The Institute for Quantitative Research in Finance

2006 - 2010

SUMMARY OF PROCEEDINGS

The Q-Group

www.q-group.org
"The Q - Group®

THE INSTITUTE FOR QUANTITATIVE RESEARCH IN FINANCE®

Founded 1966 -- Over 40 years of Research and Seminars Devoted to the State-of-the-Art in Investment Technology

Summary of Proceedings

Volume 7

2006 - 2010
At the end of 2010, The Q-Group® completed its 44th year. Throughout this time period Q® has reflected both the growing use of quantitative methods and the changing shape of the financial community. Many quantitatively orientated new firms are now an integral part of the Institute’s membership did not even exist at the time of Q’s founding. Today, The Q-Group® membership numbers more than 140 firms.

There are now seven volumes of our Proceedings which cover the period from 1976 through 2010. This period coincides with our arrangement with Professor J. Peter Williamson of the Amos Tuck School of Business Administration at Dartmouth College. Peter began summarizing Q's individual seminars at the start of that period and has continued to produce excellent summaries of every single Seminar. All of our attendees recognize the outstanding quality of Peter's efforts. His summaries to bring the presentations into focus and to understand some very technical and difficult subjects. It soon became obvious that if the individual seminar summaries could be collated into a volume organized by subject matter, rather than by date, there would be a valuable new resource for the Institute’s sponsors – so, the first volume was born. Our continuing thanks to Peter Williamson for a job so well done for so many years. It is hard to believe that 34 years have passed since he began this effort and we are deeply indebted to him.

Recently, Peter has been ably assisted in preparing the individual Seminar summaries by Professor Diana R. Harrington of Boston’s Babson College. Her participation has provided significant support to Peter in an ever increasing heavy load.

Of course, we must all realize that the success of these summaries is based upon the underlying excellence of the Institute's Seminar programs. The Program Committee, most ably directed by Brett Hammond and Mark Kritzman has consistently identified important new topics and speakers, thus retaining the interest and participation of the audience. In part, Q's® continued success relies upon the members of the Committee to correctly measure the pulse of the financial community. The Committee has accomplished this goal seminar-after-seminar, year-after-year. Our thanks to Brett, Mark and all the Committee members who have helped to plan Q® programs over these many years.

With the advent of the Internet and instant electronic communication, we have published the first 6 volumes of our activities on our website at www.q-group.org. The current volume is especially valuable as it organizes the presentations from the Seminars held from Spring, 2006 through Autumn 2010.

As has been our custom in the past, the index in Volume 7 contains detailed references to all volumes. In addition, the Roger F. Murray Prize winners are shown along with the five years of Seminar programs. Finally, Volumes 1 through 6 are on our website and Volume 7 will follow shortly.

Dale Berman
Secretary-Treasurer
January, 2011
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>PREFACE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALPHA</td>
<td></td>
</tr>
<tr>
<td>Cross Section of Stock Returns, Alphas and Information Ratios (Spring 2010)</td>
<td>1</td>
</tr>
<tr>
<td>Steven Sapra</td>
<td></td>
</tr>
<tr>
<td>False Discoveries in Mutual Fund Performance: Measuring Luck in Estimated Alphas (Fall 2009)</td>
<td>4</td>
</tr>
<tr>
<td>Russ Wermers</td>
<td></td>
</tr>
<tr>
<td>Structural Alpha (Fall 2008)</td>
<td>6</td>
</tr>
<tr>
<td>Martin Leibowitz</td>
<td></td>
</tr>
<tr>
<td>Modeling Alpha (Spring 2007)</td>
<td>9</td>
</tr>
<tr>
<td>Eric H. Sorensen</td>
<td></td>
</tr>
<tr>
<td>Panel: Future Sources of Alpha (Spring 2007)</td>
<td>11</td>
</tr>
<tr>
<td>Katrina F. Sherrerd, Chris Brightman, Craig W. French, Harinda de Silva</td>
<td></td>
</tr>
<tr>
<td>Alpha Migration: Issues and Consequences (Spring 2007)</td>
<td>12</td>
</tr>
<tr>
<td>Andrew B. Weisman, Sandeep Patel</td>
<td></td>
</tr>
<tr>
<td>Harvard, Yale and the Future of Investing (Spring 2006)</td>
<td>14</td>
</tr>
<tr>
<td>Andre F. Perold</td>
<td></td>
</tr>
<tr>
<td>ALTERNATIVE INVESTMENTS AND STRATEGIES</td>
<td></td>
</tr>
<tr>
<td>The Dynamics of Leveraged and Inverse ETFs (Fall 2009)</td>
<td>15</td>
</tr>
<tr>
<td>Ananth Madhavan</td>
<td></td>
</tr>
<tr>
<td>Risk and Return Characteristics of Venture Capital – Backed Entrepreneurial Companies (Fall 2009)</td>
<td>18</td>
</tr>
<tr>
<td>Arthur G. Korteweg</td>
<td></td>
</tr>
<tr>
<td>Capital Flows and the Returns to Private Equity (Fall 2008)</td>
<td>20</td>
</tr>
<tr>
<td>Antoinette Schoar</td>
<td></td>
</tr>
<tr>
<td>The Fundamentals of Commodity Futures Returns (Spring 2008)</td>
<td>22</td>
</tr>
<tr>
<td>K. Geert Rouwenhorst</td>
<td></td>
</tr>
<tr>
<td>The Investment Behavior of Buyout Funds: Theory and Evidence (Fall 2007)</td>
<td>25</td>
</tr>
<tr>
<td>Matthew Richardson</td>
<td></td>
</tr>
<tr>
<td>Hedge Fund Activism, Corporate Governance, and Firm Performance (Fall 2007)</td>
<td>27</td>
</tr>
<tr>
<td>Alon Brav</td>
<td></td>
</tr>
<tr>
<td>The FundCreator Approach to Hedge Fund Return Replication,</td>
<td>29</td>
</tr>
<tr>
<td>Fund Creation and Performance Evaluation (Spring 2007)</td>
<td></td>
</tr>
<tr>
<td>Harry M. Kat</td>
<td></td>
</tr>
<tr>
<td>Flirting With Danger: Optimizing Leverage and Shorting (Fall 2006)</td>
<td>31</td>
</tr>
<tr>
<td>Ronald N. Kahn</td>
<td></td>
</tr>
<tr>
<td>Returns to Portfolios of Movies (Spring 2006)</td>
<td>32</td>
</tr>
<tr>
<td>Andrew Rudd</td>
<td></td>
</tr>
</tbody>
</table>
## ASSET MANAGEMENT INDUSTRY

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Matter of Style: The Causes and Consequences of Style Drift In Institutional Portfolios</td>
<td>Russ Wermers</td>
<td>34</td>
</tr>
<tr>
<td>Portfolio Choice for Resource Based Sovereign Wealth Funds</td>
<td>Bernd Scherer</td>
<td>36</td>
</tr>
<tr>
<td>The Active Vs. Passive Decision By Sovereign Wealth Funds</td>
<td>William N. Goetzmann</td>
<td>38</td>
</tr>
<tr>
<td>On The Size of The Active Management Industry</td>
<td>Robert F. Stambaugh</td>
<td>41</td>
</tr>
<tr>
<td>The Incubation Bias</td>
<td>Richard B. Evans</td>
<td>42</td>
</tr>
<tr>
<td>Best Ideas: Finding Outperforming Managers</td>
<td>Randolph B. Cohen</td>
<td>44</td>
</tr>
<tr>
<td>The Cross Section of Managerial Ability and Risk Preferences</td>
<td>Ralph S. J. Koijen</td>
<td>46</td>
</tr>
<tr>
<td>Patents in the Asset Management Industry</td>
<td>Ralph P. Albrecht</td>
<td>49</td>
</tr>
<tr>
<td>Trends in the Money Management Industry: Systemic Imperatives</td>
<td>Michael L. Goldstein</td>
<td>51</td>
</tr>
<tr>
<td>A Rational Model of the Closed-End Fund Discount</td>
<td>Jonathan Berk</td>
<td>53</td>
</tr>
</tbody>
</table>

## BEHAVIORAL ASPECTS OF INVESTOR ACTIONS

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Origin of Behavior</td>
<td>Andrew Lo</td>
<td>54</td>
</tr>
<tr>
<td>Why Diversity is Crucial in Nature and in Markets</td>
<td>Michael J. Mauboussin</td>
<td>56</td>
</tr>
<tr>
<td>How Basic Are Behavioral Biases</td>
<td>M. Keith Chen</td>
<td>57</td>
</tr>
<tr>
<td>Influence: The Ultimate Power Tool</td>
<td>Robert B. Cialdini</td>
<td>59</td>
</tr>
<tr>
<td>I Know What to Do, Why Don’t I Do It?</td>
<td>Nick Hall</td>
<td>61</td>
</tr>
</tbody>
</table>

## ECONOMIC CRISIS

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquidity Risk and Interbank Markets</td>
<td>Brenda González-Hermosillo</td>
<td>62</td>
</tr>
<tr>
<td>Inexperienced Investors and Bubbles</td>
<td>Robin Greenwood</td>
<td>65</td>
</tr>
</tbody>
</table>
The Failure Mechanics of Dealer Banks (Fall 2009) 67
Darrell Duffie

Depression Babies: The Effect of Experiencing Macro-Economic Shocks
On Individual Risk Taking (Fall 2009) 68
Ulrike M. Malemendier

Regulatory Reform in Light of the Current Crisis (Spring 2009) 70
Richard R. Lindsey

Market Disruption, Economic Crisis, and Investor Behavior (Spring 2009) 73
Kenneth A. Froot

Brett Hammond, Kent Smetters, Kenneth A. Froot, Philippe Jorion, Sandip Bhagat, Bennett Golub,
The Global Financial Crisis (Spring 2009) 78
H. Franklin Allen

Credit Contagion from Counterparty Risk (Spring 2009) 80
Philippe Jorion

Do Arbitrageurs Amplify Economic Shocks? (Spring 2009) 83
Harrison Hong

The Origins of Value: The Financial Innovations that Created Modern Capital Markets (Fall 2008) 85
William Goetzmann

What Happened to the Quants In August 2007? (Spring 2008) 88
Andrew Lo

High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence (Fall 2007) 93
Andrew Ang

Cross Sectional Variation of Stock Returns: Liquidity and Idiosyncratic Risk (Fall 2007) 95
Matthew Spiegel

Capital Allocation (Fall 2006) 96
Stewart C. Myers

Roughing it up: Including Jump Components in the Measurement, Modeling and Forecasting of Return Volatility (Spring 2006) 98
Francis X. Diebold

ECONOMICS

The Next 100 Years: A Forecast for the 21st Century (Fall 2010) 100
George Friedman

