

## Idiosyncratic Risk and Expected Stock Returns

### 1. High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence

Andrew Ang, Roger F. Murray Professor of Finance, Columbia Business School, Columbia University, and NBER, made available a paper by himself, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang, entitled "High Idiosyncratic Volatility and Low Returns: International and Further US Evidence". Ang had made a presentation at the Spring, 2004 Q-Group<sup>®</sup> Seminar.

In previous work, Ang (Ang, Hodrick, Xing, and Zhang, 2006) reported on research that explored whether creating portfolios of US stocks sorted on the basis of their idiosyncratic volatility could lead to the identification of market mispricing. He and his co-authors found that the average return on the quintile with the lowest idiosyncratic volatility exceeded that on the portfolio with the highest idiosyncratic volatility by over 1 percent per month. The present paper finds that this result obtains in other markets.

Ang reported a second new finding: that the negative spread in returns between stocks with high and low idiosyncratic volatility in the international markets strongly commoves with the difference in returns between US stocks with high and low idiosyncratic volatility. The authors do not claim this represents a priced risk factor: no theoretical

framework exists to understand why high-idiosyncratic volatility stocks are more highly demanded and thus have lower expected returns. However, they look further at the data richer US market to rule out explanations based on market frictions, information dissemination, and on option pricing. They also control for other risk characteristics, for example liquidity risk, in their analysis.

In the analysis of US stocks the authors define idiosyncratic volatility using a Fama-French model.

$$r_i = \alpha_i^L + \beta_i^L MKT^L + s_i^L SMB^L + h_i^L HML^L + \varepsilon_i^L$$

where  $MKT$  is the market excess return,  $SMB$  is the Fama-French size factor,  $HML$  is the Fama-French value factor,  $r_i$  is the daily excess U.S. dollar return of the stock  $i$  and the L-FF factors are also expressed in U.S. dollars. The idiosyncratic volatility for stock  $i$  is measured as the standard deviation of the residuals after estimating the above equation using daily excess returns over the past month.

The construction of models for other countries is similar but the authors make use of local excess return, size, and value factors. They additionally develop a regional model grouping 23 countries into three regions and a world model using daily excess returns on firms from 23 developed markets (MSCI Developed Country Index) and the one-month US Treasury bill rate.

They then examined the relation between total volatility and

idiosyncratic volatility with respect to local, regional and world versions of the their model using a series of two-stage Fama and MacBeth (1973) regressions. They regressed the cross-sectional firm excess returns on idiosyncratic volatility together with various risk factor loadings, some firm characteristics, and other control variables. They then used the time series of the regression coefficients to test whether the average coefficient on the lagged idiosyncratic volatility measure is significantly different from zero, taking into account serial correlation in the coefficient estimates.

$$r_i(t, t + 1) = c + \gamma\sigma_i(t - 1, t) + \lambda'_\beta\beta_i(t, t + 1) + \lambda'_z z_i(t) + \varepsilon_i(t + 1)$$

where  $r_i(t, t + 1)$  is stock  $i$ 's excess return from month  $t$  to  $t + 1$ ,  $\sigma_i(t-1, t)$  is stock  $i$ 's idiosyncratic volatility computed using daily data over the previous month from  $t-1$  to  $t$ ,  $\beta_i(t, t + 1)$  is a vector of risk factor loadings over the month  $t$  to  $t + 1$ , and  $z_i(t)$  is a vector of firm characteristics observable at time  $t$ . Ang noted that the *gamma* coefficient on idiosyncratic volatility should be zero under the null hypothesis of a correctly specified factor model.

The results for seven countries are summarized in the following table. Clearly high idiosyncratic risk is associated with low subsequent returns.

	U.S.	Canada	France	Germany	Italy	Japan	U.K.
<b>g</b>	-2.014	-1.224	-1.439	-2.003	-1.572	-1.955	-0.871
<b>T-stat</b>	[-6.67]	[-2.46]	[-2.14]	[-3.85]	[-2.10]	[-5.18]	[-2.54]
	36.10%	25.20%	17.80%	18.50%	16.90%	16.50%	17.40%
<b>Economic Effect*</b>	-0.73%	-0.31%	-0.26%	-0.37%	-0.27%	-0.32%	-0.15%
	*moving from 25 <sup>th</sup> to 75 <sup>th</sup> percentiles						

The coauthors concluded from this research that stocks with recent past high idiosyncratic volatility tend to have much lower, statistically significant, returns than stocks with recent past low idiosyncratic volatility both in the US and in 23 other countries, although the strongest effect was in the US.

In conclusion, after adjusting the data for differences in market, size and book-to-market factors, Ang noted that the low returns to high

idiosyncratic volatility stocks simultaneously appear in different world regions and are robust to controlling for additional factor loadings and firm characteristics. In addition, the authors found that the low returns earned by stocks with high idiosyncratic volatility around the world co-move significantly with the idiosyncratic volatility effect in the United States. In particular, after controlling for US portfolios comprising long positions in stocks with high idiosyncratic volatilities and short positions in stocks with

low idiosyncratic volatilities, the alphas of portfolio strategies trading the idiosyncratic volatility effect in various international markets are insignificant.

While the results are strong, in further analysis on US data, the authors ruled out complete explanations based on trading or clientele structures, higher moments, and information dissemination. The low returns of stocks with past high idiosyncratic volatility cannot be explained by the leverage interaction story of Johnson (2004) or by future exposure to idiosyncratic volatility. The strong international results suggest that market-specific stories are also unlikely to hold. Ang concluded that the puzzle of why high idiosyncratic volatility stocks have low returns is a global phenomenon.

## **2. Cross Sectional Variation of Stock Returns: Liquidity and Idiosyncratic Risk**

Matthew Spiegel, Professor of Finance, Yale School of Management, Yale University, made available a paper by himself and Xiaotong (Vivian) Wang entitled "Cross Sectional Variation of Stock Returns: Liquidity and Idiosyncratic Risk."

