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Quantitative Strategy

Global Markets Research

Academic Insights

Harnessing the best ideas from academia

Welcome to our monthly Academic Insights report

Fresh insights from academia
Reading the academic literature this month is a welcome respite from the breathless market volatility lately. This month's selection of papers covers a range of interesting topics, but one theme in particular stands out: the increasing importance of market or style timing strategies.

One of the papers we review argues that the rise in passive strategies has led to a permanent increase in commonality between stocks. This in turn means that systematic market risk has increased, and makes it more difficult for investors to form truly diversified portfolios. Clearly both have implications for quant investors.

In a similar vein, another interesting paper takes a theoretical approach to the market timing problem, and derives useful analytic expressions for estimating the IR of a market timing strategy. Think of these as extensions of the Fundamental Law of Active Management to take into account market timing.

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

- Yes, passive investing increases market vulnerability
- Do industries matter in explaining stock returns and asset-pricing anomalies?
- On the expected performance of market timing strategies
- Properties of the most diversified portfolio
- Do realized skewness and kurtosis predict the cross-section of equity returns?

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.

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Introduction

Welcome to *Academic Insights*

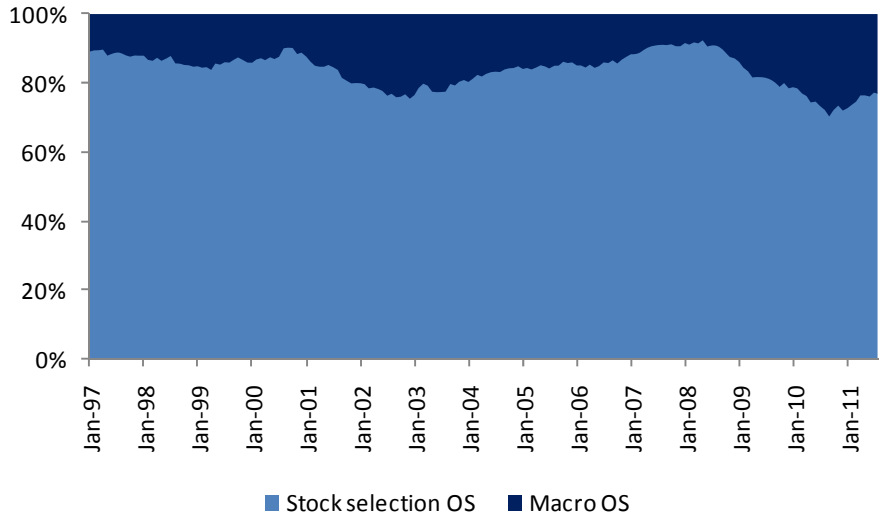
The breathless volatility in the market of late makes turning to the academic literature a refreshing change this month. The Dow goes up and down (or these days more like down and down), but the steady stream of interesting academic papers continues unabated.

Market timing strategies are getting more attention, given the travails of stock selection in a macro-driven environment

The death of stock selection?

On the subject of market volatility, one of the challenges most investors have been grappling with is the lower opportunity set for stock selection relative to market or style timing (Figure 1).[1] Most traditional quant models play on company-specific information, but in a world where big macro themes and risk-on/risk-off trading is the marginal driver of stock returns, such strategies have been less effective than in the past. The question is whether this is a temporary phenomenon that will dissipate when the macro environment normalizes, or whether there has been a permanent shift that has made stock-picking more difficult. An interesting paper by Xiong and Sullivan [2011], argues in favor of the latter. The authors show evidence that the rise in passive investing has indeed had an impact on the relationship between stocks. Using a variety of metrics to measure "trading commonality", including average pairwise correlation, they conclude that the growth in passively managed strategies has led to a rise systematic market risk and a decline in the ability of investors to build well-diversified portfolios.

Figure 1: Proportion of opportunity set due to stock selection and market timing



Source: Deutsche Bank

The difference between cross-sectional and time-series breadth is often poorly understood, so this new paper is a useful read

New measures of market timing

Another interesting paper, by Hallerback [2011], comes at the same subject from a more theoretical angle: can we come up with better ways of measuring the expected IR of a timing strategy? The ubiquity of the Fundamental Law of Active Management in the cross-sectional space illustrates the usefulness of having a simple rule of thumb to understand what drives the returns to an investment strategy. Hallerback's contribution is to do the same in the

[1] For more details on this chart, see pages 15-17 of: Alvarez, A., Chen, Z., Luo, Y., Cahan, R., and Jussa, J., 2010, "Portfolios Under Construction: Correlation and opportunity", *Deutsche Bank Quantitative Strategy*, 2 December 2010

market timing space. A subtle but crucial point in the analysis is to understand the difference between cross-sectional breadth and time-series breadth. Clearly the latter is what matters in market timing.

For the rest of this month's research, read on

But wait, there's more

Other interesting papers this month touch on the importance of industries in explaining stock returns, some new insights into Maximum Diversification Portfolios, and the use of high frequency skewness and kurtosis as stock selection signals. For more details, read on.

Regards,
The Deutsche Bank Equity Quantitative Strategy Team

Five key papers this month

Paper 1: "Yes, passive investing increases market vulnerability"

- James Xiong and Rodney Sullivan
- SSRN, available at http://ssrn.com/abstract=1908227

Does the rise of passive strategies mean opportunities for stock-picking are diminished? This paper argues the affirmative

Why it's worth reading

Systematic risk – and as a corollary correlation among stocks – has been one of the main drivers of investors' portfolio performance in recent years. We have ourselves touched upon this question in our own research.[2] In this paper, the authors argue that the growth of indexed assets under management has contributed to the rise of systematic risk. Intuitively, the larger the proportion of assets tracking the same indices, the higher the cross-sectional trading commonality should be. Moreover, the authors show that stocks' betas have risen and also converged in recent years, highlighting how much more challenging it has become to design diversified portfolios meeting a pre-defined risk budget.

The authors examine the evolution of metrics like average pairwise correlation with reference to growth in market share of passive strategies

Data and methodology

The study is run exclusively on the U.S. market, using data from the Morningstar Direct database. That in itself is interesting as our non-U.S. readers will probably have less hands-on knowledge of that dataset. The history starts in January 1979 and covers over 30 years of data, until December 2010. The authors do acknowledge that their dataset suffer from survivorship bias, as Morningstar Direct does not have coverage of stocks not listed prior to 2000, but expect this of little incidence since their study relies mostly on cross-sectional metrics. The metrics are the cross-sectional dispersion of volume changes, the average pairwise correlations among stock prices, among volume changes, the correlation between absolute return and volume levels, and the correlation between absolute returns and absolute volume changes.

