing debate on whether the size premium is a compensation for systematic risk. Since the late 1990s, research on the size effect has been characterized by two developments that are seemingly contradictory. At last, theoretical models have emerged in which the size effect arises endogenously as a result of systematic risk. However, recent empirical studies assert that the size effect has disappeared after the early 1980s. In this review, I address this disconnect between recent theoretical and empirical research."

New evidence on oil price and firm returns

- Paresh Kumar Narayan and Susan Sunila Sharma
- *Journal of Banking and Finance*, Volume 35, Issue 12, available at http://www.sciencedirect.com/science/article/pii/S0378426611001713
- Abstract: "In this paper, we examine the relationship between oil price and firm returns for 560 US firms listed on the NYSE. First, we find that oil price affects returns of firms differently depending on their sectoral location. Second, we find strong evidence of lagged effect of oil price on firm returns. Third, we test whether oil price affects firm returns based on different regimes and find that in five out of the 14 sectors this is indeed the case. Finally, we unravel that oil price affects firm returns differently based on firm size, implying strong evidence of size effects."

Derivatives and volatility

The information content of real estate derivative prices

- Shaun Bond and Paul Mitchell
- *Journal of Portfolio Management*, Volume 35, Number 5, available at http://www.iijournals.com/doi/abs/10.3905/jpm.2011.35.5.170
- Abstract: "The objective of this research was to assess whether forward returns implied by real estate derivative prices provide a more accurate measure of future real estate returns than a consensus forecast of industry experts. Implied returns derived from real estate derivative prices are often used by industry participants as forecasts of future returns, even though the theoretical justification for this is limited. Bond and Mitchell's analysis suggests that since the introduction of real estate derivatives in the U.K., real estate derivatives prices have provided a better indication of future returns than a consensus forecast. But most of this apparent superior performance can be attributed to publication delays with the consensus forecasts. When adjusted for publication delay, the information content of real estate derivatives is shown to be remarkably similar to the consensus forecasts. The authors also caution that as the market for real estate derivatives develops, a greater divergence may emerge between market forecasts and real estate derivatives prices."

Discrete dividends and the FTSE-100 index options valuation

- Nelson Areal and Artur Rodrigues
- *Quantitative Finance*, forthcoming, available at http://www.tandfonline.com/doi/abs/10.1080/14697688.2011.618457
- Abstract: "This paper studies the effect of discrete dividends on the FTSE-100 index options valuation, following closely Harvey and Whaley's [J. Fut. Mkts, 1992, 12(2), 123–137] study on the S&P-100 index. To the best of our knowledge, no such study has ever been performed on FTSE-100 options, where the dividends have a discreteness pattern different from the S&P-100. Unlike the Harvey and Whaley study, both American and European options are considered, a more accurate benchmark is proposed, and a comprehensive comparison of the accuracy of a larger set of valuation methods is performed. It is shown that there are significant differences in accuracy and speed among different methods, and that, for both American and European options, a great deal of accuracy can be gained by using an approximation that takes into account the discrete nature of the FTSE-100 index option dividends."

Overnight returns and realized volatility

- Katja Ahoniemi and Markku Lanne
- SSRN, available at http://ssrn.com/abstract=1945687
- Abstract: "The information flow in modern financial markets is continuous, but major stock exchanges are open for trading for only a limited number of hours. No consensus has emerged on how to deal with overnight returns when calculating realized volatility in markets where trading does not take place 24 hours a day. This paper explores several common volatility applications, and establishes that the chosen treatment of overnight returns can affect the conclusions drawn in empirical work. For example, the selection of the best volatility forecasting model can depend on the way overnight returns are incorporated into realized volatility. Using a recently introduced formal testing procedure, a weighted estimator can be recommended for the S&P 500 index over estimators that have been more commonly used in existing literature. For individual stocks, realized volatility estimators that do not incorporate the overnight return are more accurate."

Good volatility, bad volatility: Signed jumps and the persistence of volatility

- Kevin Sheppard and Andrew Patton
- SSRN, available at http://ssrn.com/abstract=1943825
- Abstract: "Using recently proposed estimators of the variation of positive and negative returns ("realized semi-variances"), and high frequency data for the S&P 500 index and 105 individual stocks, this paper sheds new light on the predictability of equity price volatility. We show that future volatility is much more strongly related to the volatility of past negative returns than to that of positive returns, and this effect is stronger than that implied by standard asymmetric GARCH models. We also find that the impact of a jump on future volatility critically depends on the sign of the jump, with negative (positive) jumps in prices leading to significantly higher (lower) future volatility. A simple model exploiting these findings leads to significantly better out-of-sample forecast performance, across forecast horizons ranging from 1 day to 3 months."

Appendix 1

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