Spiegel explained the linking of two independent intellectual traditions to explain what influences expected stock returns. The first comes from the work on asset pricing and the role of idiosyncratic risk in expected returns. The second is a market microstructure examination of the link between liquidity and expected returns. The authors attempt to disentangle

empirically the roles played by the two.

Using the same Fama-French three factor model as that used by Ang in his paper in the preceding presentation, for each month the authors use the previous month to estimate the three factor model's betas in both the more often used static OLS model and in the dynamic EGARCH model. Their results indicate that the EGARCH model estimates are superior to those for the OLS model. Spiegel presented a table that showed their results.

Spiegel then described the search for the factors that determine cross sectional stock returns. Using two way sorts, his primary findings are:

- Controlling for idiosyncratic risk (EIDIO), using the EGARCH model, the bid-ask spread has little explanatory power.
- Controlling for any other factor, EIDIO and dollar volume continues to have significant explanatory power.
- When EIDIO is included, liquidity is not significant.

At this point the authors queried whether high idiosyncratic portfolio returns might be due to a missing risk factor. Using a measure frequently used in the 1980s, the Connor-Korajczyk procedure, they found no identifiable missing factors. Next, they considered whether their results were dependent on the time period chosen. A sub period analysis of four decades from January 1962 through December 2003 and for a variety of economic environments, provided no new information.

Past research indicates that both idiosyncratic risk and liquidity influence stock returns. The result of their analysis is that idiosyncratic risk and liquidity alone can explain some of the observed cross sectional variation in stock returns. However, when both are used simultaneously only idiosyncratic risk and liquidity as measured by dollar volume provide any out of sample explanatory power. In contrast, idiosyncratic risk appears to play a useful role regardless of what other variables one includes as controls.

Spiegel raised the question whether one should conclude from this paper that cost based liquidity measures play little or no role in expected stock returns and suggested that in the very unlikely event that this is true it is certainly too soon to be sure. Liquidity is difficult both to define and to measure. It is possible that there exist as yet untested or even undiscovered cost based liquidity measures that add explanatory power beyond that available from idiosyncratic risk forecasts.

Another possibility is that with better data even the current measures will produce superior out of sample forecasts. Looking forward, one can also view this paper as providing a way to test any new liquidity measure. By repeating the reported analysis one can isolate those liquidity measures which impact expected returns from those that primarily result from market returns or reflect the influence of idiosyncratic risk.

Spiegel closed by updating the data for 2007 showing that returns from the EIDIO model exceeded those from the Wilshire 5000 index by over 4 percent up to October 3, 2007.

Given that this paper and that presented by Ang both looked at idiosyncratic risk and came to somewhat different conclusions, it is important to note where they are in conflict and agreement. Spiegel did just that. He and his co-author note that their results should not necessarily be seen as in conflict with those in Ang et al. (2005, 2006). Ang used daily data, and the co-authors find that firms with very high levels of idiosyncratic risk in one month tend to have below average returns the following month. As they point out, they were showing that there exists a relationship between one month's volatility and the next month's return. Monthly data necessarily pick up long-term trends, and this paper finds return persistence to the point that one year holding periods generate positive alphas. Daily data, by contrast, tend to pick up short-term trends. Thus, one can interpret the results in Ang et al. (2005, 2006) as showing that an increase in current short-term volatility leads to lower returns in the following month, while this paper presents evidence that an increase in long-term volatility leads to higher returns. Why this dichotomy may hold is an interesting question for future theoretical work.

## **Villains of Investing and Partisan Economics**

### 3. The Investment Behavior of Buyout Funds: Theory and Evidence

Matthew Richardson, Charles Simon Professor of Applied Financial Economics and Director, New York University Salomon Center, The Stern School of Business, New York University, made available a paper entitled "The Investment Behavior of Buyout Funds: Theory and Evidence", by himself, Alexander Ljungqvist, and Daniel Wolfenzon.

Richardson's presentation dealt with the role of buyout funds in financing firms and reallocating capital to more productive sectors of the economy. The paper provides an analysis of the optimal investment plans of buyout funds where there is competition for companies to buy, capital supply is sticky in the short run, and performance has implications for future fund raising.

Richardson described the increasing influence of private equity, with now more than 9,000 funds raising more than \$1.9 trillion. Buyout funds, the focus of the research, account for 63 percent. The authors develop a simple model of a buyout fund and how it allocates capital when faced with the choice between safe and risky buyout targets. Their model suggests that buyout funds generally make acquisitions when their bargaining power is high, debt is cheap and investment opportunities are good. The empirical results support the predictions of the model. In addition they find that the investment behavior of first-time funds is significantly less sensitive to market conditions than that of experienced

funds but increases relative to older funds following a string of early successes.

Characteristics that Richardson described as important in the process are:

- Once raised the fund's size cannot be increased, unless a new fund is raised, which takes some time.
- Private equity is inherently illiquid
- There is no active secondary market
- Investments take many years to pay off
- Supply response to a demand shock is slow

To capture the limited life of a fund and the decision to draw down capital over time, we assume that the general partner (GP) raises capital at the beginning of the fund's life and then invests it in each of two rounds. At the end of the fund's life, investments are liquidated and the GP may raise a second fund which, if raised, would also be invested in two rounds.

In each investment round, the GP faces two potential buyout opportunities, each with differential NPVs and risks. The authors look at a "safe" and a "risky" buyout and determine under what conditions each buyout type will be favored both by experienced funds with an established track record and by younger funds with no track record. In addition to using fund capital, the general partner can arrange to raise

capital through the target firm depending upon credit market conditions. The following testable implications from the model are:

- 1) The GP is more likely to invest in rounds in which the overall quality of buyouts is high.
- 2) The GP is more likely to invest in rounds in which its bargaining power is high.
- 3) The GP is more likely to invest in rounds in which credit is looser.
- 4) The GP's investment returns are higher when the overall quality of buyouts is high, bargaining power is high, and credit is looser.
- 5) Younger GPs are more likely to invest in risky buyouts.
- 6) Investment by younger GPs should be less sensitive to market conditions.