The results show a positive relationship between the rise in passive strategies and a number of stylized facts like higher correlations and less beta dispersion

Results

The authors then show the evolution of these metrics against the growth of the passive market share, which is defined as the ratio of the market value of total passive equity assets to the total value of all equity assets. Interestingly, the positive relationship exhibited graphically strengthens dramatically after 1997. This is further confirmed by regression analysis. These results also hold for the small cap and large cap sub universes, particularly for the large cap space. A further analysis of betas to styles also confirms these findings. Finally, analysis is performed to show the reduced diversification benefits post 1997 by selecting randomly 5 to 50 stocks to build portfolios, and estimating their excess return volatility. The conclusion is quite clear: an investor has no other choice than to increase the number of stocks in her portfolio to maintain an excess volatility budget after 1997.

This paper is interesting because it provides concrete evidence that passive investing has been impacting the opportunity set for stock pickers

Our take

We found this article interesting as it tackles the influence of the growth of index assets on systematic risk and indirectly of the reduction of the opportunity set of a stock picker. Although the data may not be readily available, we wonder whether it would be possible to focus on ETFs, whose popularity has also grown as investors have used them to express views on country, industry, and styles. Betas and correlations may for instance be more pronounced for stocks within the same industry.

[2] Alvarez, A., Chen, Z., Luo, Y., Cahan, R., and Jussa, J., 2010, "Portfolios Under Construction: Correlation and opportunity", *Deutsche Bank Quantitative Strategy*, 2 December 2010

Paper 2: "Do industries matter in explaining stock returns and asset-pricing anomalies?"

- Pin-Huang Chou, Po-Hsin Ho, and Kuan-Cheng Ko
- *Journal of Banking and Finance*, forthcoming, available at http://www.sciencedirect.com/science/article/pii/S0378426611002275

Although prior academic literature has investigated industry-related return patterns, it remains unclear how and why industries affect asset prices.

Why it's worth reading

Although prior academic literature has investigated industry-related return patterns, it remains unclear how and why industries affect asset prices. The authors try to cover this topic with a deep analysis on how industries interact with the well known firm characteristics such as size, book-to-market, and past returns to explain the cross-section of stock returns. They find that industry returns contain significant risk premiums that can't be explained by these common factors, and their empirical findings show that industry returns reflect both significant rational and behavioral components.

The authors explore the role of industry returns from rational perspective using the Fama-MacBeth cross-sectional regression methodology, and the stochastic discount factor representation proposed by Cochrane.

Data and methodology

The authors use NYSE, AMEX, and NASDQA stock returns from July 1963 to December 2006 provided by the CRSP database. The accounting data come from the Compustat database and firm size and book-to-market are calculated using the Fama and French methodology. The industry classification follows French's classification which assigns firms into one of the 48 industries based on the four-digit SIC codes. The authors explore the role of industry returns from rational perspective using the Fama-MacBeth cross-sectional regression methodology, and the stochastic discount factor representation proposed by Cochrane. They also investigate the role of industries from a behavioural point-of-view analyzing whether size, book-to-market, and momentum premiums are stable for stocks within and across industries. The authors also consider whether the premia show any symmetric patterns for firms that rank above and below their industry averages on various firm characteristics. Finally, they examine the interactions between rational and behavioural viewpoints following the BSC methodology introduced by Brennan, Chordia, and Subrahmanyam in 1998.

The rational perspective analysis show that the cross-sectional variation in industry returns cannot be fully explained by popular asset-pricing models.

The book-to-market effect remains a within-industry phenomenon, regardless of the asset pricing model.

Results

The rational perspective analysis show that the cross-sectional variation in industry returns cannot be fully explained by popular asset-pricing models. Industry-related characteristics are not fully captured by existing pricing factors, and industry portfolios reflect some missing factors than cannot be captured by common factors. The authors justify their finding by the fact that industry returns reflect market mispricing, which is behavioral in nature. The results of the behavioral viewpoint demonstrate that industry classifications relate to the book-to-market and momentum effects but not to the size effect. They also find that the book-to-market effect is an intra-industry phenomenon, whereas the moment effect is an across-industry one. The results of the interaction analysis between the two perspectives look quite interesting. The book-to-market effect remains a within-industry phenomenon, regardless of the asset pricing model. If industry-relate factors are considered, the momentum effect completely disappears. They also find that empirical results reveal that asset pricing anomalies, including the small-firm effect, the book-to-market, and the momentum effect relate to the industry classification.

Although the authors identified several industry-related characteristics, their findings raise more questions about return relationships.

Our take

Although the authors identified several interesting industry-related characteristics, their findings raise more questions about different firm characteristic-return relations, and either rational or behavioral theories alone cannot explain industry returns. These topics seem worthy of further investigation, because a better understanding of these phenomena may help developing an asset pricing model that could mirrors the real world in a better way.

Paper 3: "On the expected performance of market timing strategies"

- Winfried G. Hallerback
- SSRN, available at http://ssrn.com/abstract=1887264

Market and style timing strategies are rapidly gaining popularity in a world where stock-specifics matter less than big macro themes

Why it's worth reading

There is no arguing that market and style timing strategies have gained much popularity and now garner a significant level of attention even across managers who traditionally focused on pure stock-selection. This surge of interest can be traced back to the lackluster performance of many traditional quantitative factors during 2007-2010, as well as the undeniable opportunity in timing strategies arising from the current macro influence in stock returns. Given this backdrop, we welcome this research, which does a great job in connecting timing strategies to the traditional quantitative framework. However, it goes further and provides a set of useful metrics, applications and valuable insights.

This paper develops analytical expressions for the expected IR of a timing strategy

The paper begins with a detailed description of a timing strategy along with some of its inherent characteristics such as the timing frequency, success and failure ratios, and breadth. The authors then proceed to develop a set of analytical expressions for the expected IR of a timing strategy under parametric and non-parametric settings. These expressions lend themselves to measure and analyze the potential IR of a timing strategy given a certain investment frequency, volatility and hit rate. In addition, the author goes on to show the results when combining multiple timing strategies, and link their results with the Fundamental Law of Active Management (FLAM). In the discussion on FLAM, the author addresses the subtle, but very important distinction between the conventional "cross-sectional" breadth and "time series" breadth; the latter of which is of great important to timing strategies. Last the authors find a very interesting result which suggests that volatility-weighted bet sizes can actually increase IR by smoothing out volatility regimes.

Most of the results in this paper are theoretical, but there is an empirical portion that uses simulated strategies

Data and methodology

The core results in the paper are analytical and consist of various expressions for describing and measuring the expected IR of timing strategies in very general settings. However, there is an empirical portion, which tests a series of simulated timing strategies across currencies, equity and fixed income assets. The currency timing strategies are implemented on a daily frequency and the data comes from Bloomberg spanning Jan 01, 1999 to Oct 07, 2010. The equity, bond and interest rate timing strategies are run on a monthly frequency and the data are taken from Ibbotson's "*Stock, Bonds, Bills and Inflation*" database spanning from Jan 1926 to Dec 2007.