Are Stocks Less Volatile in the Long Run? (Spring 2010) 101
Robert F. Stambaugh

McWages (Fall 2008) 104
Orley Ashenfelter

Sinking Globalization: What Could Go Wrong? (Fall 2006) 104
Niall Ferguson

Capital Ideas: Out of This World or In The Thick of It? (Fall 2006) 105
Peter L. Berstein
Will The Phillips Curve Cause World War III? (Fall 2006)  
Jack L. Treynor  

HARRY MARKOWITZ  
The “Harry Markowitz Effect,” 50 Years Later and Still Counting (Fall 2009)  
Martin L. Leibowitz  

LIQUIDITY  
Liquidity and Corporate Bonds (Fall 2008)  
Jiang Wang  

The Divergence of Liquidity Commonality (Spring 2008)  
Ronnie Sadka  

Stale or Sticky Stock Prices (Spring 2008)  
Donald B. Keim  

Implied Liquidity From Redundant Futures Markets (Fall 2007)  
John Curran  
Larry Harris  

Liquidity Risk in the Corporate Bond Markets (Spring 2006)  
George Chacko  

MARKET MODELS AND SIMULATION  
Market Equilibrium in NonCAPM Worlds (Fall 2006)  
Harry M. Markowitz  

Equilibrium Simulation (Fall 2006)  
William F. Sharpe  

Putting Economics (Back) Into Quantitative Models (Spring 2006)  
Vineer Bhansali  

PERFORMANCE EVALUATION AND BENCHMARKS  
Pension Funds: Performance, Costs and Benchmarks (Fall 2009)  
Rob Bauer  

Should Benchmark Indices Have Alpha? Revisiting Performance Evaluation (Spring 2009)  
K.J. Martijn Cremers  

Non-Cap Weighted Indexes (Spring 2007)  
Robert D. Arnott, Clifford S. Assness  

Attribution: A Unified, Portfolio Based Approach (Fall 2006)  
Richard Grinold  

POLITICAL AND TAXATION IMPACTS ON INVESTMENT PERFORMANCE  
Reflections on the Actions of the New Administration (Spring 2009)  
William G. Gale
Investment Taxation and Portfolio Performance  (Fall 2008)  
Jeffery Pontiff  

Investment Implications of the 2008 Elections  (Spring 2008)  
Gregory R. Valliere  

Corporate Political Contributions and Stock Returns  (Fall 2007)  
Michael J. Cooper  

Partisan Impacts on the Economy: Evidence from Prediction Markets and Close Elections  (Fall 2007)  
Eric Zitzewitz  

Party Influence in Congress and the Economy  (Fall 2007)  
Eric Zitzewitz  

National Politics Today – As I See It  (Spring 2007)  
Cynthia Tucker  

QUANTITATIVE TOOLS FOR PORTFOLIO MANAGEMENT  
Rebalancing and Asset Allocation  (Fall 2008)  
Sébastien Page  

RETIRED INVESTING  
Lifetime Consumption and Investment for Retirement  (Fall 2010)  
Philip H. Dybvig  

Retirement Investing: Analyzing the “Roth” Conversion and Re-characterization Options  (Spring 2010)  
Chester B. Spatt  

Portfolio Choice In Retirement: Health Risk and the Demand For Annuities, Housing and Risky Assets  (Fall 2009)  
Motohiro Yogo  

Optimal Portfolio Choice Over the Life Cycle With Social Security  (Spring 2009)  
Kent Smetters  

Financial Liquidity and Savings: Evidence from 401(k) Loans  (Fall 2008)  
Brigitte Madrian  

Life Cycle Funds  (Spring 2008)  
Luis M. Viceira  

The Theory of Life-Cycle Savings and Investing  (Spring 2008)  
Paul S. Willen  

The Major Provisions of the Pension Protection Act of 2006: Implications for Pension and Investment Management  (Spring 2007)  
Mark J. Warshawsky  

Demographics and Finances of the Baby Boomers  (Spring 2007)  
Olivia S. Mitchell  

Participant Reaction and the Performance of Funds Offered by 401(k) Plans  (Spring 2006)  
Edwin Elton, Martin J. Gruber
RISK MEASURES AND MANAGEMENT

Financial Intermediary Leverage and Value-at-Risk (Fall 2008) 170
Tobias Adrian

Alpha/Beta Separation (Spring 2007) 171
James L. Haskel

Extreme Bound Analysis (Spring 2007) 172
John Benson Durham

On the Implications of Modern Risk Management for Equity and Credit Analysis (Fall 2006) 174
Robert C. Merton

A Speculator’s Look At Risk Management (Fall 2006) 175
Myron S. Scholes

Downside Risk and Its Implications for Financial Management (Spring 2006) 176
Robert Engle

Buy Side Risk Management (Spring 2006) 178
Kenneth J. Winston

SECURITIES LENDING

The Effects of Stock Lending on Security Prices: An Experiment (Fall 2010) 180
Steven N. Kaplan

SOFTWARES OF RETURNS IN INVESTING

Forecasting Returns – The Sum of the Parts Approach (Fall 2010) 181
Miguel Ferreira

Returns to Buying Earnings and Book Value: Accounting for Growth and Risk (Fall 2010) 184
Stephen H. Penman

Value and Momentum Everywhere (Spring 2010) 185
Clifford S. Asness

Risk Premia and the Conditional Tails of Stock Returns (Spring 2010) 188
Bryan T. Kelley

What Drives the Value of Analyst’s Recommendations: Earnings Estimates or Discount Rate Changes? (Spring 2010) 191
Roni Michaely

Accrual Reversals, Earnings and Stock Returns (Spring 2010) 195
Richard G. Sloan

The Demographics of Innovation and Asset Returns (Fall 2009) 197
Leonid Kogan

The Rational Part of Momentum (Spring 2008) 198
James H. Scott

The Franchise Cycle (Fall 2006) 201
Martin L. Leibowitz

Persistence, Predictability, and Portfolio Planning (Spring 2006) 203
Michael Brennan
**TRADING**

<table>
<thead>
<tr>
<th>Title</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determinants of Value In Dark Pools (Fall 2010)</td>
<td>Mark J. Ready</td>
<td>205</td>
</tr>
<tr>
<td>Market Microstructure in the Crosshairs (Spring 2010)</td>
<td>Lawrence E. Harris</td>
<td>207</td>
</tr>
<tr>
<td>Shackling Short Sellers: The Effects of the Recent and Proposed Restrictions (Spring 2010)</td>
<td>Charles Jones</td>
<td>210</td>
</tr>
<tr>
<td>Market Microstructure Invariants (Fall 2009)</td>
<td>Albert S. Kyle, Anna Obizhaeva</td>
<td>214</td>
</tr>
<tr>
<td>Do Noise Traders Move Markets? (Fall 2008)</td>
<td>Terrance Odean</td>
<td>216</td>
</tr>
<tr>
<td>Agency Costs of Institutional Trading (Fall 2007)</td>
<td>Roger M. Edelen</td>
<td>218</td>
</tr>
<tr>
<td>Algorithmic Trading: A Quant Perspective (Fall 2007)</td>
<td>Ananth Madhavan, George Sophianos</td>
<td>219</td>
</tr>
<tr>
<td>Order Flow and Prices (Fall 2007)</td>
<td>Ekkehart Boehmer</td>
<td>221</td>
</tr>
<tr>
<td>Panel: Exploring Capacity Issues (Spring 2007)</td>
<td>Joanne M. Hill, Dan Bienvenue, Knut Kjaer, Matt Yamini</td>
<td>223</td>
</tr>
</tbody>
</table>

**Seminar Programs, Listed in Chronological Order** 226

**Authors Index to Volumes I, II, III, IV, V, VI and VII** 235

**Subject Index to Volumes I, II, III, IV, V, VI and VII** 241

**Prize Committee Awards** 247
Alpha

1. Cross Section of Stock Returns, Alphas and Information Ratios (Spring 2010)


Sapra began describing the motivation for this research: most research into active money management concludes that the majority of managers underperform their benchmarks, net of expenses and trading costs, as do hedge funds. He reviewed what others have said and found regarding the costs of active management:

1. Samuelson [2004]: If more investors just indexed to the stock market – instead of investing actively – their wealth and overall welfare would be higher.

2. French [2008] estimates the lost wealth from too much active equity investing, and finds that society loses about 0.67% of the total value of the stock market each year. When Sapra applied that estimate to 2007, when the U.S. stock market was worth about $15 trillion, he estimates that active equity management took over $100 billion more from society than it produced in value-added returns.

3. The financial services industry compensation of $500 billion in 2008 was at least 20 percent higher than break-even for society as a whole, not including hedge fund fees.

To gain insight into this conundrum, Sapra and his coauthors investigated the cross-sectional dispersion of stock volatility and how performance metrics like alpha and the information ratio change over time with this measure of volatility. This, he said, allowed them to observe how the opportunity to earn higher and lower returns relative to the market expands and contracts over time. They concluded that lack of manager outperformance is not due to lack of alpha opportunity: the cross-sectional volatility of alpha is high and particularly so following high-dispersion environments. He said they estimate that the “alpha pie” available for investors is about 30 percent per year.

Sapra expanded on their contribution: they examined cross-sectional dispersion (CS) and how that dispersion interacted with volatility. Cross-sectional dispersion is positively related to time-series volatility since time-series volatility is a component of cross-sectional dispersion:

1. Portfolio risk is positively related to cross-sectional dispersion since cross-sectional dispersion is a component of portfolio risk.

2. Idiosyncratic risk is positively related to cross-sectional dispersion since cross-sectional dispersion is a component of active risk.

3. Alpha opportunities are positively related to cross-sectional dispersion, since alpha is linear in cross-sectional dispersion.

4. The information ratio is invariant to changes in cross sectional dispersion, since cross-sectional dispersion affects active return and active risk in a linear fashion.

For Sapra, alpha is estimated using Fama-French four-factor model.
Using a sample that consisted of all stocks in the S&P 500 index from January 1980 to October 2008 obtained from CRSP and updated from Yahoo! Finance, Fama-French daily systematic return factors and excess returns, and the risk-free rate from Ken French’s website. They tested the following hypotheses:

1. Higher (lower) values of the cross-sectional dispersion of returns or the VIX will be associated with higher (lower) future dispersion of alpha.

2. The information ratio will remain unchanged following high- and low-levels of return dispersion or the VIX since active returns and tracking error are expected to change proportionally with return dispersion.