The research made use of complete and detailed cash flow and investment data for 207 private equity funds raised between 1981 and 2000 from one of the earliest and largest institutional investors in private equity in the U.S. The data are for every private equity fund the limited partner invested in through 2000, representing close to \$5 billion in committed capital, as well as data for these funds' investments in 2,274 portfolio companies through 2003.

Using their framework and the data, the authors document evidence consistent with their hypotheses. Controlling for fund characteristics and market conditions, the authors

show that the competitive environment facing fund managers plays an important role in how they manage their investments. During periods in which investment opportunities are good, existing funds invest their capital faster, taking advantage of the favorable business climate. This tends to lead to significantly better returns on their investments. In contrast, when facing greater competition from other private equity funds, fund managers invest their capital more slowly. Returns on acquisitions made when competition was tougher are ultimately significantly lower. Consistent with the model, looser credit leads to more investment and higher subsequent returns.

The authors also find that the ability of a fund manager to affect the perception of its talent affects its investment behavior. In particular, they find that young fund managers' investments are less responsive to market conditions and that these managers invest in riskier targets.

The results have important implications for understanding fund performance. Assuming managers' fees are homogenous across funds, investors who have access to funds that are in a position to take advantage of the stickiness of private equity capital should earn excess returns. Other investors earn normal risk-adjusted rates of return. The fact that younger funds take larger risks can help explain the negative expected returns found by other research.

Raising the question "Why then would anyone invest in first-time funds?" Richardson provided the

possible explanation that that investments in first-time funds provide investors with an option to invest in the GP's later funds if its first-time fund has been successful. Investors may then actually earn normal expected returns on first-time funds due to the embedded option.

#### **4. Corporate Political Contributions and Stock Returns**

Michael J. Cooper, Associate Professor of Finance, The David Eccles School of Business, University of Utah, made available a paper by himself, Huseyin Gulen and Alexei V. Ovtchinnikov, entitled "Corporate Political Contributions and Stock Returns". Cooper had made a presentation at the Spring, 2004 Q-Group<sup>®</sup> Seminar.

Cooper began his presentation by highlighting the political science research into the impact of corporate political contributions that has concluded that companies do not benefit in a measurable way from political contributions but that such contributions are a "patriotic consumption good." However, he reported considerable anecdotal evidence that politicians help companies and firms help politicians. In this paper the authors report the results of their examination into whether firms that make contributions to political candidates are rewarded in terms of increased shareholder wealth, a previously untested relationship.

Cooper described the merger of two data bases to test for evidence of pervasive cross sectional return effects related to firm political

contributions. Comprehensive data on publicly traded firms' political action committee (PAC) hard money contributions to political campaigns in the U.S. from 1979 to 2004 came from the US Federal Election Commission (FEC). The authors merged these data with the CRSP/Compustat data that is widely used in finance research. The merged data capture over 70 percent of the total dollar volume of all corporate contributions and represent on average 60 percent of the market-value-weighted capitalization of all publicly traded firms in the US.

Using these data the authors calculated a number of political indices (PI) for (1) the number of candidates each company supports, (2) the strength of the contribution relationship, (3) the ability of candidates to help a firm, and (4) the power of the candidates in their elected offices, and they provide the descriptive statistics for each PI.

They find that the companies in the contributor sample are larger, worse stock performers, more profitable and more levered than those that do not make political contributions. Cooper reported that based on their analysis of the data, firms are more likely to contribute as size, leverage, market share, regulation, geographic concentration and government purchases from the company increase, and cash flow decreases.

Cooper displayed a table showing that, using the Fama Macbeth (1973) approach, political contribution indexes help explain the cross section of future returns for the firms.

More specifically, the results showed that the effects were:

- Positive for both political parties but stronger for Democrats.
- Positive for both Chambers but appear stronger for the House.
- Positively and significantly related to future performance changes.

Cooper reported that in addition:

- The degree of participation varies across industries: defense, smoke, aircraft, soda and drugs having the highest number of supported candidates per firm.
- As the number of firms decreases, the effect increases.
- As industry concentration and degree of unionization increase, the effect increases.

- As sales to government, and industry regulation increase, the effect does not appear to increase as they thought it would.

Portfolios were formed to determine whether the abnormal returns were significant and Cooper concluded that the authors found a correlation with contributions.

In conclusion, the research shows that firms do not contribute, as the political science research suggests, simply in order to consume “patriotic consumption goods” but to increase firm value.

The following table shows portfolio alpha values related to the four political indices:

Table

Monthly Abnormal Returns for Firms Participating in the Political Process,  
11/1984 — 10/2005

We form portfolios of contributing firms by weighting each firm by its relative value of a given lagged political contribution index. The portfolios are rebalanced once a year, at the end of October. The weight given to stock  $i$  in the portfolio from November of year  $t$  to October of year  $t+1$  is:

$$w_{it}^p = \frac{PI_{it}^p}{\sum_{i=1}^N PI_{it}^p}$$

where  $p$  equals the portfolio for a particular political index and  $PI_{it}^p$  is the political index value for firm  $i$  (where  $i = 1, 2, \dots, N$ ) in October of year  $t$ . We form a time series of monthly returns to each portfolio from November 1984 to October 2005. We regress the time series of portfolio returns in excess of the risk free rate on the four factors from the Fama-French-Carhart model and report the intercept (i.e., the alpha) for each portfolio. Returns are in decimal form, i.e., 0.01 is one percent. T-statistics are in parenthesis.