The authors derive expressions for the IR of timing strategies under various conditions

Results

The main results are the expressions for the IR of a timing-strategy in the general non-parametric case, the normal case and when the strategies are leptokurtic (i.e. fat tails). In addition the authors show the expression for IR in the case where the volatility of a timing strategy is regime dependent rather than constant over time. When this is the case the author shows that analytically IR may be increased by weighting the strategy such that volatility is smoothed over time (lower weight when volatility is higher and vice-versa). The simulated empirical results verify much of the analytical results presented in the paper and show to be more accurate than the results implied by the FLAM.

Our take

We very much liked this paper and plan on using it in the future as we investigate timing strategies across sectors, different markets and asset classes.

Paper 4: "Properties of the most diversified portfolio"

- Yves Choueifaty, Tristan Froidure, and Julien Reynier
- SSRN, available at http://ssrn.com/abstract=1895459

Alternative portfolio construction techniques are one of the hottest topics in the quant world right now

Why it's worth reading

One of the areas of quantitative investment management that is getting a lot of attention right now is the subject of alternative portfolio construction methodologies, particularly those that offer an alternative to the standard mean-variance framework. Minimum variance, risk parity, and maximum diversification are all buzzwords right now in the quant space. This paper focuses on the latter – maximum diversification – and offers new insights on the subject, building on the same authors' previous work.

This paper extends the same authors' earlier work with some interesting new theoretical and empirical results

Data and methodology

At the heart of the paper is the concept of the Maximum Diversification Portfolio (MDP), which the authors introduced in an earlier paper (Choueifaty and Coignard [2008]). The MDP is defined as the portfolio that maximizes the Diversification Ratio (DR), which in turn is defined as the ratio of the portfolio's weighted average volatility to its overall volatility. In this paper, the authors extend the idea of the MDP portfolio in two directions. First, they present an interesting set of theoretical results that illustrate some quite useful properties of the MDP portfolio. Second, they conduct an empirical analysis in which they run a horse race between five portfolio weighting strategies: capitalization-weighted, equally-weighted, risk-weighted, minimum variance, and of course MDP. The universe for the empirical study is the MSCI World index, however to avoid liquidity issues the authors only consider stocks in the top half of the index by market cap. Each strategy is rebalanced semi-annually and, for those strategies that require a covariance matrix input, the sample covariance matrix based on one year of daily returns is used (shrinkage estimates are also tested as an extension). Backtests are conducted from 1999-2010.

Theoretically the MDP is shown to have a number of attractive properties; empirically it is shown to outperform a range of alternative construction techniques

Results

In terms of theoretical results, the authors derive a number of interesting results. One is a decomposition that breaks the DR into two components, a weighted-correlation metric and a weighted-concentration metric. As expected, DR increases when average correlation is lower or when concentration is lower. Another interesting section shows that the square of the DR equals the number of independent risk factors represented in the portfolio. There is also a section that theoretically compares the MDP to the mean-variance optimal portfolio under certain assumptions. This will be useful for those trying to understand how alternative techniques like the MDP compare to the de facto standard.

With regard to the empirical results, all the alternative weighting schemes outperform the cap-weighted portfolio over the backtest period, both in terms of raw returns and risk-adjusted performance. Furthermore, the MDP portfolio significantly outperforms, with a Sharpe of 0.43, compared to the next closest competitor – the minimum variance portfolio – with a Sharpe of 0.36. It is worth noting though that the MDP does seem to generate higher turnover, 82% one way versus 76% for the minimum variance portfolio.

This paper is a useful starting point for those considering some of new, "anti-benchmark" portfolio construction techniques

Our take

This paper is a useful starting point for those considering alternative ways of building portfolios. Like the minimum variance portfolio, the MDP is arguably more passive, because it does not require explicit forecasts of asset returns. As well, the empirical results do suggest that, beyond the attractive theoretical properties, there are real-world performance gains to be had from such "anti-benchmark" techniques.

Paper 5: "Do realized skewness and kurtosis predict the cross-section of equity returns?"

- Diego Amaya, Peter Christoffersen, Kris Jacobs, and Aurelio Vasquez
- SSRN, available at http://ssrn.com/abstract=1898735

Academic research is starting to move away from the standard monthy/ quarterly/yearly frequency

Why it's worth reading

Historically, most academic research has focused on monthly, quarterly, or yearly time frames. Likewise, the majority of practitioner quantitative research is conducted at a monthly time horizon. However, this is starting to change rapidly with the advent of new database technologies and the greater availability of high frequency data. This paper is a case in point: the authors use high frequency intraday data (five-minute returns) to construct factors, and then test the investment strategy in a lower frequency environment (weekly horizon). The approach coincides with the direction we have been taking in our recent research[3].

This paper uses TAQ data to compute intraday skewness and kurtosis

Data and methodology

The authors analyzed all listed stocks in the Trade and Quote (TAQ) database from January 4, 1993 to September 30, 2008. Stock returns are calculated using five-minute bars from 9:30AM EST to 4PM EST. Some minimum requirements on liquidity are also set.

Stocks with higher skewness underperform; stocks with higher kurtosis outperform

Results

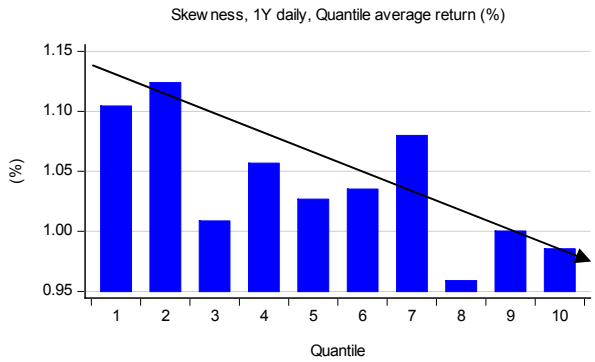
The authors found a strong negative relationship between realized skewness and next week's stock returns, and a positive relationship between kurtosis and next week's returns. A decile spread strategy based on skewness generates an average weekly return of 43 bps, while the same strategy based on kurtosis generates 16 bps.