Sapra provided the following chart depicting the volatility of the S&P 500 from 1981-2008 and the VIX (CBOE) from 1991-2008. The shaded bars identify bear market periods. This graph, he said, is consistent with the widely-accepted idea that volatility is higher in bear markets, and since the VIX has a contemporaneous correlation coefficient of +0.835 with the volatility of the S&P 500, and +0.676 with volatility 30 calendar days ahead, it provides confirmation that the VIX provides reasonably effective forecasts of the time series volatility of US stocks.

![Time Series & Cross-Sectional Volatility](image)

Using this chart, Sapra confirmed that return volatility and dispersion tend to move together and are generally higher in bear markets and that the VIX forecasts dispersion as accurately as it does time series volatility (correlation coefficient 30 days ahead of +0.700). As to using the VIX, its contemporaneous correlation to the time series volatility is 0.835 and with the cross sectional dispersion it is 0.758. Looking forward 30 days, the correlations are slightly lower. Because of these data, he said, the VIX can therefore be interpreted as a signal of not only of time-series volatility, but also of cross-sectional dispersion over the next trading month.
Next Sapra turned to alpha, looking first at the cross-sectional dispersion of realized alpha and how it varied with the measures of volatility. The following graph compares alpha and the S&P 500’s daily returns over the period of their data: alpha percentiles increase and decrease with the overall dispersion of returns.

![Alpha Percentiles & Return Dispersion](image)

Sapra reported that the dispersions of the alpha percentiles are related to one another: the relative spreads expand and contract together; the spreads increasing noticeably during bear markets. In addition, he provided charts showing that the percentage spreads between the alpha categories are large and economically significant, and stated that a manager, who was skilled at going long stocks in the 75th and shorting stocks in the 25th performance percentile, should earn average portfolio alphas of 28-30 percent before fees and costs. While the alpha analysis is strong, the results for the information ratio are not. In fact he found that return dispersion is inversely related to future information ratio dispersion.

Next, Sapra turned to some comments on manager performance. The results suggest that active equity managers are not underperforming their indexes due to inadequate dispersion or supply of alpha: the alphas that can be earned in higher-performing stocks are large and economically significant. For example, he reported that the 75th performance percentile annualized alpha has averaged 15.2 percent since 1981 and for the past 27 years one-fourth of all S&P 500 stocks have outperformed the Fama-French 4-factor model by no less than 7.8 percent in any year with an average of 15.2 percent. There is, however, a barrier to realizing the returns: the VIX and alpha dispersions are significantly higher in bear markets, and result in alpha-generation opportunities being best during periods when equity values are generally declining and volatility is high. The best opportunities for skilled investors to increase portfolios alpha present themselves when most investors are decreasing equity allocations and trying to reduce the risk exposure of their portfolios.
2. False Discoveries in Mutual Fund Performance: Measuring Luck in Estimated Alphas (Fall 2009)

Russ Wermers, University of Maryland, presented “False Discoveries in Mutual Fund Performance: Measuring Luck in Estimated Alphas,” work he coauthored with Laurent Barras, Imperial College, and Olivier Scaillet, University of Geneva.

Investors and academic researchers have long searched for outperforming mutual fund managers. Some researchers have documented negative average fund alphas net of expenses and trading costs while others indicate that some fund managers have stock-selection skills. Wermers said previous research is not particularly informative and they centered their work on whether outperforming mutual funds exist. Their research focused on three questions:

1. What is the impact of luck on performance?
2. Where in the distribution of fund alphas are funds with superior and inferior performance?
3. What is the nature of mutual fund manager performance over time?

Wermers laid out their approach. The first step was to precisely separate funds into skill groups:

- Unskilled: funds that produce an alpha shortfall, net of trading costs and expenses. Wermers said that these funds may have managers with stock picking skills, but inefficiency is introduced by mutual fund company overcharges.
- Zero-alpha: funds managed by managers who earn an alpha but the total is relinquished to the fund company, resulting in a zero alpha for the investor.
- Skilled: funds with managers who produce an alpha surplus from efficient stock picking skills without relinquishing the entire alpha to the fund company.

The last is the group of funds Wermers and his colleagues were attempting to isolate.

One innovation in this paper was using a method not before used in finance research, False Discovery Rate (FDR). They used this method because of their concern about the normal testing for fund alpha that uses a null hypothesis that all funds have an alpha of zero. However, Wermers contended this assumption of zero alpha is overly conservative if some managers are skilled. In their approach they let the data estimate the proportion of zero-alpha funds, rather than making the normal ex-ante assumption of a zero alpha. The following example was used to demonstrate the process. Suppose we observe 100 basketball players shooting free-throws: 20% make 2 of 10; 60% make 5 of 10; 20% make 8 of 10. The question is: How can we estimate the proportion that are skilled enough to make 8 of 10 over the long-run? Their approach was to use the center of the distribution (60% average players) to estimate the tails. Examining the role of luck required some special ingenuity. Their model is shown below:

\[
\hat{\gamma}^+ = \hat{S}^+ - \hat{F}^+ = \hat{S}^+ - \hat{\pi}_0 \gamma \sqrt{2}
\]

Where:
- \(\hat{\gamma}^+\) = skilled funds
- \(\hat{S}^+\) = Significant alpha funds
- \(\hat{F}^+\) = Lucky funds (or False Discoveries)
- \(\hat{\pi}_0\) = Proportion of zero alpha funds

Clearly, the key is how to measure \(\hat{\pi}_0\).
Using this method, they calculated alpha and the p-values for each fund using the four-factor model of Fama/French/Carhart and monthly returns of US open-end growth, aggressive growth and growth and income equity funds from 1975 and 2006. They examined the alphas close to zero and used them to estimate the proportion of high alpha, lucky, funds. They found that the performance of all funds declined over time, and the proportion of skilled fund managers had diminished rapidly over the 20 years.

As for alpha, while the number of funds increased over the period, the average alpha decreased as shown in the following chart.

In his presentation, Wermers provided a list of the top “lifetime alpha” funds that were still in existence in 2008. Four of the funds had an average annual alpha of over 10%. Wermers provided some economic interpretations of their findings:

- While 75 percent of their sample were zero-alpha funds, they found that the average negative alphas documented in the previous literature were caused by a minority of funds.
- The large number of new funds over the sample period did not add to the skilled manager pool.
- Expense ratios appeared to be too high in the industry relative to the skills of managers, particularly in the last 10 years. Thus it is puzzling why investors seem to increasingly tolerate the existence of a large number of actively managed funds that produce negative alphas, when an increasing array of passively managed funds have become available.
- Actively managed mutual fund underperformance was due to the long-term survival of a minority of truly underperforming funds.

In answer to his initial questions about performance, Wermers said:
1. Luck has a stronger impact on the right tail of the estimated alpha distribution.

2. Skilled funds are in the extreme right tail, while unskilled funds are spread throughout the left tail.

3. The proportion of truly skilled fund managers has decreased substantially over time.

To conclude, Wermers outlined the value of their use of the FDR methodology:

- It is a simple tool which makes it possible to correctly measure the number of funds with truly positive and negative performance.
- It is flexible and can be applied to different performance measures and hedge fund industry data.
- It has wide application.

3. **Structural Alpha (Fall 2008)**

Martin Leibowitz of Morgan Stanley & Co. Incorporated has made presentations at many previous Q-Group® seminars. He presented “Portfolio Strategy: The Endowment Model: Theory and More Experience,” he coauthored with Anthony Bova also of Morgan Stanley & Co. The paper and slides were not for distribution or copy outside the limited Q-Group® setting.

Leibowitz explores the question of whether the new endowment model of investing is superior to that of the traditional 60/40% US stock/bond allocation model. His new endowment model expands to international and emerging market equity, real estate, absolute return, private equity, and venture capital for a total of eight asset classes as shown below, for four different portfolios, B1 through C.

<table>
<thead>
<tr>
<th>Sample Portfolio Allocations</th>
<th>Description</th>
<th>B1</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Equity</td>
<td>60%</td>
<td>40%</td>
<td>30%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>US Bonds</td>
<td>40%</td>
<td>30%</td>
<td>25%</td>
<td>20%</td>
<td>15%</td>
</tr>
<tr>
<td>International Equity</td>
<td>30%</td>
<td>25%</td>
<td>20%</td>
<td>15%</td>
<td>10%</td>
</tr>
<tr>
<td>Emerging/Non Equity</td>
<td>20%</td>
<td>15%</td>
<td>10%</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Real Estate</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
<td>30%</td>
</tr>
<tr>
<td>Absolute Return</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
<td>30%</td>
</tr>
<tr>
<td>Private Equity</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>Venture Capital</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

His question is whether the new, diversified, model, is superior to the traditional model.

The results of a previous study covering 2003-07 were provocative: realized alpha returns from the diversified endowment model were far higher and far more consistent than expected, and at no sacrifice to risk. The current study examines the actual performance of four representative allocations (plus the traditional model) over the past five calendar years, using standard market index returns for the relevant asset classes. The results of the beta-based theory could then be compared with the actual 2003-2007 performance.

In terms of total returns, all asset classes performed much better than expected except for US Bonds and Venture Capital. These results appeared even better when beta-based analysis was used to partition the returns into equity-associated components and beyond-equity alphas. The basic equity real return was within expectation, but the alpha returns far exceeded expectations from the beta-based analysis.

In terms of risk characteristics, the actual 2003-2007 return data are generally quite supportive of the theoretical beta-based analysis. In terms of the realized performance, both the total returns and the alpha returns increased with higher levels of diversification, just as predicted.
The extraordinary market performance, combined with the theoretical benefits of diversification, has definitely enhanced the appeal of the diversified endowment model for a wide range of institutional investors. However, these realized returns are so extraordinary, both in level and consistency, as to raise potentially troubling questions about their credibility as a basis for extrapolation into the future.

The actual portfolio volatilities vary significantly depending on the period, although the primary driver of the level of portfolio volatility is the magnitude of the equity volatility. Over the long term, the volatilities of diversified portfolios (C and C2) are generally close to the theoretical projections (based on the index values), while the behavior in shorter periods can be quite different from projections. The theoretical projections are shown below.

Looking at the sub periods for the actual portfolios, Leibowitz reports that betas for diversified portfolios were lower, and that over longer periods the covariance-based beta estimate appears to be an appropriate indicator of overall portfolio risk.

As for realized alpha, the following table shows that it is higher as diversification increases, and is stable and greater than projected returns.
In looking at the results, Leibowitz says that risk estimates from a standard covariance matrix are remarkably accurate in projecting the risk characteristics over the last 15 years. Both the ratio of portfolio volatility to US equity volatility and the portfolio correlation to US equity proved consistent, leading to stable betas over the 15-year history. These theoretical and empirical results demonstrate that the risk characteristics of a traditional 60/40 fund and an endowment-type portfolio are fundamentally similar, and true advantage gained by the new endowment type portfolio is not risk reduction but the accumulation of alpha returns over time. Over recent history, Leibowitz concludes that funds’ alpha returns have been far greater and far more stable than projected, raising a number of intriguing questions.