Portfolio	FF-4-factor alpha			
	$PI^{candidates}$ weighted	$PI^{strength}$ weighted	$PI^{ability}$ weighted	$PI^{power}$ weighted
All candidates portfolio	0.0021 (2.82)	0.0017 (2.32)	0.0022 (3.18)	0.0021 (2.86)
Democratic portfolio	0.0021 (2.97)	0.0018 (2.55)	0.0024 (3.41)	0.0022 (3.01)
Republican portfolio	0.0020 (2.67)	0.0017 (2.16)	0.0021 (2.94)	0.0021 (2.76)
House portfolio	0.0021 (2.84)	0.0018 (2.39)	0.0022 (3.16)	0.0021 (2.86)
Senate portfolio	0.0020 (2.71)	0.0016 (2.08)	0.0023 (3.09)	0.0021 (2.84)

## 5. Influence: the Ultimate Power Tool

Robert B. Cialdini, President, Influence At Work and Regent's Professor of Psychology and Marketing, Arizona State University, spoke about the influence process, the focus of his research, writing and consulting. He talked about his principles of ethical influence: reciprocity, consensus, authority, consistency, scarcity and liking but concentrated on three of the principles especially relevant to his audience. In particular, he noted that the principles were germane during times of uncertainty, like that being experienced by investors in the capital markets lately.

The first was scarcity. It is a powerful motivator to move people to "saying yes." Cialdini said people want more things they can have less of because people are loss averse. For members of Q-Group<sup>®</sup> he said they should be clear about what differentiates them and their skills and products. In fact, since people fear losing something rather than getting it, one should concentrate on describing services and products in terms of what one stands to lose from not having these, rather than what one stands to gain by having them. He said that "scarcity is the rule of the rare," and one should emphasize genuine scarcity, unique features, and exclusive information.

Authority is the second principle he developed. He suggested that when people are uncertain, they look outside themselves for answers. One place to turn is to legitimate experts. Before you can influence people, you

must inform them of your expertise, even though it may not be easy to be convincing. He proposed that a third party call ahead and introduce you, or, if there is not a handy third party, that you call ahead or send a letter before a meeting, with information on your expertise. If you have no time before a first meeting, always start your introduction by disclosing a weakness before speaking of your strengths. It encourages people to trust the positive information to follow.

Consensus was the final topic. People find an idea or action more valuable if they see other people like them doing or buying the same thing. You are entitled to tell them about people like them who have profited from activities or actions that you are proposing. He called this "warranted influence."

To finish, he distributed to all who attended the dinner laminated cards describing his six principles.

## Trading and Market Microstructure

### 6. Agency Costs of Institutional Trading

Roger M. Edelen, Assistant Professor, Carroll School of Management, Boston College, and ReFlow Management, LLC, made available a paper by himself and Gregory Kadlec, entitled "Agency Costs of Institutional Trading."

Edelen described the development and testing of a model

of the agency conflict that arises when the portfolio manager's trades are delegated to the trader. The portfolio manager wants to benefit from the trader's expertise, but granting discretion to the trader leads to trading biases. The authors report that the cost of these biases appears to be on the order of 30 basis points.

At the heart of the conflict are the distinct and different skill sets and time horizons of the two parties. Edelen noted that portfolio managers cannot directly verify the trader's skill and effort: the trader is compensated based on the execution price relative to VWAP, the total volume weighted average price for the day (or some other measure established before the execution of the trade). This compensation system can give the trader incentives that are at odds with the objectives of the portfolio manager.

The authors posit that traders are selectively executing those trades that are most rewarding to them: they are willing to pay more than fair value when buying against falling prices and to accept less than fair value when selling against rising prices, to benefit from the fact that their performance is evaluated relative to a backward-looking benchmark. As a result, the trader locks in positive performance when price-to-VWAP is favorable even though price-to-fair-value is unfavorable. Likewise, traders will profit by only partially filling orders when selling against falling valuations or buying against rising valuations, even though the price is attractive relative to fair value. They delay completing the order until the VWAP to price ratio is attractive.

Edelen described a model with a core prediction that traders will tend to execute the portfolio manager's order counter to both systematic and idiosyncratic shifts in valuation if they are given discretion, just as described above. They create a model that adds to the trader's basic compensation a reward for achieving average prices that are superior to VWAP for all trading during the day and a penalty for not completing the portfolio manager's order during the day. The portfolio manager is responsible for setting the weight to be attached to the reward and the penalty. The weights should be chosen to minimize the total costs: execution costs, opportunity costs of partial fill, and compensation. The optimal weight,  $\Omega$ , is chosen by:

Portfolio Manager chooses  $\Omega$  to minimize total costs:

- Execution costs,
- Opportunity cost of partial fill,
- Compensation costs...

$$\Omega^* = \frac{3}{10} \cdot \frac{\sigma_{NT}^2}{(\sigma_{FV}^2 + \sigma_{NT}^2)}$$

Thus the portfolio manager grants the trader discretion to partially fill orders, to the extent  $\sigma_{FV}^2 > 0$  where  $\sigma_{NT}^2 =$  Explained Variance in the Noise Trader component of returns.

Their model yields a number of testable implications regarding cross-sectional and time-series properties of price adjustment delays.

The model was tested using a sample drawn from the universe of roughly 7,000 US domiciled common

stocks transactions on the New York or American Stock Exchanges, or on Nasdaq, during the period January 2001 through December 2001

The authors document real price-adjustment delays with respect to equity-index futures returns for a large sample of stocks. They test and confirm the conditional predictions of the model, specifically that price adjustment delays are:

- positively related to a stock's price-VWAP ratio,
- negatively related to lag buy-sell order flow imbalances,
- negatively related to lagged trading volume, and
- positively related to the time of day.

Their model also finds that the degree to which the PM grants the trader discretion, and the extent of agency induced price adjustment delays, are related to the liquidity of the stock. For the most liquid stocks, as they predicted, the PM will impose a full-execution constraint on the trader and grant no discretion. But for relatively illiquid stocks, where the trader's expertise can lead to larger improvements in trade-execution costs, the PM grants a relatively high degree of discretion. Thus, the model predicts little price adjustment delay in large-cap liquid stocks but relatively large price adjustment delays in small-cap illiquid stocks.