We find similar results at a daily frequency, although the relationship between kurtosis and future returns is very non-linear

Our take

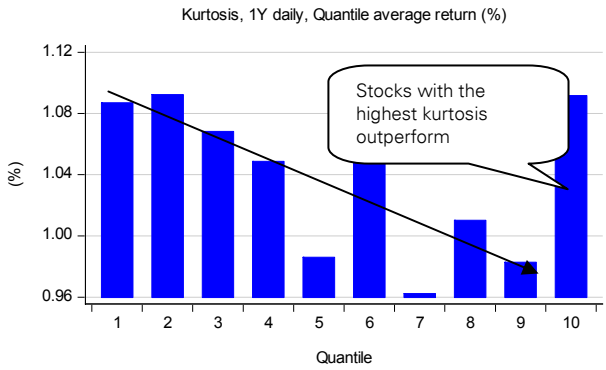
In our factor library, we also have both factors (albeit calculated using daily returns). If we measure factor performance using hedged decile portfolios, we find similar results. However, if we measure factor performance using rank information coefficient, the result for kurtosis is exactly the opposite, i.e., we find a negative relationship between kurtosis (daily) and forward returns. As shown in Figure 3 the issue lies in the decile of stocks with the highest kurtosis. We need to better understand this nonlinear pattern in realized kurtosis and the economic reason.

Figure 2: Average decile portfolio returns, skewness



Source: Deutsche Bank

Figure 3: Average decile portfolio returns, kurtosis



Source: Deutsche Bank

[3] We have tested three different high frequency factors in our own research: order imbalance, abnormal volume in large trade, and residual probability of informed trading. See Cahan, R., Luo, Y., Alvarez, M., and Jussa, J., 2010, "Signal Processing: Frequency arbitrage", *Deutsche Bank Quantitative Strategy*, November 10, 2010.

Upcoming conferences

Europe

Figure 4: European event calendar

Date	Location	Conference
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	**Paris**	**Quant Invest 2011**
December 2011		http://www.terrapinn.com/2011/quant-invest/
30 November – 2	**London**	**Quantitative Equity Methods and Analysis**
December 2011		TBA

Source: Deutsche Bank

North America

Figure 5: 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

Asia

Figure 6: Asian event calendar

Date	Location	Conference
31 August–1 September	**Hong Kong**	**ETF Index Investment Summit**
2011		http://www.wbresearch.com/etfs/
6-8 September 2011	**Hong Kong**	**Trading Architecture Asia 2011**
		http://www.wbresearch.com/tradingarchitecture/
8-12 October 2011	**Bali**	**The 12th Asian Academic Accounting Association (AAAA) Annual Conference**
		http://aaaa2011.fe.ui.ac.id/dcp.php
12-13 December 2011	**Sydney**	**QMF 2011 Practitioner Workshops**
		http://datasearch2.uts.edu.au/qfrc/news-events/events-detail.cfm?ItemId=26538
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

Short-term residual reversal

- David Blitz, Joop Huji, Simon Lansdorp, and Marno Verbeek
- SSRN, available at http://ssrn.com/abstract=1911449
- Abstract: "Conventional short-term reversal strategies exhibit dynamic exposures to the Fama and French (1993) factors. We develop a novel reversal strategy based on residual stock returns that does not exhibit these exposures and consequently earns risk-adjusted returns that are twice as large as those of a conventional reversal strategy. Residual reversal strategies generate statistically and economically significant profits net of trading costs, even when we restrict our sample to large-cap stocks over the post-1990 period. Our results are inconsistent with the notion that reversal effects are attributable to trading frictions, liquidity, or non-synchronous trading of stocks and pose a serious challenge to rational asset pricing models."

Time horizon trading and the idiosyncratic risk puzzle

- Juliana Malagon, David Moreno, Rosa Rodríguez
- SSRN, available at http://ssrn.com/abstract=1891985
- Abstract: "We analyze if the idiosyncratic risk puzzle pointed out by Ang et al., (2006, 2009) can be explained by the existence of market participants with different time horizons. To decompose returns distribution in different time-scales, each one corresponding to a group of investors, we adopt a Wavelet Multiresolution Analysis. Our approach splits the nonlinear link between expected returns and idiosyncratic risk into two linear relationships: a positive one for long-term investors and a negative one for short-term agents indicating that the puzzle is only observed for short-term investors. Our results are robust to several types of wavelets, different definitions of short-term investors and to various measures of idiosyncratic risk. The negative link for short-term investors is challenging and might be attributed to isolation of investment strategies such as high frequency trading and hedge funds."

Another look at trading costs and short-term reversal profits

- Wilma de Groot, Joop huji, and Weili Zhou
- *Journal of Banking and Finance*, forthcoming, available at http://www.sciencedirect.com/science/article/pii/S0378426611002263
- Abstract: "Several studies report that abnormal returns associated with short-term reversal investment strategies diminish once trading costs are taken into account. We show that the impact of trading costs on the strategies' profitability can largely be attributed to excessively trading in small cap stocks. Limiting the stock universe to large cap stocks significantly reduces trading costs. Applying a more sophisticated portfolio construction algorithm to lower turnover reduces trading costs even further. Our finding that reversal strategies generate 30 to 50 basis points per week net of trading costs poses a serious challenge to standard rational asset pricing models. Our findings also have important implications for the understanding and practical implementation of reversal strategies."

Risk, uncertainty, and expected returns

- Turan G. Bali and Hao Zhou
- SSRN, available at http://ssrn.com/abstract=1898878

- Abstract: "Based on a consumption-based asset pricing model with risk and uncertainty, we investigate whether the time-varying exposures of equity portfolios to the market and uncertainty factors predict their future returns. The empirical results from the size, book-to-market, and industry portfolios as well as individual stocks indicate that the conditional covariances of equity portfolios (individual stocks) with market and uncertainty predict the time-series and cross-sectional variation in stock returns. We find that equity portfolios that are highly correlated with economic uncertainty proxied by the variance risk premium (VRP) carry a significant premium relative to portfolios that are uncorrelated or lowly correlated with VRP. The insignificant alpha estimates indicate that the conditional asset pricing model proposed in the paper also explains the industry, size, and value premiums."

Average stock variance and market returns: Evidence of time-varying predictability at the daily frequency

- Huafeng Chen, Hernan Ortiz-Molina, and Siliang Zhang
- *Journal of Portfolio Management*, Volume 37, Number 4, available at http://www.iijournals.com/doi/abs/10.3905/jpm.2011.37.4.086
- Abstract: "Chen, Ortiz-Molina, and Zhang develop a daily measure of average stock variance and study whether it can predict market returns one day ahead. Using a time-invariant prediction model, they find a robust predictive relation between these variables that cannot be used to profitably time the market. A closer look reveals that the strength and even the direction of the predictive relation vary significantly over short periods of time. Moreover, a simple timing strategy that exploits this variation over time significantly outperforms the market buy-and-hold strategy in terms of the mean-variance trade-off. The evidence shows that predictability is stronger during business cycle contractions and that the timing strategy is profitable because it avoids losses during bad times. The evidence also shows that parameter breaks occur very frequently over short periods of time, and not only when the economy switches from one phase of the business cycle to another. The authors' results suggest that idiosyncratic risk matters in asset pricing and that its effect is time varying."