His final slide shows some concerns and the results from late 2008 show stressed betas and dismal returns. Real equity returns for 1993-2007 were 7.59%. For 2008 to September 30 the returns was -15.35% and by October 15 the equity market return YTD was -37%. Portfolio B and D earned -23% and -29.8% respectively.

He summarized his implications in the slide shown below.
4. Modeling Alpha (Spring 2007)

Eric H. Sorensen, President and CEO PanAgora Asset Management, and Edward Qian, Director-Macro Strategies, PanAgora Asset Management, made available a paper by themselves and Ronald Hua entitled “Information Horizon, Portfolio Turnover, and Optimal Alpha Models.”

Sorensen began the presentation. The IR (Information Ratio) is the annualized ratio of the averaged IC (Information Coefficient) to the standard deviation of the IC. And $IR = \frac{IC}{\sqrt{N}}$ where IC is the cross-sectional correlation coefficient between the factors value at the start of time t and the security returns over the time period t. Some investor behavior assumptions are necessary.

- Manager knows the metric of skill
- Manager applies (optimizes) skill, according to CAPM

In addition, security behavior assumptions are:

- Same skill level applies to all asset choices
- Sources of information are independent

Now we want the factor weights that maximize IR. At this point Qian took over the presentation. We must convert the raw IC to a risk adjusted IC, and Qian showed the large difference between the two. The true active risk consists of $\sigma = \sqrt{N\sigma_{model}}$ the strategy risk component is $\sigma_{model}$ and is different for different factors. The fundamental law of active management is true only if $\sigma_{model} = \frac{1}{\sqrt{N}}$, implying that IC is time invariant, which is not likely to be quite true.

He turned next to the maximization of multifactor models:

A quantitative framework for combining for multiple factors

- Similar to optimal allocation problem for multiple active managers
Individual factor (one manager)

- Average IC (expected alpha), standard deviation of IC (active risk)

Multi factor (managers)

- IC correlation: time series correlations between different ICs is key
- Analogous to correlations between excess returns of different managers
- The correlations between different factors are much less important
- Factor correlation is not the same as IC correlation

In many cases, IC correlations are significantly different from average factor correlations

IC correlations are critical to maximize multi-period IR

Factor correlations are useful for single-period composite scores

Sorensen took over the presentation at this point with the IR maximization of multi-factor models which led to:

Problem:

\[
\text{Maximize} \\
IR = \frac{\text{avg}(IC_i)}{\text{std}(IC_i)}
\]

Solution:

\[
\overline{IC} = (\overline{IC}_1, \overline{IC}_2, ..., \overline{IC}_M) \sum_{iC} = (\rho_{ij,IC})^{M}_{i,j=1}
\]

\[
W^* \propto \sum_{iC} \overline{IC}
\]

Turning to contextual models, Sorensen showed:

Theoretical advances

- Conditional asset pricing

Practical approaches

- Style investing
- Sector models

Contextual modeling

- A piecewise linear model
- Partitioning the security universe according to risk/attributes
- It follows business cycle of individual stocks

He went on to discuss a two dimensional example, for growth and value factors and tabulated the factor weights. He also tabulated the unique factor weights for each of four stocks: IBM, GM, TYC, and VSAT.

Qian returned to take over the presentation, adding turnover constraints to an optimal alpha model, maximizing the net IR. Turnover is a function of the targeted risk, the number of stocks, the forecast autocorrelation, and the average specific risk. While turnover is sometimes treated as a constraint in portfolio optimization, the authors preferred an integrated approach – using optimal models with turnover targets built into them. Lower turnover may be achieved at the cost of alpha and an important question then is what is the right tradeoff. He showed the equations for constrained optimization to find the optimal weights, and tabulated the correlation matrix of current and lagged values for price momentum and earnings yield in an example.
Finally, he summarized advances in multifactor models as:

**Correct skill measure – risk adjusted IC**
- Bridge the gap between model and actual performance

**Optimal modeling framework - maximizing IR**
- Maximize IR not IC
- Incorporate IC volatility and IC correlation

**Contextual modeling – not one-size-fits-all**
- Increase the depth of quant model
- Know where the market efficiency is

**Optimal models with costs constraints – maximizing net IR**
- Integrate alpha model with implementation

5. **Panel: Future Sources of Alpha (Spring 2007)**

The moderator of the panel was Katrina F. Sherrerd, Principal – Strategic Planning & Affiliate Relations, Research Affiliates, LLC, and the panelists were: Chris Brightman, CEO, University of Virginia Investment Management Company, Craig W. French, Partner, Corbin Capital Partners, L.P., and Harinda de Silva, President, Analytic Investors.

Sherrerd asked the panel what is alpha? The panel had some difficulty responding. The simplest definition appears to be excess return over a benchmark. This however begs the question what benchmark? Perhaps some of what we think of as alpha is actually beta, or “exotic beta.” Some would relate alpha to factor exposures, but it may be hard to identify exposures to factors, there are many indexes, and there are compound factors. Brightman commented that the separation of alpha and beta is helpful as a theoretical construct. And it can have practical application in liquid publicly traded markets. It is not useful in illiquid markets. He commented that the UVA Trustees are not really interested in alpha and beta. They want to compare the total return on their endowment with the total returns on other major endowments.

Sherrerd suggested that alphas start out uncorrelated, but later display correlation. French agreed with this and commented on experience of correlations moving towards one.

Sherrerd asked whether there is a meaningful alpha for an entire multi-asset portfolio. Some questions came in from the participants. One suggestion was that we should continue the use of alpha and beta as distinct measures, recognizing that the alpha depends upon a chosen benchmark. It may be more useful however, to focus on skills and factors.

The discussion turned to future sources of return, not simply sources of alpha. A distinction was clearly drawn between success at identifying discrepancies between intrinsic value and market value of investment vehicles, and perception of opportunities for increased financial or operational efficiency to add value. French and de Silva expanded on this, and de Silva moved on to the issue of whether increasing market efficiency will make alpha achievement more difficult. He judged that adding value, whether it is called alpha or not, is becoming more popular but that changing exposures to
different factors will continue to be a source of return. French suggested that taking advantage of under-leveraged balance sheets remains an attractive source of return. Special situations are likely to persist. There will be plenty of opportunities to be discovered by clever analysts and managers.

Sherrerd asked how do we estimate alpha in advance? This led back to whether the focus should be on improving the value of an enterprise over time through increased efficiency, or on the difference between intrinsic and market value. Brightman went back to the question whether alpha and beta separation is useful or practical. Finding skill in investing is very important, and hence finding the best way to look for skill is important.

6. Alpha Migration: Issues and Consequences (Spring 2007)

Richard Michaud introduced Andrew B. Weisman, Managing Director, Hedge Fund Development, Merrill Lynch, noting that he had spoken before, at the Q-Group® Spring 2001 seminar. Weisman and Sandeep Patel, Portfolio Analytics, Merrill Lynch, made available a draft paper entitled “Chasing Your Tail”, co-authored by Anil Suri. In their abstract, the authors comment that they focus on the development of a portfolio construction framework that integrates intuition with relevant financial engineering in the presence of tail events (particularly left tail events) and short track records. The first framework they deal with accommodates non-normality, extreme co-movements, and drawdown related risk measures. The second framework addresses additional issues pertinent to hedge fund investments: short and unequal track records, illiquidity, estimation error and the absence of meaningful priors on return distributions. They believe these frameworks represent a significant advance beyond the original Markowitz Mean-Variance Optimization.

However such procedures are highly data dependent and frequently do not provide adequate guidance on the estimation of future loss distributions—a significant limitation in the presence of “peso problems”. To better understand this issue they discuss sources of hedge fund “alpha” that often lead to significant negative returns, and develop a simple intuitive framework to estimate future loss distributions. Their analysis shows that expected losses are directly related to the magnitude and propensity of observed gains. Finally, they show the efficacy of their simple framework in predicting drawdowns against a broad range of hedge fund strategies and equity markets.

Weisman identified a number of advances in portfolio construction analytics. To deal with non-normality, we can estimate marginals by kernels. For tail correlation, we can use the t-Copula methodology. For estimation error, we can do resampling. There are relevant risk measures for drawdown. An extension of Black-Litterman to a non-normal market can be helpful. To deal with the absence of priors, unequal history for managers and illiquidity, he referred to Kullback-Leibler, Masking Technology and a Barrier Option model.

The paper describes these conditions and goes into some detail with respect to ways of dealing with them. A particularly interesting exercise is the simulation of returns for managers with unequal track records. He showed a histogram of the observed returns history of manager 1 for 84 months, and another for the observed
returns history for manager 2 for only 24 months. Using semi-nonparametric resampling, the authors created a set of simulated returns as a guide to future performance. The results were consistent with the empirical intuition that even though manager 2 had a lower observed volatility it had to be “handicapped” because of its shorter history.

To deal with non-normality in hedge fund indices, the authors analyzed quarterly index-level hedge fund returns using a wide variety of distribution functions, and showed the results for 7 types of hedge fund indexes. What was particularly interesting was the extension of left tails in the distributions. Referring to sources of tail risk in hedge fund returns, they noted that the first and most obvious reason is that the instruments hedge funds hold and trade exhibit tail risk. Two other sources are illiquidity and short optionality. A graph of weekly returns for a variety of traded commodities over 20 years ending January 2007 showed that each of the major traded commodities had exhibited a 5 sigma or higher weekly return event, and in certain cases 20 sigma or even higher.

A particularly interesting problem shows up in the presence of reasonable doubt as to the “appropriate value” of an illiquid security at a specific point in time. Weisman showed a smoothing algorithm that can lead to significant valuation disparities. When a manager’s smoothing results in too obvious an overvaluation in the portfolio, investors tend to demand capital back. At the same time, prime brokers tend to react by demanding the sale of some or all of the portfolio, or by restricting or withdrawing financing for leveraged investments. In either case, a sudden forced liquidation of potentially highly illiquid securities is triggered. The authors presented a simple barrier option model to capture this economic behavior and then analyze the necessary adjustment to forward-looking estimates of returns.