## 7. Algorithmic Trading: A Quant Perspective

Ananth Madhavan, Global Head of Trading Research, Barclays Global Investments, made available a paper entitled "Algorithmic Trading: A Buy-side Perspective." He began by providing an algorithmic trading primer. In particular he made the distinction between "high touch" trading, trading as we knew it a few years ago, and "low touch" trading—electronic, automatic, trading. Madhavan had made presentations at the Spring 1991 and the Spring 2001 Q-Group<sup>®</sup> Seminars.

He was the first speaker at this session, approaching the topic from the buy-side. The changes in the way trades are made, he suggested, are driven by changes in technology and competition. The trend toward electronic markets has been accompanied by a rapid growth in low touch trading. This method of trading is used primarily in equity markets, but is expanding to other markets as these markets are more integrated and faster, and more real time information is available. Algorithmic trading has the advantages of being scalable, anonymous, transparent and very fast.

He detailed the drivers of algorithmic trading as:

- Automation helps scale the trading desk
- Traders become "macro-managers"
- Anonymity and low cost are achieved
- Controlled crossing is achieved
- Explicit selection of aggression and execution profile

Increased adoption of algorithms drives order size down, further reinforcing use of low touch trading. He noted that order size on the NYSE declined dramatically from over 2,000 in 1998 to just over 330 in 2007.

The challenges for quantitative managers are to determine how to select among tactics and how to evaluate the algorithm's performance. Madahavan illustrated his conceptual framework using regressions with data from 101,000 recent order level execution data from a buy side firm. His conclusions were:

- Broker indicator variables capture preferred choices controlling for stock specific and exchange factors.
- Active strategies are preferred in smaller capitalization, volatile stocks that are not exchange-listed.
- Active strategies are preferred for higher liquidity demands and smaller trade values.

The modeling of costs led to the following:

- Broker indication variables interacted with order size show differential price response to order flow.
- Costs increase with volatility and order size variable.
- Costs decrease with market capitalization.
- Strong economic and statistical significance of selectivity variable indicates endogenous choice.

- Allowing for selectivity and other factors, aggression increases costs.

Finally, Madhavan provided a look at the future of algorithmic trading:

- Algorithmic trading is continuing to evolve.
- It is becoming more complex, and the tactics robust.
- Buy-side will need to answer the fundamental questions that must be jointly addressed in the context of alpha generation.
- Algorithms will evolve into dynamic limit orders as technology evolves.
- We will be required to specify explicitly the link between the current market state (prices, volumes news, etc.) and determinants of the trade list – alpha, risk and expected cost.

George Sophianos, Vice President, Equity Execution Strategies, Goldman, Sachs & Co. took over the presentation with the topic "Execution Strategies: Why is it so hard to optimize?" His approach was from the sell-side. Using a very large data set from Goldman Sachs he compared the manner in which traders should behave to the way in which they actually behave, explaining why behavior so often fell short of what it should have been and pointing out its implications.

He reviewed a wide spectrum of execution choices and dealt with specific buy side trader choices. He noted a number of examples of suboptimal execution which

included the failure to turn from low touch to high touch during the recent market turmoil and mistaken choices between passive and aggressive algorithms.

In answering the question, “Why is it so hard to optimize?” he focused on evidence on the short-term alpha, the execution shortfall. He said that the expected short term alpha is by far the most important factor in managing shortfall. However, his data showed no correlation between actual short-term alpha and the choice of execution strategy. He suggested that one reason is because traders don’t optimize. A second reason is that they cannot easily predict the short term alpha, and this is the explanation he prefers.

In considering why it is difficult for traders to predict short term alpha, he listed several reasons:

- Organization failure: suboptimal communication between portfolio managers and traders.
- Short term alpha is intrinsically hard to predict:
  - It is not clear how the alpha signal gets incorporated into price
  - There are short term order flow considerations

Finally, he suggested that portfolio managers and traders should work more closely with each other.

## 8. Order Flow and Prices

Ekkehart Boehmer, Associate Professor of Finance, Mays Business School, Texas A&M University,

made available a paper by himself and Julie Wu entitled “Order Flow and Prices.” Boehmer described his presentation as dealing with a relationship he believed was not well understood. Execution cost management requires measuring and managing price impact. Predicting the optimal trading strategy requires an understanding of the dynamics relating to order flow and prices, and his paper offers some new results. He said empirical evidence uniformly supports the prediction that inventory effects and informed trading explain the price impact of order flow.

It turns out that order imbalances from different trader types play distinctly different roles in price formation. Institutions and individuals are contrarians with respect to previous-day returns, but differ in the effect their order imbalances have on contemporaneous returns. Institutional imbalances are positively related to contemporaneous returns, and this is likely to be result of firm-specific information institutions have. Individuals, specialists, and other market makers provide liquidity to these actively trading institutions. It turns out that institutional program trades are a special category. Institutions choose program trades when they have no firm-specific information and can afford to trade passively. As a result, program trades provide liquidity to the market. Finally, both institutional non-program and individual imbalances (information not available to market participants) have predictive power for next-day returns.

The research made use of a sample of (on average) 1,322 NYSE-listed stocks between 1988 and 1998. The data set covered buys and sells for each trader type and market-makers. The research was based on proprietary data from the New York Stock Exchange permitting separate observation of buy and sell transactions for different trader types. The data covered all securities traded on the NYSE between January 2000 and April 2004. The data set contained aggregate buy and sell volume for each day and security for certain combinations of account types, represented by the number of trades, share volume, and dollar volume. The researchers were able to distinguish 6 account-type categories: individuals, institutions, regular institutional program trades, institutional index arbitrage program trades, non-NYSE market maker proprietary trades, and specialists.

The NYSE data were matched to security information from the Center for Research in Security Prices (CRSP) to obtain daily returns, market capitalization, and consolidated trading volume. Boehmer described a number of exclusions to refine the data set.