Optimization, portfolio construction, and risk management

Where the black swans hide and the 10 best days myth

- Mebane Faber
- SSRN, available at http://ssrn.com/abstract=1908469
- Abstract: "Below we examine market outliers in financial markets. How much effect do these outliers have on long term performance? Can the investor prepare for these anomalies, or are they truly 'black swans' that cannot be managed? In this issue we examine numerous global financial markets on daily and monthly time frames. We find that these rare outliers have a massive impact on returns. However, these outliers tend to cluster and the majority of both good and bad outliers occur once markets have already been declining. We critique the "missing the 10-best-days" argument proffered by advocates of buy and hold investing, demonstrating that a significant majority of the 10 best days and the 10 worst days occur in declining markets. We continue to advocate that investors attempt to avoid declining markets where most of the volatility lies, and conclude that market timing and risk management is indeed possible, and beneficial to the investor."

A survey of alternative equity index strategies

- Tzee-man Chow, Jason Hsu, Vitali Kalesnik, and Bryce Little
- *Financial Analysts Journal*, forthcoming, available at http://www.cfapubs.org/doi/abs/10.2469/faj.v67.n5.5
- Abstract: "After reviewing the methodologies behind the more popular quantitative investment strategies offered to investors as passive equity indices, the authors devised an integrated evaluation framework. They found that the strategies outperform their cap-weighted counterparts largely owing to exposure to value and size factors. Almost entirely spanned by market, value, and size factors, any one of these strategies can be mimicked by combinations of the others. Thus, implementation cost is a better evaluation criterion than returns."

Tracking error rebalancing

- Lydia Chan and Sunder Ramkumar
- *Journal of Portfolio Management*, Volume 37, Number 4, available at http://www.iijournals.com/doi/abs/10.3905/jpm.2011.37.4.054
- Abstract: "The goal of strategic rebalancing is to limit unintended drift or tracking error from the strategic policy benchmark without incurring large transaction costs. Traditional rebalancing, however, specifies fixed bands around each asset class and can result in significant tracking error and high transaction costs in stressed markets, as volatility and illiquidity increase. Tracking error rebalancing is an alternative approach in which investors directly monitor tracking error (rather than asset class misweights) and ensure that tracking error stays below a specified threshold using trades that minimize transaction costs. Rather than trading all assets that breach the fixed bands, investors use current estimates of volatilities and costs to determine the trades that result in the most risk reduction per unit cost. In stressed markets, this strategy can help avoid trades in illiquid assets and exploit asset class relationships to reduce risk at significantly lower costs."

Downside risk management in emerging markets

- Issam S. Strub, Edward D. Baker III
- SSRN, available at http://ssrn.com/abstract=1889252
- Abstract: "This article presents various tools and strategies for downside risk management for an emerging markets equity long only product. We evaluate different risk adjusted strategies applied to asset allocation between emerging markets equities and cash and at a later stage between emerging markets equities and US bonds. We demonstrate that it is possible to significantly reduce both volatility and maximum drawdown without a notable decrease in returns by adjusting the allocation to equities according to risk levels."

Exchange-traded funds, persistence in tracking errors and information dissemination

- Sangheon Shin, Gokce Soydemir
- SSRN, available at http://ssrn.com/abstract=1896515
- Abstract: "We estimate tracking errors from 26 exchange-traded funds (ETFs) utilizing three different methods and test their relative performance using Jensen's model. We find that tracking errors are significantly different from zero and display persistence. Based on Jensen's alpha, risk adjusted returns are significantly inferior to benchmark returns for all ETFs with two exceptions at conventional significance levels revealing that passive investment strategy does not outperform market returns. We then examine the degree to which frequently used factors such as expense ratio, dividends, exchange rate and spreads of trading prices may be underlying sources of tracking errors causing this underperformance. We find that the change in the exchange rate is a significant source of tracking errors. Our serial correlation test, runs test and panel regression analysis reveal that Asian markets display relatively greater persistence and therefore are less efficient in disseminating information and noisier in filtering the information contained in returns."

Tail risk attribution

- Andreas Steiner
- SSRN, available at http://ssrn.com/abstract=1908148
- Abstract: "Tail risk refers to the shape of the left tail of the distribution of investment returns. Return distributions are traditionally described in terms of their first for moments: mean return, volatility, skewness and kurtosis. Attribution is a descriptive approach used in portfolio analysis to explain a certain magnitude as the sum of contributions from portfolio constituents as well as contributions from constituent attributes. In this research note, we propose a tail risk attribution methodology which allows to explain portfolio modified value-at-risk in terms of contributions from assets as well as mean, volatility, skewness and kurtosis. The approach is free of any residuals."

Asset allocation and sector/style rotation

Predicating market components out of sample: Asset allocation implications

- Aiguo Kong, David Rapach, Jack Strauss, and Guofu Zhou
- *Journal of Portfolio Management*, Volume 37, Number 4, available at http://www.iijournals.com/doi/abs/10.3905/jpm.2011.37.4.029
- Abstract: "The authors analyze out-of-sample return predictability for components of the aggregate market, focusing on the well-known Fama–French size/value-sorted portfolios. Employing a forecast combination approach based on a variety of economic variables and lagged component returns as predictors, they find significant evidence of out-of-sample return predictability for nearly all component portfolios. Moreover, return predictability is typically much stronger for small-cap/high book-to-market value stocks. The pattern of component return predictability is enhanced during business cycle recessions, linking component return predictability to the real economy. Considering various component-rotation investment strategies, the authors show that out-of-sample component return predictability can be exploited to substantially improve portfolio performance."

Seasonal asset allocation: Evidence from mutual fund flows

- Mark Kamstra, Lisa Kramer, Maurice Levi, and Russ Wermers
- SSRN, available at http://ssrn.com/abstract=1907904
- Abstract: "This paper explores U.S. mutual fund flows, finding strong evidence of seasonal reallocation across funds based on fund exposure to risk. We show that substantial money moves from U.S. equity to U.S. money market and government bond mutual funds in the fall, then back to equity funds in the spring, controlling for the influence of past performance, advertising, liquidity needs, capital gains overhang, and year-end influences on fund flows. We find a strong correlation between mutual fund net flows (and within-fund-family exchanges) and the onset of and recovery from seasonal depression, consistent with the hypothesis that investor risk aversion varies with the seasons. Further, we find stronger seasonality in Canadian fund flows (a more northerly location relative to the U.S., where seasonal depression is more severe), and a reverse seasonality in fund flows for Australia (where the seasons are reversed). While prior evidence regarding the influence of seasonal depression on financial markets relies on seasonal patterns in asset returns, we provide the first direct trade-related evidence."