The authors examined a third source of tail risk by noting the similarity in the return profiles of hedge funds and simple options-based strategies. It is not entirely evident why investors are attracted to hedge fund strategies that produce return outcomes with significant left tail skew. To better understand this, the authors structured what they referred to as the Alpha Transfer Experiment between two simple investment strategies: long and short option positions. Briefly, at the beginning of each month manager 1 sells an out-of-the-money call option on a common stock which expires at the end of the month, while manager 2 buys the same call option at the same price. The underlying stock price paths are generated using Monte Carlo simulation assuming geometric Brownian motion. Three cases are examined: where the option is over-valued, when it is fairly valued, and where it is under-valued. In the first case, alpha is transferred from manager 2 to manager 1; in the second there is no alpha transfer, and in the third it is transferred from manager 1 to manager 2. Each of the three transfers are repeated for ten years, and the results are rather interesting. For a constant level of alpha, manager 1 does better than manager 2, although all the investors in manager 2 do better than the investors in manager 1. This is because the short option strategy maximizes incentive fees for a given skill level, that is for ability to generate alpha. So fund managers are economically incented to prefer short option strategies even when the underlying options are underpriced. These findings, the authors conclude, go a long way to explain why the hedge fund industry tends to exhibit such a pronounced left tail skew as a broad range
of investment processes pursued by hedge fund managers generate option-like payoffs.

The paper continues, to deal with the periodically efficient market, a binomial loss model to estimate future loss potential, and particularly tail loss potential.

In conclusion, the inability to adequately parameterize asset returns based on historical data is not a new problem. The peso problem is a good example of the danger in using historical returns to calibrate a risk/investment model. The paper examines sources of the peso problem in the context of hedge funds, suggesting a simple and direct method to estimate unobserved tail losses that arise as a result of the peso problem and shows the efficacy of this method in estimating potential tail losses for hedge funds and equity markets.


Andre F. Perold, Sylvan C. Coleman Professor of Financial Management, Harvard Business School, who has spoken at five previous Q-Group® meetings, Spring 1980, 1987, 1994 and 2002, and Fall 2004. He presented a case study concerning the endowment funds of Harvard and Yale universities. He had made available a series of readings, consisting of commentary in newspapers and journals describing the management of the Harvard and Yale endowments, including performance statistics, manager compensation details, and the controversy that has arisen at Harvard University with respect to the very high compensations earned by Harvard employees managing the endowment. Perold also made available some descriptive statistics of the Yale and Harvard endowments and presented four discussion questions:

1. What is the best way today to invest a long-term pool of assets?
2. What is the best approach to making asset allocation and manager selection decisions?
3. How should Harvard think about internal versus external management? About performance measurement? About compensation of investment professionals?
4. What strategies are likely to perform best over the next twenty years?

He began the discussion, with a review of the statistics. Until about the year 2000, the performance of the Harvard endowment had been superior to that of the Yale endowment. Since that time Yale has edged ahead of Harvard, and in 2005 Yale’s return was above Harvard’s. David F. Swensen runs Yale’s $15 billion endowment, and has shown extraordinary ability in choosing managers for Yale – the endowment is entirely in the hands of outside fund managers. Harvard has relied primarily on inside management, where incentive compensation has led to very substantial fees, reaching in 2003 a total of $107 million shared by six managers. (To put this in context, the fees were essentially the reward for beating benchmarks, and the total represented about 10% of the alpha generated by the managers.) Perhaps in part the result of complaints by students, janitors, alumni and others at Harvard, Jack Meyer, who had been in charge at Harvard for 15 years has resigned to form his own hedge fund, with very substantial assets and half a billion dollars of Harvard money. His successor, Mohamed El-Erian, a fixed income specialist who has spent the past six years running $28 billion in emerging-markets portfolios at bond fund giant PIMCO, has an extraordinary performance record at PIMCO.
It turns out that the asset allocation of the Harvard and Yale endowments are fairly similar, and the changes in allocation over recent years are fairly similar. In both endowments, the proportion invested in US equities has been falling over the past twenty years or so, while the proportion in foreign equities has held fairly steady, as has private equity investing, which is substantial. The proportion in US bonds has been declining and investments in real assets have been rising.

In answer to a question about the sources of Harvard’s superior performance, Perold responded that about 1/3 of the endowment fund’s alpha was due to asset allocation and about 2/3 to selection. He guessed that the figures for Yale were probably similar.

A suggested strategy for Harvard was simply imitating the Yale strategy which had proved so successful. Perold commented that a great many endowment funds were attempting to do just that. Was it reasonable to expect that with many endowment funds trying to copy Yale, Harvard might expect to excel by doing the same? It appeared to Perold that much of the success at Yale and Harvard was due to finding good people to invest in areas largely ignored by other major institutions. Would it not make sense for Harvard to look for areas where there was little or no competition? It occurred to him that truly long horizon bets might be appropriate.

There was an extended discussion of the pros and cons of attempting truly long horizon investing. Finding qualified managers, measuring performance and setting compensation could present problems. At the same time, there was not great confidence among the participants that simply continuing with the strategies that had worked in recent years could be counted on for the long run future.

Finally, there appeared to be no consensus, and Perold closed with the comment that it will be interesting to see where Harvard goes under its new leadership.

Alternative Investments and Strategies
8. The Dynamics of Leveraged and Inverse ETFs (Fall 2009)


Madhavan started by saying that since leveraged and inverse funds are not well understood, even by industry professionals, his goal was to provide a unified framework to better understanding:

- The underlying dynamics of leveraged and inverse ETFs.
- Their impact on market volatility and liquidity.
- The unusual features of their product design.
- The relevant questions of investor suitability.

Madhavan called leveraged and inverse ETFs hot products that are popular with short-term traders and hedge funds managers for directional trades, and with individuals for hedging and leverage.
without derivatives. He provided an estimate of the size and character of the market that is shown in the chart below.

**Leveraged and inverse ETFs**
AUM by weighting scheme for US equity ETPs, August 2009

He went on to report the magnitude of their influence: 6 of the top 10 equities are ETFs and 2 of the 6 are leveraged; of assets under management, 4.3 percent are leveraged ETFs and constitute 7 percent of the trading volume of equities. As for the character of the leveraged ETFs, Madhavan provided the following chart. While the bulk of the assets under management are in the -2x and +2x products, the top two are in +/-3x.

**AUM for all inverse and leveraged ETPs**
(in millions of dollars as of August 2009)

Source: Authors’ estimates based on Bloomberg data and reported leverage for 139 funds
These securities operate like leveraged mutual funds except that the leverage is explicitly embedded as part of product design. The design of these instruments creates both intended and unintended characteristics not seen in ETFs, and thus, Madhavan contended, they should be clearly differentiated and called Exchange Traded Products (ETPs).

Leveraged and inverse ETFs are designed to provide leveraged long or short exposure to the daily return of various indexes, and sectors. Asset classes track well at the daily and intraday level as shown below:

They do not, however, track over the longer periods shown in the following chart.

In his presentation Madhavan provided a number of graphic illustrations of the behavior of ETFs and leveraged ETFs under the same market movements, making clear that the hedging term is non-linear, asymmetric, and unique to leveraged and inverse ETFs. This creates a need for end-of-day rebalancing, requiring special attention from investors.

Madhavan pointed out two major market microstructure implications of these instruments:

1. Hedging demands magnify volatility, increasing the market impact coefficient for all flows, irrespective of their source, and provides additional momentum to same day returns that increases the price
pressure effect of any signed order imbalance regardless of source.

2. Price impact is greater with higher volatility, lower market liquidity, higher same day effects, increased AUMs, and higher leverage ratios: the presence of the lagged hedge induces serial correlation in returns because the previous period’s hedge is linearly related to the previous return.

Madhavan listed some policy implications for protecting investors: better disclosure qualifications and margin requirements may be the needed. As for protecting markets, Manhavan concluded that regulation is needed to protect investors and he pointed out the direction regulation might take.

9. Risk and Return Characteristics of Venture Capital – Backed Entrepreneurial Companies (Fall 2009)

Arthur G. Korteweg, Stanford University, presented, “Risk and Return Characteristics of Venture Capital-Backed Entrepreneurial Companies,” work he coauthored with Morten Sorensen, Columbia Business School and NBER.

Valuations of entrepreneurial companies are observed only occasionally, albeit more frequently for well-performing companies than poor performers. This infrequent trading valuation problem occurs not only for entrepreneurial companies but for many other infrequently traded assets — real estate, corporate and municipal bonds, small-cap stocks, structured products, and OTC traded securities. Since valuations are known only when the securities trade, data for these assets are sporadic and can be quite stale. Consequently, estimators of risk and return must be corrected for sample selection to obtain consistent estimates. Korteweg and his coauthor developed a general model of dynamic sample selection using data from venture capital investments in entrepreneurial companies.

Their goal was to estimate characteristics of VC-backed private firms, with valuations only observed when companies have funding or exit events. Problematically, better performing firms are more likely to have more funding and exit events, creating a “Dynamic sample selection problem.” Clearly, Korteweg said, the dynamic selection issue arises in any setting where the probability of observing a return is related to the return itself. It is this dynamic selection problem they address by developing a new empirical methodology.

The authors focused on entrepreneurial companies financed by venture capital investors using data from 5,501 VC investments in 1,934 portfolio companies between 1987 and 2005. These companies have staged financing and, although Korteweg said 43.4% are “zombies” (the companies have disappeared), 10.3% companies went public, 23.3% were acquired, and 23.0% were liquidated, thus creating data events. Standard factor-model market values with unobserved valuations are treated as latent variables. To this they added a selection equation that determined when valuations were observed. Since a large number of latent valuation and selection variables, characteristics that affect refinancing and exit events, create numerical problems, they used Bayesian methods using Kalman filtering and Gibbs sampling to overcome the problems. The probability of a financing event depends upon a variety of factors shown in the chart below:
Using the Fama French model, the find the following:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Effect on prob of observing a financing event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return since last financing round</td>
<td>(+)</td>
</tr>
<tr>
<td>Time since last financing round</td>
<td>(+) when low (-) when high</td>
</tr>
<tr>
<td>Aggregate # acquisitions of VC-backed firms</td>
<td>(+)</td>
</tr>
<tr>
<td>Agg. # IPOs of VC-backed firms</td>
<td>(0)/(+/-)</td>
</tr>
<tr>
<td>Agg. # financing rounds</td>
<td>(+)</td>
</tr>
<tr>
<td>Market return</td>
<td>(+)</td>
</tr>
</tbody>
</table>

Using the Fama French model, the find the following:

<table>
<thead>
<tr>
<th></th>
<th>No Selection</th>
<th>With Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-1.2%</td>
<td>-5.4%</td>
</tr>
<tr>
<td>RMRF</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>SMB</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>HML</td>
<td>-1.2</td>
<td>-1.6</td>
</tr>
<tr>
<td>Idiosyncratic volatility</td>
<td>35.6%</td>
<td>40.3%</td>
</tr>
</tbody>
</table>

They conclude that VC-backed private firms behave like small growth firms. The factor loadings for the FF model are dependent upon the stage in the VC process as shown below:
Korteweg concluded that in dealing with the sample selection problem, they had developed and estimated a dynamic model to account for estimators of risk-return of infrequently traded assets, and in doing so, provided the most comprehensive risk-return estimates of entrepreneurial companies to date. Their estimates showed reasonable patterns both in return and selection equations and the methodology is generally applicable to hedge fund performance, real-estate, corporate bonds, and CLOs / CDOs.