Boehmer discussed a number of measures of order imbalance that have been used by others. A direct measure of imbalance between demand and supply is not available because the number of shares bought always equals the number of shares sold. But this condition is not true within individual trader types. The authors observed imbalances that reflect the entire buying and selling activity for each trader type, including the specialist. This

approach allows both market and limit orders to affect prices. Three measures of order imbalance for each trader group-stock-day observation were the number of trades, the number of shares bought less the number of shares sold, and dollar volume of buys minus sells, in each case scaled by total flow for that stock. Over the sample period institutions were net buyers, whether using regular or program trades. The three remaining groups were net sellers.

With the exception of index arbitrage trades, specialists' imbalances are negatively correlated with those of each other group. Specialists engage in market-making activity and provide liquidity when orders arrive. Institutions tend to trade in the opposite directions from individuals, consistent with the interpretation that individuals provide liquidity to institutions. Institutions appear to use regular trades and program trades as substitutes. It also turns out that regular institutional trades and index arbitrage trades are moving with the market, while program trades are moving against the market. This suggests that institutions use regular orders when they are trading actively. Index arbitrage traders attempt to exploit potentially short-lived price discrepancies between derivatives and cash markets. They are also active traders that move price in the direction of trading. Institutions appear to use program trades primarily when they are trading passively and program trades seem to provide liquidity.

Boehmer discussed a number of regressions explaining order imbalances for different trader types.

An important explanatory variable was stock returns and market returns, both past and contemporaneous.

Boehmer's conclusions were:

- Results on trading motivation
  - Institutions use regular trades when they are informed and hence move prices.
  - Institutions use program trades when they are not informed.
  - Together with individuals and market makers, program traders provide liquidity to active institutional traders.
- Results on price impact
  - Institutional OIB have positive price impacts, apparently resulting from information, and they predict next-day returns.
  - Individuals and program traders have negative price impacts, apparently resulting from liquidity provision.

#### **9a. Implied Liquidity From Redundant Futures Markets**

John Curran, MD, Products and Services, CME Group, made available his paper "Implied Liquidity From Redundant Futures Markets." The object of the presentation was to lay out the way in which futures markets have evolved from an open outcry market in 1997 to the CME Globex matching

engine used to execute orders from outright and spread markets in simultaneous combination. The change has virtually eliminated arbitrage opportunities.

Curran laid the ground work for the presentation by providing an overview of futures contracts. He said that many futures markets concentrate activity in the nearest expiration contract month, that individual contract months are highly correlated, that market shocks impact all contract months similarly, and mismatch costs are relatively small. He noted that 99 percent of the volume in the lead month and 96-98 percent of the lead month open positions are in the S&P 500 and the US 10-year T-note futures.

Moving from open outcry to an electronic market was done to optimize liquidity and trading efficiencies. He showed an example of how the multiple book matching of this electronic market works, and said that matches are constructed from combinations of individual leg markets, calendar and butterfly spreads. In Eurodollar electronic trading, average dollar volume of futures contracts has grown from under 1 million predominately open outcry contracts in 2002 to over 11 million electronically connected contracts in the third quarter of 2007.

To conclude, Curran said that the CME was working on adding more spreads and chaining more markets together for simultaneous execution.

#### **9b. Larry Harris, Discussant**

Larry Harris, Professor, University of Southern California,

Los Angeles, completed the discussion on market microstructure by providing a review of the main topics and findings in market microstructure and relating them to the papers that were presented. Harris has made many presentations at Q-Group<sup>®</sup> Seminars.

He offered the following pointed observations.

- In a zero sum game, all performance relative to the total market is due to trading.
- You lose if you trade when you should not.
- The most important transaction cost strategy is to avoid trading when you shouldn't.
- You lose when you pay too much to trade and when you fail to execute trades that a better trader could have executed.
- We cannot sensibly compare transaction costs across brokers and systems without knowing the imperative to trade.
- Transaction costs depend upon the price of liquidity.
- Push too hard and you pay for liquidity; don't push and you lose opportunities.
- Buy liquidity when it is cheap and valuable to you; sell liquidity when it is expensive and not valuable to you.
- Know how valuable liquidity is to your success, but also know the price of liquidity.
- The PM knows the value of liquidity.

- Good traders know the price of liquidity better than do other traders.
- Liquidity is expensive when it is hard to find the other side and cheap when the other side is readily available and possibly looking for you.
- When liquidity is valuable, traders should trade more aggressively and trades should be more costly.
- Two important decisions in trading – aggression and display.
- Display too much and the market fades; don't display and you don't attract liquidity.
- Modulate the aggression in your trading according to your needs and opportunities.
- Solve agency problems in the trading process by using measures that cannot be gamed, by pooling compensation among PMs and traders.

## **Villains of Investing and Partisan Politics**

### **10. Hedge Fund Activism, Corporate Governance, and Firm Performance**

Alon Brav, Associate Professor of Finance, The Fuqua School of Business, Duke University, made available a paper entitled "Hedge

Fund Activism, Corporate Governance, and Firm Performance” coauthored with Wei Jiang, Frank Partnoy, and Randall Thomas.

Brav started with the assertion that hedge funds are different from other investment pools: there are fewer conflicts of interest among the parties; the manager’s incentives are different; they are more flexible and largely unregulated. The interest of Brav and his coauthors is in hedge fund activism.

A combination of the large increases in capital allocated to hedge funds and the major increase in interest in corporate governance has led to a focus on how hedge funds use their economic influence to bring about changes in the governance of the companies in which they invest interesting, and whether this activism enhances or destroys shareholder value.

As interesting as the questions about hedge fund activism are, there existed no data base on which to examine the questions until Brav and his co-authors developed one. They used the SEC 13D filings that report on 5 percent ownership of a company but also:

- Filtered out such groups as financial companies, foreign institutions and individuals from the sample.
- Searched the internet and other sources to verify the hedge fund status.
- Called the filers to ask for self classification.
- Checked their list with people in the industry.