Should investors include commodities in their portfolios after all? New evidence

- Charoula Daskalaki and George Skiadopoulos
- *Journal of Banking and Finance*, Volume 35, Issue 10, available at http://www.sciencedirect.com/science/article/pii/S0378426611000938
- Abstract: "This paper investigates whether an investor is made better off by including commodities in a portfolio that consists of traditional asset classes. First, we revisit the posed question within an in-sample setting by employing mean–variance and non-mean–variance spanning tests. Then, we form optimal portfolios by taking into account the higher order moments of the portfolio returns distribution and evaluate their out-of-sample performance. Under the in-sample setting, we find that commodities are beneficial only to non-mean–variance investors. However, these benefits are not preserved out-of-sample. Our findings challenge the alleged diversification benefits of commodities and are robust across a number of performance evaluation measures, utility functions and datasets. The results hold even when transaction costs are considered and across various sub-periods. Not surprisingly, the only exception appears over the 2005–2008 unprecedented commodity boom period."

Time-varying international equity market integration: Evidence from market price of Exchange-Traded Funds

- Sangheon Shin
- SSRN, available at http://ssrn.com/abstract=1896466
- Abstract: "We examine time-varying international equity market integration using the VAR-based rolling cointegration analysis and coefficients of the error correction terms. Using Exchange-traded funds (ETFs) as proxies for international equity markets allows us to take advantages of avoiding discrepancy of trading time, exchange rate volatility and lack of liquidity. Applying different sizes of window for the rolling cointegration analysis, we reveal that 500-day (or less) windows may not be long enough and more likely to have results biased. We also find three sub-periods showing relatively strong cointegrating relationships, but results for the rest of sample period display weak integration among international equity markets. Then, we conclude that investors can benefit by diversifying their investments to major equity markets and others. Our findings from the error correction model exhibit that major markets with greater coefficients are more efficient than the markets with relatively smaller coefficients. After all, there might be an arbitrage opportunity due to a different response speed of short-run dynamics to the deviations from long-run equilibrium. We can easily apply our findings to actual investment strategies by simply buying stocks of ETFs, and enjoy the benefits from diversification and arbitrage opportunities."

Hedging Equity Market Risk in Hedge Fund Investing: A New Approach

- Daniel Hartmann, Dieter G. Kaiser
- The Journal of Portfolio Management, Summer 2011, Vol. 37, No.4, available at http://www.iijournals.com/doi/abs/10.3905/jpm.2011.37.4.138
- Abstract: "Hartmann and Kaiser argue that investors in funds of hedge funds underestimate the traditional equity market beta of these perceived absolute return investment vehicles. Hence, during times of financial crisis when the correlations of most asset categories with each other increase dramatically, the traditional equity market beta can have an adverse effect on the performance of funds of funds. Because investors in such environments are rarely able to redeem their fund-of-funds holdings due to low liquidity (e.g.,notice and redemption periods or lock-ups) or extraordinary circumstances (e.g., maximum redemptions, gates, and side pockets), the authors posit that the only way to decrease unwanted exposure is through overlay strategies. The academic literature so far has focused on the multifactor approach to estimate equity exposure in hedge fund portfolios. The authors compare different hedging approaches: a pure value-at-risk (VaR)-based approach, a technical market risk signal approach, and a combination of both over the May 2004–September 2009 period using weekly data from an investable hedge fund index. Their results suggest that using a risk overlay system for funds of hedge funds significantly decreases the downside risk of hedge fund investing during economic crises."

Trading and market impact

The breakdown of standard microstructure techniques: And what to do about it

- Craig Holden and Stacey Jacobsen
- SSRN, available at http://ssrn.com/abstract=1911491
- Abstract: "U.S. equity markets have explosively increased their trade and quote frequency and the decline of the dominance of the NYSE has increased the importance of National Best Bid and Offer (NBBO) quotes. We address three NBBO issues: (1) millisecond versus second timestamps, (2) withdrawn quotes, and (3) canceled quotes. We find that each of these three issues is a significant and independent source of distortion in standard measures of market quality. The distortions are so massive that standard microstructure techniques essentially fail. We test fourteen different methods for matching trades to quotes based on different combinations of three clean-up techniques, two alternative quote sources, and three quote timing techniques. We conclude that the first best solution is to use the NBBO file in the Daily Trade And Quote (DTAQ) database, because this is the only way to avoid major distortions on most performance criteria. If a researcher is financially constrained to using only the Monthly Trade And Quote (MTAQ) database, then the second best solution is to use two clean-up techniques (Withdrawn Quotes and exclude the remaining NBBO Crossed and Locked observations) and use Interpolated Time as the quote timing technique. Each of these three techniques independently contributes to reducing distortion on most performance criteria and the combination of all three goes the furthest distance possible in reducing distortion. Looking to the future, we anticipate the ultimate demise of the NBBO and propose to replace it with a Relative Best Bid and Offer (RBBO) that is different for each market center."

Intraday jumps and US macroeconomic news announcements

- Kevin Evans
- *Journal of Banking and Finance*, Volume 35, Issue 10, available at http://www.sciencedirect.com/science/article/pii/S0378426611000896
- Abstract: "This paper applies recent non-parametric intraday jump detection procedures to investigate the presence and importance of intraday jumps in US futures markets. More importantly, the paper investigates the extent to which statistically significant intraday jumps are associated with US macroeconomic news announcements. Jumps are prevalent, large and contribute heavily to total daily price variation. Approximately one third of jumps correspond to US macroeconomic news announcements, with pure announcement effects causing large increases in the absolute sizes of jumps and the informational surprise of the announcement explaining large proportions of the jumps. The statistical and economic significance of news-related jumps is confirmed by results that show higher volatility persistence, predictability of lower frequency returns, larger effects on microstructure variables, jump clustering and co-jumps from these jumps versus non-news-related jumps, although there are some interesting variations across asset classes."

Revamping Liquidity Measures: Improving Investibility in Emerging and Frontier Market Indices and Their Related ETFs

- Andrew Clark
- SSRN, available at http://ssrn.com/abstract=1893684
- Abstract: "In this article we present a new way of measuring stock liquidity. The method uses price and bid-ask spread (not dollar volume, transactions or turnover) as the primary inputs and Extreme Value Theory to build the measure. We demonstrate its value by its ability to identify successfully liquid stocks in emerging and frontier markets better than volume, transaction and turnover based measures of liquidity. We offer this new measure because recent research has demonstrated that volume, transaction and turnover based measures do not on their own measure liquidity."