His presentation ended with some caveats:

1. The model does not incorporate cross-sectional covariance.
2. “Instruments” in the selection equation may be correlated with VC specific shocks, and time since last financing may be a better instrument than market-wide activity.
3. Caution is required when interpreting coefficients. Alphas reflect compensation for investors’ skill, illiquidity, lack of rebalancing, and zero-payout risk, and may not be attainable. Still, the dollar-weighted alpha by stage is 2.5%/month.

10. **Capital Flows and the Returns to Private Equity (Fall 2008)**


First, Schoar demonstrated the returns from 1984 to 2000 for private equity (PE), venture capital (VC) and the S&P 500. These are shown in the following graph. She notes that the PE and VC returns show procyclicality.
For valuations of PE and VC deals she provides the following insights:

- Valuations are driven by exit markets: how the PE or VC fund is liquidated.
- IPO and M&A valuation are strongly procyclical.
- Large capital inflows follow high returns from the partnership.
- Funds raised in high capital inflow years have poor subsequent performance and vice versa.
- Making disciplined valuations at the deal level is difficult.
- Inflows are driven by psychology of the investors expecting good performance to follow good performance.
- Young funds having worse track records are negatively impacted.
- Established funds better survive the cyclical nature of the industry.

Schoar noted that the equity market, on the other hand, is characterized by unpredictable returns, benefits of diversification, and the possibility of arbitrage. These features do not apply to private equity investments. Private equity has entry limitations imposed by high initial investments. At the present, she says, the minimum for entry is $10 million. In addition, investments are illiquid and there are large information asymmetries.

Next she turned to the probability that the next fund of a given partnership is likely to stay in the same performance bracket. Clearly there is persistence, and it is larger for the top tercile even in market downturns.

<table>
<thead>
<tr>
<th>Persistence of Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Bottom</td>
</tr>
<tr>
<td>Medium</td>
</tr>
<tr>
<td>Top</td>
</tr>
</tbody>
</table>

A comparison of returns showed that the average VC or Buyout fund does not outperform the S&P 500. But there are enormous differences between the top and bottom quartile returns. Over the 1990s, there were great differences in the experience of investor classes, with endowments leading by a wide margin, and banks trailing. It was also true that idiosyncratic risk was lowest for the high return investors (endowments lowest and banks highest).

Schoar continued with a discussion of the causes of the differences. She suggested that the superior performance by endowments comes from an ability to monitor fund size and partnership growth. In particular, there is a concave relationship between fund size, measured as capital committed at closing, and IRR, even controlling for vintage year and fund category. As the partnership produces more funds, the IRR rises, as it does when partners commit more capital.

In conclusion, Schoar says that PE does differ from other asset classes, and that to make successful investments in PE, the limited partner should:
Focus on relationships with top funds rather than ex ante asset allocation.

Manage the investment process opportunistically.

Have a bottom up approach.

Not have fixed allocation targets.

Examine incentives for capital deployment to be sure they are not detrimental to returns.

Don’t think of PE as an asset class, but invest when you have information on specific funds.

11. The Fundamentals of Commodity Futures Returns (Spring 2008)

K. Geert Rouwenhorst, School of Management, Yale University, distributed and presented “The Fundamentals of Commodity Futures Returns,” a paper written with Gary Gorton, The Wharton School, University of Pennsylvania, and Fumio Hayashi, Tokyo University. The authors report on their examination of commodity futures risk premiums across commodities and over time, finding that these depend on the level of physical inventories.

Rouwenhorst began his presentation with a list questions that were posed following his last presentation at the Q-Group® Spring 2005 Seminar. Which commodities outperform the average? What are the drivers behind risk premiums? This paper, supported by the Q-Group®, was designed to answer some of those questions.

First, he presented a chart that showed commodity futures steadily outperforming bonds in all periods, and stocks in all but the era of the Tech Stock Bubble.

He then turned to a classic question in financial economics - the relationship between inventory storage and commodity futures’ risk premiums. The starting point for the authors’ analysis was the traditional Theory of Storage that links term structure of futures prices and the level of commodity inventories. In this paper the authors combine the Theory of Storage with the Theory of Inventory Behavior to create a model they call the GHR model. Their model predicts links between the state of inventories, the shape of the futures curve, and expected futures risk premiums.

To test their new model, the authors use price and inventory data for 31 commodities from 12/1969 to 12/2006. They first show that the inventory time-series of most commodities contains a time-trend and exhibits strong seasonal variation. Rouwenhurst showed two charts that demonstrated that commodity variation is different between commodities with steady production and with seasonal demand, (oil) and those with seasonal production and steady demand (corn).

The authors then link the basis, the difference between the current spot commodity price and the nearest-to-maturity futures price, to the level of inventories. They document the predicted
Theory of Storage’s nonlinear relationship and find that low inventory levels for a commodity are associated with an inverted (backwardated – when a futures price is lower in the distant than in near delivery months) term structure while high levels of inventories are associated with an upward sloping futures curve (contango – when distant delivery prices for futures exceed spot prices usually due to the costs of storing and insuring the underlying commodity). Rouwenhorst concluded that the relationship between inventories and the shape of the futures curve is non-linear and that the slope of the futures curve becomes steeper as inventories decline, thus suggesting that the shape of the futures curve can predict returns.

The authors next document an empirical link between inventories and risk premiums. They use inventories as a direct explanatory variable for risk premiums and show that by sorting commodity futures into portfolios based on high or low inventory levels that inventory level is correlated with future average returns. Their equally-weighted portfolio of the sample commodities shows an average basis of 2.10%, leading the authors to conclude that on average across commodities and time periods, futures prices have exceeded contemporaneous spot prices.

In addition, they show that low commodities inventory months are associated with above average basis for that commodity and that the basis is below average during high inventory months, suggesting a workable momentum strategy they label RS for relative strength. Their results are clear in the following chart that Rouwenhorst presented. The lowest returning strategy is an equally-weighted portfolio. It is inferior to the returns on the high basis portfolio, and a combined portfolios. The momentum portfolio (high relative strength) leads for all the periods. The value of the combined strategy portfolio lies in its return lower volatility, not its return. The authors caution that the interpretation of the findings is complicated by an unknown timing lag in the information release of inventories data and subsequent data revisions.
Rouwenhorst noted during his presentation that while the Theory of Storage does not make direct predictions about futures risk premiums, it does make predictions about the future volatility of spot prices. This prediction stems from the fact that when inventories are low the ability of inventories to absorb shocks to demand and supply is diminished, thus raising the conditional volatility of future spot prices. To the extent that the risk premium on long futures positions is compensation paid by hedgers to obtain insurance against price risk, the mean excess return from commodity futures should increase when future spot price risk increases. Therefore, the Theory of Storage implies that the state of inventory at the end of the month is a key predictor of the excess return from the end of the month to the next and that the mean excess return and inventory are inversely related. However, when the authors test for this relationship they find no evidence that supports the hedging pressure explanation for risk premiums in commodity futures markets. The following chart was used by Rouwenhurst to demonstrate their findings.

Instead, they show that risk premiums systematically vary with the state of inventories. Rouwenhurst showed charts that demonstrated that backwardation, momentum investing, works with commodities.

On the basis of their research, Rouwenhorst provided the following conclusions.

- The basis is negatively related to inventories.
- The relationship is non-linear for many commodities.
- The basis and prior returns are indicators for the state of inventories.
- The inventories, the basis, and prior returns, are correlated with expected

---

Yale School of Management

Hedging Pressure and Risk Premiums (Table 12)

R-squared of Futures Returns on Commercial Positions
CFTC data1986/12 - 2006/12

---

![Chart](image.png)
price volatility and predict future risk premiums.

- That argument that hedging pressure is an alternative explanation for commodity futures risk premiums is not supported.

He said there are two unanswered questions for future research:

- Does the single factor explanation capture most of the predictable variation of risk premiums?
- Can the risk premiums be reconciled with modern asset pricing theories of risk?

12. The Investment Behavior of Buyout Funds: Theory and Evidence (Fall 2007)


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 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.
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.


On this occasion, he was introduced by Richard Michaud, who observed that Kat had taken his study of hedge funds to a new level, and wondered how much alpha is left in hedge funds, are hedge funds a diversifiable asset, and what about fees? Kat proposed that synthetic funds would solve many problems. These included excessive fees for regular hedge funds, lack of liquidity and transparency, lack of capacity, hidden operational risks, annoying managers, a drift in style, and potential regulation.

Two approaches are possible for the creation of synthetic funds. One could use a traditional factor model, trying to match the risk exposures of a fund or index of funds. If successful, this produces the same month-to-month returns and therefore the same properties as the target fund or index of funds. His alternative, less ambitious than
the factor model, aims to generate returns with the same statistical properties as a given fund or index, but not necessarily the same month-to-month returns. He discussed factor models, and concluded that:

1. Factor models cannot replicate individual funds.
2. Factor models cannot replicate most hedge fund indices.
3. Factor models can replicate the most diversified indices, but these don’t make very interesting investments. Put simply: It works when you don’t really need it to work!
4. When replication is not accurate the statistical properties of the returns generated are unclear.

Kat demonstrated graphically that the performance of the fund he synthesized from March 1997 – March 2006 came very close to delivering the specified characteristics.

Lest there be some skepticism about the dynamic trading strategy he used, he pointed out that it is the same strategy used by banks all over the world to hedge the sale of an option.

Explaining further, he observed:

- Every payoff function implies a return distribution. Use reverse reasoning: If you can find a payoff function that implies the desired return distribution then you can generate that distribution by executing the hedging strategy for that payoff function.

Next he turned to how one might use a synthetic fund. It could be used to move money through time. It might be a reserve asset, the main source of uncertainty. It might be a reference portfolio, to correct the relationship between the reserve asset return and the reference portfolio return. One might wish to create an investment that has zero correlation with an existing portfolio. He went on to display some out-of-sample tests showing examples of replicating the performance of portfolios, for example one consisting of 50% S&P 500 and 50% Treasury bonds. Continuing with uses for synthetic funds, he showed how hedge fund index returns could be achieved with highly liquid futures and without the hedge fund fees with a number of examples.
In conclusion he observed:

- Factor models only work well in cases where we don’t really need them to work.
- The properties of factor model based funds are unclear.
- FundCreator allows investors to design funds that optimally fit into an investor’s portfolio.
- FundCreator based funds have predefined statistical properties. You get what you ask for.
- Neither factor models nor FundCreator truly “replicate” or “clone” hedge fund returns.
- Roughly 80% of hedge funds and funds of funds have not provided returns that could not have been generated mechanically trading a basket of liquid futures contracts.
- Hedge fund performance has deteriorated over time.
- Successful hedge funds tend to become less successful over time.