The remaining sample included 311 hedge funds. The authors excluded highly specialized funds active in distressed company acquisition, merger and acquisition arbitrage, and non-regular corporations including closed-end funds. Their final sample was 236 hedge funds with data from 2001 to 2006. They sorted the events on the activists’ hedge funds stated objectives. Most common among the tactics of hedge funds were communicating with the board and management on a regular basis with the goal of improving shareholder wealth, and demanding change by make formal shareholder proposals and/or publicly criticizing the company. In their sample they included hedge funds whose tactics were both hostile and non-hostile and noted that, despite their frequently aggressive behavior, activist hedge funds do not typically seek control of target companies.

The questions that interested the authors were:

- Which firms do activists target and how do those targets respond?
- How does the market react to the announcement of activism?
- Do activists succeed in implementing their objectives?
- Are activists short-term in focus?
- How does activism impact firm performance?

The events that were studied were categorized in four activism type groups:

- Activism with regard to a company's undervaluation and/or circumstances where the fund can help the manager maximize shareholder value.
- Activism targeting firms' payout policy and capital structure.
- Activism targeting business strategy.
- Events involving activism urging the sale of the target.

To categorize these, the authors detailed events that would indicate activism, such as:

- The fund states that it intends to communicate with the board/management on a regular basis with the goal of enhancing shareholder value.
- The fund seeks board representation without a proxy contest or confrontation with the existing management/board.
- The fund threatens to wage a proxy fight in order to gain board representation, or to sue the company for breach of duty, etc.
- Events in which the hedge fund sues the company and the hedge fund intends to take control of the company.

The authors found that success rates of activism across the objectives varies widely. Aggregated across both hostile and non-hostile events, hedge funds mostly achieved success in their main stated goals. In 25.8% of the cases, they observed a partial success where hedge funds gained

major concessions from their targets, and in 21.4% of the cases the fund failed its mission or withdrew from the target.

In addition to the single hedge fund tactics Brav described, he noted that hedge funds frequently work together to achieve their goals. In approximately 22.1% of the events, multiple hedge funds that are not directly affiliated report as one group in a single Schedule 13D filing. This does not include cases where 13D filings are not required and where multiple funds follow one another in investing in targeted companies forming a so-called "wolf pack" that acts together to force the target to address their demands, or funds that buy after the lead hedge fund 13D filing. Compared to single-fund-filing cases, multiple-fund filing groups tend to take higher stakes in the target (13.7% vs. 11.9%) and are more likely to employ hostile tactics (41.9% vs. 23.9%). Brav presented a table showing the length of time the investments were held indicating that 95 percent were held 4 years or more.

Before proceeding to examine stock market returns, both short-term announcement event-day returns and the long-run returns, the authors compared their hedge fund target group with matched funds and found few differences except the target group exhibited more characteristics associated with value stocks than did the matched companies.

Turning to returns, the authors found that hedge fund activists are a particularly nimble kind of shareholder, use a wide variety of tactics to pursue their objectives, and

are largely successful even though they hold relatively small stakes. Sometimes hedge fund activists benefit from friendly interactions with management (and in this way resemble large block holders), but other times they are openly confrontational with target boards when they perceive them as entrenched. Unlike traditional institutional investors, hedge fund managers have very strong personal financial incentives to increase the value of their portfolio firms, and do not face the regulatory or political barriers that limit the effectiveness of these other investors.

Although they found a large cross-sectional variation, the authors found that hedge fund activism generates value on average, not because activists are good stock pickers, but because they credibly commit up front to intervene at target firms on behalf of shareholders, and then follow through on their commitments. The authors conclude that hedge fund activism can be viewed as a new middle ground between internal monitoring by large shareholders and external monitoring by corporate raiders. The benefit from their activism goes beyond the improved performance and stock prices at the actual target companies. The presence of these hedge funds and their potential for intervention exert a disciplinary pressure on the management of public firms to put shareholder value as a priority. During the period their data covered, hedge fund activism became increasingly common and the return from that activism (measured as the average abnormal returns at the filing of Schedule

13D), dropped from 15.9% in 2001 to 3.4% in 2006.

Extrapolating from these data, Brav stated that if viewed as another form of arbitrage, then abnormal returns associated with hedge fund activism will decline, or even disappear, as more funds chase after fewer attractive targets, and as the market incorporates the potential for investor intervention and improvement into security prices. Both effects suggest that decreasing returns to activists do not necessarily imply reduced benefits for shareholders from activism. Hedge fund activism might remain a staple of corporate governance, but at a lower equilibrium level of profitability.

## **11. Partisan Impacts on the Economy: Evidence from Prediction Markets and Close Elections**

And

### **Party Influence in Congress and the Economy**

Eric Zitzewitz, Associate Professor of Economics, Dartmouth College, based his presentation on two NBER working papers, one dated March 2006 and entitled "Partisan Impacts on the Economy" and a second dated December 2006 titled "Party Influence in Congress and the Economy." His co-authors were Erik Snowberg and Justin Wolfers.

He began with the question "Do election outcomes affect the economy?" His work exploits two recent financial market developments: The electronic trading

of equity index and other futures prices while votes are actually being counted on election night, and the emergence of a liquid prediction market tracking the election outcome. The data make it possible to track equity prices and interest rates over a time period during which evidence is mounting from which it is possible to base predictions of the outcomes of contests for the Presidency, control of the Senate, and control of the House.

The authors analyzed the 2004 elections, comparing the results from the high frequency analysis with a more traditional pre-election analysis of daily data. They found that Bush's reelection led to modest increases in equity prices, nominal and real interest rates, oil prices, and the dollar, and that the biases in a more traditional research design would have been substantial. The authors followed with a similar analysis of the 2000 election, finding partisan effects consistent with their analysis of the 2004 election. Finally, they turned to a longer sample, analyzing event returns surrounding elections back to 1880. They found a remarkably consistent pattern of election outcomes affecting financial markets.