On the performance of the tick test

- Marcelo Perlin, Chris Brooks, Alfonso Dufour
- SSRN, available at http://ssrn.com/abstract=1891914
- Abstract: "In microstructure studies the sign of a trade plays an important role, it says which side (buyer or seller) is the aggressor in a financial transaction. Usually, this information is not available from empirical data and has to be assessed by indirect methods. A general procedure used to predict the sign of a trade in the absence of quote data is to compare the adjacent trade prices with a simple set of rules. This methodology is called the tick test and was popularised by the 1991 seminal paper of Charles Lee and Mark Ready. In the present paper I investigate the accuracy of the tick test from an analytical point of view by providing a closed formula for the performance of the prediction algorithm. This formula takes as input the spread of the traded asset, the volatility of the innovations, the proportion of buy/sell trades and outputs the percentage of times that the tick test will make correct predictions regarding the sign of a trade. Further analysis shows that by imposing a naive guess for the proportion of buys and sells in the data, the formula for the tick test performance takes as input simple statistics from a vector of trade price differences. This means that, without the need for quote data (or the real sign of the trades), the formula can assess the percentage of cases in which the tick test will make correct predictions. Using tick data for ten heavily traded stocks in the Brazilian equity market I was able to compare the values from the analytical formula against the empirical performance of the tick test. The analysis showed that the derived formula is quite realistic in assessing the performance of the prediction algorithm."

Optimal trend following trading rules

- Min Dai, Qing Zhang, Qiji Jim Zhu
- SSRN, available at http://ssrn.com/abstract=1762118
- Abstract: "We develop an optimal trend following trading rule in a bull-bear switching market, where the drift of the stock price switches between two parameters corresponding to an uptrend (bull market) and a downtrend (bear market) according to an unobservable Markov chain. We consider a finite horizon investment problem and aim to maximize the expected return of the terminal wealth. We start by restricting to allowing flat and long positions only and describe the trading decisions using a sequence of stopping times indicating the time of entering and exiting long positions. Assuming trading all available funds, we show that the optimal trading strategy is a trend following system characterized by the conditional probability in the uptrend crossing two threshold curves. The thresholds can be obtained by solving the associated HJB equations. In addition, we examine trading strategies with short selling in terms of an approximation. Simulations and empirical experiments are conducted and reported."

What's not there: The odd-lot bias in TAQ data

- Maureen O'Hara, Chen Yao, and Mao Ye
- SSRN, available at http://ssrn.com/abstract=1892972
- Abstract: "We investigate the systematic bias that arises from the exclusion of trades for less than 100 shares from TAQ data. In our sample, we find that the median number of missing trades per stock is 19%, but for some stocks missing trades are as high as 66% of total transactions. Missing trades are more pervasive for stocks with higher prices, lower liquidity, higher levels of information asymmetry and when volatility is low. We show that odd lot trades contribute 30 % of price discovery and trades of 100 shares contribute another 50%, consistent with informed traders splitting orders into odd-lots and smaller trade sizes. The truncation of odd-lot trades leads to a significant bias for empirical measures such as order imbalance, challenges the literature using trade size to proxy individual trades, and biases measures of individual sentiment. Because odd-lot trades are more likely to arise from high frequency traders, we argue their exclusion from TAQ and the consolidated tape raises important regulatory issues."

Finance theory and techniques

The common component of idiosyncratic volatility

- Jefferson Duarte, Avraham Kamara, Stephan Siegel, and Celine Sun
- SSRN, available at http://ssrn.com/abstract=1905731
- Abstract: "We advance that a systematic risk factor, missing from Fama and French (1993), explains why high idiosyncratic volatility (IV) stocks yield lower risk-adjusted returns than low IV stocks. A single principal component, associated with business cycle variables, explains 32% of IV variation. Almost the entire mispricing reported in Ang, Hodrick, Xing and Zhang (2006) occurs in portfolios sorted on IV predicted by this component. A new risk factor, PIV, the return on a high minus low predicted IV portfolio, contributes significantly to the pricing of 25 Fama-French portfolios, beyond size and value. Out-of-sample, PIV substantially reduces mispricing of IV portfolios."

The macroeconomic content of international equity market factors

- Sarantis Tsiaplias
- *Quantitative Finance*, forthcoming, available at http://www.tandfonline.com/doi/abs/10.1080/14697688.2011.572902
- Abstract: "Although existing research has examined the association between macroeconomic data and particular equity markets, little is known regarding the economic content of the latent factors common to international equity markets. This paper considers the macroeconomic information incorporated in unobserved common equity market factors, as well as the possibility that the macroeconomic sensitivities of the factors differ across alternative levels of volatility. Several models are estimated for 15 developed equity markets to examine the economic composition of the common factors, thereby providing an alternative perspective on the economic fundamentals underlying equity markets. A formal Bayesian selection process suggests that a common structure incorporating global and European factors is preferred to the baseline case of a single global factor or the extended scenario of dual global factors. The common factors are associated with a small set of macroeconomic variables."

The equity risk premium: Empirical evidence from emerging markets

- Michael Donadelli Sr., Lorenzo Prosperi
- SSRN, available at http://ssrn.com/abstract=1893378
- Abstract: "The understanding of the Equity Risk Premium (ERP) and the Equity Premium Puzzle (Mehra and Prescott 1985), is still widely discussed in the economic and financial literature. The purpose of this paper is to show differences in the ERP between developed and emerging markets. Using data from both markets, we first provide an ex-post simple time series analysis on the ERP. Compared to developed markets, and in line with existing literature, we find that emerging markets compensate investors with higher returns. We observe that the time varying nature of the equity risk premium in emerging economies, relates mainly to economic cycles, shocks and other macro phenomena (i.e. global financial market integration). Basic statistics also show that during the last decade the ERP shrunk, especially in advanced economies. To improve investigations on the higher emerging markets' equity premium, a standard global asset pricing model is adopted. On one hand, we mainly find that the one-factor model does not fully characterize emerging markets' equity premia. On the other hand, we discover that the inclusion of liquidity conditions and time-varying components provides reasonable explanations for the behaviour of equity premia in these "young"' markets. Our final findings mainly suggests that global business cycle and financial integration process are crucial in determining the risk associated to emerging markets' investments."

New evidence on short-term reversals in monthly stocks returns: Overreaction or illiquidity?

- Christopher Stivers and Licheng Sun
- SSRN, available at http://ssrn.com/abstract=1911506
- Abstract: "Are short-term contrarian profits in monthly stock returns driven by investor overreaction to new information? Or, is the evidence more consistent with temporary reversals associated with illiquidity? We confront these potential explanations with new empirical evidence over 1926 to 2010 that updates and further dissects the short-term reversal phenomenon in monthly stock returns. First, we find that short-term reversals have substantially weakened over the post-discovery period since 1990. Second, we find that short-term reversals are much stronger for small-cap and low-priced stocks. Over the post-discovery period, reliable reversals are only evident for small-cap stocks (the smallest quintile). Third, we find that the short-term reversals are much stronger in January for both the pre- and post-discovery period. For the post-discovery period, only the small-cap stocks exhibit reliable reversals for the non-January months. We also find no evidence of the lead-lag size-based effect contributing to contrarian profits. Finally, contrarian strategy implemented on monthly industry-level returns yield negative returns, but the January performance is reliably better. Our findings are inconsistent with the notion of an ongoing, pervasive overreaction to firm-level information flows. Rather, our results are consistent with an illiquidity-based explanation for the short-term reversal phenomenon in monthly stock returns."