### 15. Flirting With Danger: Optimizing Leverage and Shorting (Fall 2006)

Ronald N. Kahn, Global Head of Advanced Equity Strategies, Barclays Global Investors, made available a paper, by himself, Seanna Johnson and Dean Petrich titled “Optimal Gearing.” The authors establish a metric for efficiency, in the form of the transfer coefficient (TC). The TC is the correlation between an actual portfolio and an ideal optimal portfolio. It can also be expressed as the ratio of the IR (information ratio) in the actual portfolio to the IR in the ideal portfolio. Turning to long-short implementations, Kahn asked whether there is a single correct risk level at which to operate.

He presented a simple model. We have \( N \) stocks. The residual returns are uncorrelated, with identical volatilities, \( \omega_0 \). The forecasts of alpha are: \( \alpha_n = IC \cdot \omega_0 \cdot z_n \) where \( z \) is a normally distributed random variable with mean = 0 and standard deviation = 1. We build the optimal portfolio \( h \), with risk = \( \omega^* \) (\( \omega^* \) is the target risk). Then we estimate portfolio gearing \( G \):

\[
G = \left( \frac{1}{2} \right) \sum_{n=1}^{N} |h_{PA}(n)|,
\]

where \( h_{PA}(n) \) is the active holding for stock \( n \). For long-short portfolios with cash benchmarks, the active holding equals the total holding. By this definition, a long-short fund 100% long, 100% short, and with 100% collateral, has \( G=1 \).

We consider various possible long-short portfolios with a gearing of 1. The optimal risk level, based on residual risk and number of stocks, is:

\[
\omega^* = G \cdot \sqrt{2\pi} \cdot \left( \frac{\omega_0}{\sqrt{N}} \right).
\]

So, for example, optimal risk is lower in Japan or the US than in Hong Kong, which has fewer stocks and typically higher levels of stock residual risk.

Kahn offered a graph plotting the TC against risk. With the gearing fixed, there is one particular risk level that maximizes the transfer coefficient. In other words, there is an optimal level of risk. Furthermore, operating above that optimal level can be worse than operating below it: the TC is not symmetric around that optimal risk. It is also true that given a fixed risk level,
there is an optimal gearing. So managers must choose gearing and risk in concert.

Turning to shorting, we know that the long-only constraint significantly lowers the transfer coefficient. Allowing some shorting in previously long-only portfolios has to help. The question is, how much?

Kahn presented the results of simulation analyses of partial short (e.g. 120/20 or 180/80) portfolios. The simulations are used to build optimal portfolios of different target risk levels and different levels of allowed shorting.

As active risk increases, the desired amount of shorting increases. Partial short portfolios can achieve TC=1 up until a critical risk level, beyond which the desired amount of shorting exceeds the partial limit. Implementing equality constraints (e.g. requiring exactly 30% shorting) is optimal only at exactly the right risk level. In the example analysis, 30% shorting is optimal at about 1.3% active risk. It would be sub-optimal to require 30% short at 0.20% active risk or at 10% active risk.

Finally, partial short implementations require less shorting than equivalent risk long-short implementations, because partial short portfolios can implement negative views by underweighting stocks before needing to actually short the stocks. Because of this, as the costs of shorting increase, we may prefer partial short to long-short portfolios, although under most conditions it appeared that the long-short was superior.

In setting out his conclusions, Kahn referred to two surprises. The first is that long-short is only optimal at the right level of risk, given fixed gearing; or at the right level of gearing, given fixed risk. The second surprise is that partial short portfolios can be more efficient than fully long-short depending on risk levels, costs, and the specific benchmark.

The three lessons he identified from his work were: (1) Constraints and costs matter, (2) It is important to understand them in detail, and finally (3) We continue to learn.

16. Returns to Portfolios of Movies (Spring 2006)

Andrew Rudd, Managing Partner, and Mark Ferrari, Director of Research, Procinea Management LLC, presented a series of slides describing the movie industry and the development of a model for selecting movie investments. Rudd has made or participated in a dozen presentations at Q-Group® seminars, the most recent in Spring of 2000.

Rudd began the presentation with a general discussion of the movie industry as an alternative asset class for investments. It has been the beneficiary of significant co-financing over the years but the total return has not proved exciting. Procinea has undertaken an active quantitative strategy to deliver attractive returns as part of a broader initiative to analyze the investment potential of artistic and intellectual property.

A major issue has been to define an appropriate contract to align interests between investors and studios. Unsuccessful attempts by previous investors have led to skepticism.

A second major issue is identifying an investment strategy. Rudd’s focus was on movies distributed by the major studios and their subsidiaries, movies that are
contracted for world-wide distribution. Behavioral problems are significant. The creative people in the movie business have agendas that appear to conflict with those of business managers. Their motivations can be difficult to reconcile with financial success.

Turning to a breakdown of the roughly $100 billion retail revenue for the movie industry world-wide, Rudd pointed out the perhaps surprising observation that US box office revenue has actually been rising over the past fifteen years. The same is true of the slightly larger international box office revenue. US home video revenue is larger and rising faster as is international home video. Overall, revenue has risen from about $35 billion to $100 billion over the fifteen year period.

Major studios finance 100-125 titles per year. The average production and distribution cost of each title exceeds $100 million, creating an annual funding need of $10-12 billion. The studios do not have the capital needed and have a long history of using co-financing partners. Procinea estimates a funding gap of $5 billion or more per year, one that is liable to increase as the number of films and costs per film rise.

An average production cost of $60-70 million is incurred over twelve to eighteen months. Prints and advertising (P&A) can be as much or more than production costs when foreign marketing is included. Revenue is earned relatively quickly after release, with 60% in the first year and almost 90% by the end of the second year. Procinea focuses on “first cycle” revenues.

An interesting question is when to invest in a movie. The choice is essentially between the “greenlight” time, when production is authorized, and the later date of the film release. Waiting until the release date risks adverse selection by the movie producer.

The Procinea policy is to invest at greenlight.

From 1997 to 2004, 1627 movies were released in the US or Canada, with a minimum production cost of $2 million. About 836 were eligible for investment, and 588 constituted a target universe for Procinea. All were financed or co-financed and distributed by a major studio. It is important that 60% of all movies do not cover their costs. Of the target universe, 57% lost money, and while the mean return on investment was 10.7%, the median was -10.2%. These statistics were considerably better than those for the broad universe of movies.

Rudd discussed a number of model issues. Revenue is clearly non-linear in movie attributes. Interactions between the attributes are likely to be important. Many interesting movie attributes are not publicly available, including actor compensation. It is not an optimistic sign that the studios themselves have difficulty predicting success. There is a significant academic literature on the subject of movies and movie investing and the conclusions are generally negative for investors.

Mark Ferrari took over the presentation to describe the development of a revenue model. He relies on standard industry data sources, augmented with extracts from on-line entertainment media, media research reports, etc. He himself defines and collects movie attributes not provided by vendor and industry sources. An example is the order in which movie casts are billed. His database includes up to
70 data points per movie, for more than 7,800 films.

Production cost is important. A regression line, as well as clustering of data points, indicated that log revenue rises more or less linearly with log production cost. There are, however, many significant outliers. The data covered 1995-2004.

Procinea’s proprietary hit ratio D quantifies the past financial performance of a director. The correlation of production cost C and hit ratio is 0.34. Both factors and their interaction are significant predictors of revenue Ri of movie i according to an ordinary least squared regression. The model takes the form:

\[
\log R_i = a_1(C, D)\log C_i + a_2(C, D)D_i + \eta_i
\]

\[w_i = \left[1 - \left(\frac{d_i}{d_N}\right)^3\right] \quad \text{Tricubic weight}
\]

\[d_i = \left[\left(C_i - C\right)^2 + \left(D_i - D\right)^2\right]^{1/2} \quad \text{Euclidean distance}
\]

Some conclusions drawn from the model estimation are that a better director increases log revenue for any budget. A little skill really helps a small project. A little cash really helps a struggling director. Excellent directors cannot outperform if cash-constrained.

Revenue depends on the season of the film release and the rating. Both effects are significant at the 95% level. It turns out that important predictive factors are the primary genre from a Nielsen classification. It also appears that quality is rewarded, based on regressions of revenue and rating scores between 0-100 obtained from metacritic.com, which aggregates movie reviews. Story elements also influence revenue, in this case independently of their correlation with genre.

Finally, the revenue forecasting factors are production cost, talent (director, actor, writer, producer, …), studio, rating, season of release, genre, story elements, demographics, run time and interactions (teams repeat, stars specialized by genre, …). A decision rule for each movie is that:

- Given attributes at greenlight, the model predicts total revenue.
- Total revenue is divided among channels according to historical fractions.
- Channel revenue is scheduled according to historical time envelopes.
- Value is estimated as the present value of these cash flows at a fixed required rate.
- Project is accepted if value exceeds fully loaded production cost, including a cost-dependent estimate of P&A.

141 movies (24% of target universe) were selected from 1997 – 2004.

Asset Management Industry

17. A Matter of Style: The Causes and Consequences of Style Drift In Institutional Portfolios (Fall 2010)

Russ Wermers, Associate Professor of Finance, Robert H. Smith School of Business, University of Maryland at College Park, presented “A Matter of Style: The Causes and Consequences of Style Drift in Mutual Fund Portfolios.”

Investors, especially institutional, categorize stocks and funds into style categories, in spite of the fact that little is known about the dynamics of this approach. Wermers wonders whether:
1. Style specialization improves performance?

2. Institutions actively control their style drift?

3. We should constrain active managers to stick to their “style box”? 

4. Who is right, those who believe style drift should be tightly constrained, or those who do not?

On the basis of his research he finds:

1. The smallest cap funds have almost twice the style drift of largest cap funds.

2. Growth funds exhibit slightly higher style drift than value funds.

3. There was an initial increase in style drift following the 1975 removal of fixed trading costs.

4. There has been a significant decline in style drift since the mid-1980s, even though trading costs have decreased substantially.

5. Funds with more “active style drift” (style drift through trading) have significantly higher alphas.

6. The average fund manager does not seem overly concerned with style drift.

A little history is important, Wermers says. Prior to the 1990s, there were many more “balanced” funds with the asset allocation and sector allocation decisions handled by the manager. In 1992 Morningstar introduced its “Style Box”. Now most mutual fund managers have a style specialization and use some indication of their style in the fund’s name. Indeed, supporting this, the SEC requires that 80% of the securities in a portfolio must be consistent with the fund name. This style commitment could be a marketing gimmick appealing to investors who need organizing principles, risk control, or a way to commit the manager to a particular investment universe.