The 2004 election is a particularly interesting example. During that election cycle, Tradesports.com created a contract that would pay \$10 if Bush were elected President, and \$0 otherwise. The price of this security yields a market-based estimate of the probability that Bush would win the election. These Tradesports data revealed the last trade and bid-ask spread every ten minutes during

election day until the winner was determined in the early hours of the following morning. The data were paired with the price of the last transaction in the same ten-minute period for the December 2004 futures contracts of various financial variables: The Chicago Mercantile Exchange (CME) the S&P 500, and the NASDAQ 100 futures, CME currency futures, the Chicago Board of Trade (CBOT), Dow Jones Industrial Average and 2 and 10-year Treasury Note futures and a series of New York Mercantile Exchange (NYMEX) Light Crude Oil futures.

Zitzewitz presented a figure showing the close tracking of the probability that Bush would win the Presidency (from Tradesports) and the S&P 500 futures contract with a delivery date of December 2004. At noon November 2, the probability of Bush winning the election started near 55%. When exit poll data were leaked, the markets quickly incorporated this information, sending Bush's probability of election down to 30% and stocks down nearly one full percentage point. When it became clear that the earlier exit poll data were faulty, Bush's chances rose to 95% and stocks rebounded, rising 1.5%. In both cases, it appears that the political news was reflected in the stock market slightly before it was in the prediction market.

The authors regressed changes in the S&P 500 on changes in Bush's chances of reelection. The twelve percentage point decline in Bush's reelection probability from 3 to 4 pm, was accompanied by a 1 or 2 basis point reduction in both nominal and real bond yields, while the 55

percent point increase from 4 pm to 9:30 am the next morning was accompanied by a 6 to 8 basis point increase in both real and nominal yields.

The analysis of the 2004 election alone did not permit disentangling whether the estimated effects were due to the election of a Republican (and hence reflected partisan effects) or to the reelection of the sitting president (reflecting the benefits of stability). The analysis was repeated for the 2000 election, in which there was no incumbent candidate running, and the Democrats were the incumbent party. There were no accurate estimates of the probability of victory of either candidate since there were no contracts that tracked this. Centrebet, an Australian bookmaker, did trade an appropriate contract but closed their market on the morning of the election. The election morning odds suggested that Bush had a 60% chance of winning the election. Assuming that the prices of the various indicators at the beginning of the sample period corresponded to a 60% chance of Bush winning, then the decline observed between 6 pm and 9 pm cannot represent more than a 60% decrease in the chance of a Bush victory. Likewise the change from 9 pm to 2:15 am cannot represent more than a 100% increase in the probability of a Bush win. From this the inference could be drawn that a Bush presidency caused at least a 1.5% increase in the S&P 500, a 3.5% increase in the NASDAQ 100 and a ½% appreciation of the dollar versus a trade weighted currency portfolio.

The authors also undertook an analysis of the period 1880 – 2004. Use of a variable describing the

partisan shock (measured in the change in beliefs that a Republican would be elected) and the change in expectations that the incumbent party would be reelected, produced strong evidence that partisanship, rather than incumbency effects, was driving the results.

Bond yields were historically quite unresponsive to political shocks until the election of Reagan in 1980, when the yield on the 10-year Treasury bill increased by 15 basis points. Prediction markets viewed the chances of his election at 80%. Regressing changes in bond yields on the change in probability of a Republican president reveals there was no statistically or economically significant difference in the reaction of bond markets to Democratic or Republican candidates from 1920 to 1976. From 1980 onward, a Republican president increased the 10-year bill yield by 13 basis points. This pattern is consistent with both the relatively low national debt before 1980 and a re-alignment of the political parties with regard to government debt after 1980. Partisan political business cycle models specify that parties have different intrinsic policy goals. An immediate implication is that changes in election probabilities generate shocks to expectations about macroeconomic policy, and indeed the authors found that changes in the perceived probability of electing a Republican president caused changes in expected bond yields, equity levels and oil prices. Zitzewitz reported that a closer inspection of results yielded somewhat more surprising insights. Finding that equity values were expected to be 2 to 3 percentage points higher under Bush is easily

reconciled with expectations of favored treatment of capital over labor, current firms over future entrants, equity over bond holders, or expectation of stronger real activity. Long bond yields were expected to be 10 to 12 basis points higher under Bush, a finding at odds with the usual characterization of right-wing parties as more strongly committed to balancing the budget even if the cost is lower economic activity. That said, this finding was consistent with observed higher deficits under Republicans since the 1980s.

The later paper turned from the Presidency to the importance of the majority party in Congress in shaping the broad contours of economic policy and impacting equity and debt markets. In the run-up to the 2006 Congressional elections, Tradesports.com created two contracts tied to Republican majorities in Congress: one paid \$10 if Republicans maintained a majority in the Senate, the other \$10 if they maintained a majority in the House. The House contract traded at \$2 in the beginning of election night, suggesting that Republicans had a 20% chance of maintaining their majority in the House. At 5 pm EST exit poll data indicating a poor showing by Republicans became

available. As actual vote tallies provided confirmation of a Republican loss, this probability slowly declined to 0. In contrast, the probability of Republicans retaining a majority of Senate seats began election night at approximately 70% and fluctuated substantially. The release of early vote counts brought the probability up to 90%. A few hours later, the probability of Republicans maintaining a majority plummeted.

The prediction market data from Tradesports.com was paired with the price of the last transaction in the same 30-minute period for the December 2006 futures contracts for various financial variables. The changes in the financial variables were then regressed on the change in the prices of the contracts tracking the Republican chances of maintaining majorities in both houses of Congress. The estimated effect of a change in the majority party in the Senate on the S&P 500 was 0.17%, an order of magnitude smaller than the effect of a change in the party of the President in the 2004 election. The effect of partisan majorities in the House was much smaller, and the strong expectation of a Democratic majority led to little election night variation.