An improved estimation method and empirical properties of the probability of informed trading

- Yuxing Yan and Shaojun Zhang
- *Journal of Banking and Finance*, forthcoming, available at http://www.sciencedirect.com/science/article/pii/S0378426611002433
- Abstract: "We report evidence that boundary solutions can cause a bias in the estimate of the probability of informed trading (PIN). We develop an algorithm to overcome this bias and use it to estimate PIN for nearly 80,000 stock-quarters between 1993 and 2004. We obtain two sets of PIN estimates by using the factorized likelihood functions in both Easley, Hvidkjaer, and O'Hara (EHO, 2010) and Lin and Ke (LK, 2011), respectively. We find that the estimate based on the EHO factorization is systematically smaller than the estimate based on the LK factorization, meaning that there is a downward bias associated with the EHO factorization. In addition, we find that boundary solutions appear with a very high frequency when the LK factorization is used. Thus it is necessary to use the LK factorization together with the algorithm in this paper. At last, we document several interesting empirical properties of PIN."

Regime changes and financial markets

- Andrew Ang and Allan G. Timmermann
- NBER Working Paper No. 17182, available at http://www.nber.org/papers/w17182
- Abstract: "Regime switching models can match the tendency of financial markets to often change their behavior abruptly and the phenomenon that the new behavior of financial variables often persists for several periods after such a change. While the regimes captured by regime switching models are identified by an econometric procedure, they often correspond to different periods in regulation, policy, and other secular changes. In empirical estimates, the regime switching means, volatilities, autocorrelations, and cross-covariances of asset returns often differ across regimes, which allow regime switching models to capture the stylized behavior of many financial series including fat tails, heteroskedasticity, skewness, and time-varying correlations. In equilibrium models, regimes in fundamental processes, like consumption or dividend growth, strongly affect the dynamic properties of equilibrium asset prices and can induce non-linear risk-return trade-offs. Regime switches also lead to potentially large consequences for investors' optimal portfolio choice."

What does the value premium tell us about the term structure of equity returns?

- Huafeng Chen
- SSRN, available at http://ssrn.com/abstract=1903904
- Abstract: "Conventional wisdom holds that growth stocks (low book-to-market stocks) have higher future cash-flow growth rates and longer durations than value stocks, and that the value premium implies a downward sloping equity term structure. Empirical evidence suggests the opposite. Earnings of growth stocks grow more slowly than those of value stocks for both rebalanced and buy-and-hold portfolios. I point out survivor-ship and static biases in common empirical procedures. Growth stocks behave like short-duration assets: their prices are less sensitive to changes in discount rates, and their discount rates are more volatile. The value premium implies an upward sloping equity term structure. I argue that my results help explain a number of puzzling facts."

Equity issuance, equity mutual fund flows, and noise trader sentiment

- Hsin-Hui Chiu and Omesh Kini
- SSRN, available at http://ssrn.com/abstract=1908503
- Abstract: "We examine the relation between various facets of the equity issuance process and monthly fund flows into equity mutual funds during the period 1986 – 2009. We find that more IPO and SEO firms issue equity and fewer IPO firms withdraw their equity issue when equity fund flows are higher. In addition, our results indicate that more firms file with the SEC when the predicted equity fund flows in the expected month of equity issuance is greater. We also find that price revisions are positively related to contemporaneous equity fund flows and unexpected equity fund flows for both IPO and SEO issuances. Initial returns, however, are positively related to contemporaneous equity fund flows only for IPO issuances. This result, in conjunction with a lack of a relation for SEO issuances, is consistent with the notion that equity fund flows capture noise trader sentiment. Finally, our results related to issuances, price revisions and initial returns are driven entirely by retail, and not institutional, equity fund flows, thereby indicating that fund flows attributable to unsophisticated retail investors are the reason why aggregate fund flows have a component that is related to investor sentiment."

Derivatives and volatility

The anomalous behavior of the S&P covered call closed end fund

- David P. Simon
- Journal of Derivatives & Hedge Fund 17, 165-180 (August 2011)
- Abstract: "This article examines the anomalous behavior of the S&P Covered Call Closed End (BEP) Fund, which traded in 2007 at substantial premiums to its net asset value, which reached 23 per cent. The large premium is striking in light of the highly transparent and easy to replicate strategy of the fund, which involves rolling over one-month, at-the-money S&P 500 index covered calls. The article finds that the large premium was a result of BEP returns overreacting to positive S&P returns, adjusted for the deltas and gammas of the options that the fund was short. Another possible explanation for the emergence of the large premium was the near doubling of the VIX from very low and stable levels, which may have encouraged unsophisticated investors to buy the BEP fund at increasingly elevated premiums. The article then examines the anomaly from the perspective of the noise trader literature and finds that during the period of high premiums the volatility of BEP returns was not unusually high relative to the volatility of the underlying fundamentals, and that large premiums did not emerge at other covered call closed end funds. The evidence also indicates that short positions grew substantially during this period, which suggests that short covering may have been a factor behind the surge of the premium."

What does implied volatility skew measure?

- Scott Mixon
- *Journal of Derivatives*, Summer 2011, Vol. 18, No. 4, available at http://www.iijournals.com/doi/abs/10.3905/jod.2011.18.4.009
- Abstract: "The Black–Scholes model has been acknowledged as a brilliant breakthrough in asset pricing theory. But in applying it to real world options, problems immediately arose, because the volatility that make an option's model value consistent with its market price is different for different strike prices: the wellknown "volatility smile." Over time, the smile evolved into a more monotonic, downward-sloping "skew," and traders became comfortable with the idea of modeling its behavior and describing option market conditions in terms of the level and skew of implied volatilities. A standard explanation for the skew is that the return distribution is not lognormal; in particular, it generally has a negative third moment (i.e., negative skewness). The similarity of the terms and the (potential) connection between the volatility skew and statistical skewness is one source of confusion. Another is that (unlike skewness) there is no standard measure for the volatility skew. Mixon explores these issues and reviews a number of common skew measures. One significant result is that most of them vary strongly with the level of volatility, making comparisons across different underlying assets or over time difficult. After examining several performance measures, Mixon suggests that the most useful measure of the volatility skew is the difference between the implied volatilities for a 25 delta put and a 25 delta call, divided by the implied volatility for a 50 delta option."

Appendix 1

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