Using a measure of Total Style Drift (TSD) in style dimension where weights (w) are stock/portfolio at the end of a quarter and C is the stock characteristic at end-of-quarter t:

$$TSD_t = \sum_{j=1}^{N} (\tilde{o}_{j,t} \tilde{C}_{j,t} - \tilde{o}_{j,t-1} \tilde{C}_{j,t-1})$$

Wermers decomposes TSD into Passive Style Drift (PSD), the change in style during quarter t assuming buy-and-hold, and Active Style Drift (ASD), the change in style due in the actual portfolio, relative to a buy-and-hold portfolio. The data he uses are from Thomson quarterly US domestic equity mutual fund holdings from 1975 to 2006. The data are matched with fund returns and characteristics and manager characteristics. He provides the following chart showing the importance of some of these characteristics and ASD.

Characteristics of Funds and Managers with High vs. Low Active Style Drift (ASD).
He finds that:

- More aggressive managers of smaller funds with good track-records have the highest ASD;
- Higher ASD leads to significantly higher pre-cost alphas, expense ratios and trade cost estimates;
- He indicates that some of this alpha would survive costs.

Wermers provides information on the drift by size, momentum and book-to-market. All show some style drift. In times of confusion, momentum peaks.

A 31-Year Look at Style Drift: Momentum Dimension

To conclude, Wermers says he created a new holdings based methodology to measure active and passive drift. Using his measures he finds that active drift is declining over time and it is higher for growth funds and small funds. In addition, style drift is higher for successful managers.

18. Portfolio Choice for Resource Based Sovereign Wealth Funds (Fall 2010)

Bernd Scherer, Professor of Finance, EDHEC Business School, presented “Optimal Asset Allocation for Resource Based Sovereign Wealth Funds.”

To begin, Scherer lays out two basic types of sovereign wealth funds (SWF), foreign exchange and resource based. It is resource-based funds, commodity funds that are financed through earnings on commodity exports (taxed by the government), on which he focuses. Most of those are based on oil, a commodity that is volatile, as shown in the following chart:
SWF funds provide commodity to equity transformation, and require risk management of volatile revenues and economic diversification. Scherer addresses how to model the asset allocation. He creates a model containing both oil wealth and financial wealth such that speculative demand for oil is offset by hedging demand. In this model hedged demand is zero only if oil price risk is purely idiosyncratic.

In the case of oil Scherer provides the following correlation of asset returns, US Treasuries of various maturities, and global equities (MSCI World in US dollars), with percentage oil price changes.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>1 year</th>
<th>1-3 year</th>
<th>3-5 year</th>
<th>5-7 year</th>
<th>7-10 year</th>
<th>10-20 year</th>
<th>20 plus year</th>
<th>Global Equities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly</td>
<td>-8.28%</td>
<td>-2.38%</td>
<td>1.16%</td>
<td>2.26%</td>
<td>2.75%</td>
<td>1.18%</td>
<td>0.16%</td>
<td>9.19%</td>
</tr>
<tr>
<td></td>
<td>-0.99</td>
<td>-0.43</td>
<td>0.21</td>
<td>0.41</td>
<td>0.49</td>
<td>0.21</td>
<td>0.03</td>
<td>1.66</td>
</tr>
<tr>
<td>Quarterly</td>
<td>-9.29%</td>
<td>-22.59%</td>
<td>-20.08%</td>
<td>-21.00%</td>
<td>-19.60%</td>
<td>-23.92%</td>
<td>-24.42%</td>
<td>-9.34%</td>
</tr>
<tr>
<td></td>
<td>-0.65</td>
<td>-2.42</td>
<td>-2.14</td>
<td>-2.24</td>
<td>-2.09</td>
<td>-2.57</td>
<td>-2.63</td>
<td>-0.98</td>
</tr>
<tr>
<td>Annual</td>
<td>-38.81%</td>
<td>-40.70%</td>
<td>-50.94%</td>
<td>-56.52%</td>
<td>-59.48%</td>
<td>-55.04%</td>
<td>-51.29%</td>
<td>24.10%</td>
</tr>
<tr>
<td></td>
<td>-1.52</td>
<td>-2.36</td>
<td>-3.13</td>
<td>-3.63</td>
<td>-3.92</td>
<td>-3.49</td>
<td>-3.16</td>
<td>1.31</td>
</tr>
</tbody>
</table>

He then discusses reasons for ignoring the evidence: political meddling or institutional failure to deal with oil and financial wealth together. The following chart compares optimal solution (asset allocation considering oil wealth) versus naive solution (asset allocation independent of oil wealth).

He concludes that these inefficiency costs could be reduced by running an overlay strategy on top of financial and resource wealth and discusses the costs of ignoring the evidence.

The model thus far assumes the value of oil reserves is known to the decision maker. That is not true: the value is neither known with great precision nor immune to legal disputes. The model also assumes independence between background risk, oil revenue variability, and asset risk. He then describes his more realistic model and concludes that an increase in background risk will lead to a decrease in risk taking for the SWF. In addition the effect becomes stronger the more volatile the risky assets. In a test of the model he expects that SWFs with larger resource uncertainty will invest less aggressively, and that economies with low reserves relative to financial wealth will be less affected by resource uncertainty. Scherer creates the following optimizations with various levels of uncertainty.
Table 1: Optimal Asset Allocation, No Resource Uncertainty

<table>
<thead>
<tr>
<th>γ</th>
<th>cash</th>
<th>1-year</th>
<th>10-year</th>
<th>Equities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0%</td>
<td>46%</td>
<td>2%</td>
<td>52%</td>
</tr>
<tr>
<td>3</td>
<td>0%</td>
<td>26%</td>
<td>56%</td>
<td>18%</td>
</tr>
<tr>
<td>5</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>7</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>10</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>25</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 2: Optimal Asset Allocation, With Resource Uncertainty

<table>
<thead>
<tr>
<th>γ</th>
<th>cash</th>
<th>1-year</th>
<th>10-year</th>
<th>Equities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0%</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
</tr>
<tr>
<td>3</td>
<td>0%</td>
<td>69%</td>
<td>8%</td>
<td>23%</td>
</tr>
<tr>
<td>5</td>
<td>0%</td>
<td>40%</td>
<td>57%</td>
<td>3%</td>
</tr>
<tr>
<td>7</td>
<td>0%</td>
<td>10%</td>
<td>90%</td>
<td>0%</td>
</tr>
<tr>
<td>10</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>25</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

From this Scherer concludes:

- An increase in background risk will lead to a decrease in risk taking for the SWF.
- The effect becomes stronger the more volatile the risky asset.
- Empirically we should observe that SWF’s with larger resource uncertainty should invest less aggressively and vice versa.
- Economies with low reserves relative to financial wealth are less affected by resource uncertainty.

He continues to adapt the model for multi period choices. He concluded the presentation by saying that:

- As oil wealth becomes depleted, the relative importance of financial assets to natural resources shifts.
- Hedging demand is negative for positively correlated assets.
- With no resources left, the SWF would invest about 42% in the risky asset with the remaining allocation into cash.

19. The Active Vs. Passive Decision By Sovereign Wealth Funds (Fall 2010)


Goetzmann and his colleagues were asked by the Norwegian government to determine the role active management had played in the significant decline of the Norwegian Government Pension Fund – Global NGPFG returns during the Financial Crisis. He reports that they found that active management was not a factor in the
decline. The NGPFG was very highly correlated with its benchmark and showed very little alpha from the active managers.

The NGPFG is a very large ($44 billion at the time of the study) Norwegian fund with assets sourced solely from Norwegian oil profits. Despite the name of the fund, pensions are not paid from this portfolio and the choice of how the fund and its returns will be used is up to the government. In addition, the asset allocation, 60/40 stocks/bonds, and the 4% tracking error limits are set under Parliamentary control.

During the financial crisis NGPFG returns dropped precipitously. As seen in the following chart which shows annual and cumulated excess returns. The fund had shown modest excess returns until 2007. At that point excess returns became negative and, by year-end 2009, the decade long cumulative excess return turned negative as well.

Norwegians blamed the performance problem on active management. To address their concerns, Goetzmann et alia, were asked to provide a report on the Efficient Market Hypothesis, active management, and to assess the role of active managers. Under consideration was a change to a passively managed fund strategy.

Efficient Market Theory Norwegian style is in contrast to Modern Efficient Market Theory, Goetzmann says. It does not recognize real-world frictions and excess returns, even though such excess returns are difficult to capture especially by funds as large as NGPFG. A challenge confronting this research was to determine whether any excess returns were the result of risk taking or of skill, a task that is difficult.

For a benchmark, NGPFG created and uses a custom benchmark, the S&P 500 less stocks that do not meet a socially responsible mandate. In this research Goetzmann uses two familiar concepts, alpha, excess return relative to the benchmark, and residual returns, $ResRet$, which are defined as: $resret_t = ret_t - \beta bmk_t$.

Goetzmann first questions the source of the problem, looking to the equity and fixed income segments of the Fund. For the equity proportion, the cumulative average residuals, CARs, declined, but never turned zero during the Crisis. However, the fixed income component was the real contributor to wiping out 10 years of positive CARS for the Fund.

Goetzmann then asks what caused the negative returns of the fixed income component? He looks to five common factors. In a plot, it becomes very clear that FXCarry and Term had no impact on the declines. It was purely the three highlighted factors in the list below:

- **TERM**: Difference between long- and short-maturity US Treasury bond returns.
- **CREDITAa**: Difference between Aa and Treasury bond returns.
- **CREDITBaa**: Difference between Baa and Aa bond returns.

- **CREDITHY**: Difference between high yield and Baa bond returns.

- **FXCARRY**: Captures the carry trade of investing in currencies with high interest rates and shorting currencies with low interest rates.

He introduces a further factor, **LIQUIDITY**, to reflect periods of high and low liquidity (on-the-run off-run 10 yr USG), which, he believes, holds real promise for this and others’ research.

Regarding the question of the role of active management in the losses, Goetzmann reports that the variance attribution of the fund to benchmark and active returns show that there was almost no active component to the returns. The chart is shown below:

<table>
<thead>
<tr>
<th></th>
<th>Total Fund</th>
<th>Fixed Income</th>
<th>Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Fixed Income</td>
<td></td>
</tr>
<tr>
<td>Benchmark Return</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Sample</td>
<td>99.1%</td>
<td>97.1%</td>
<td>99.7%</td>
</tr>
<tr>
<td>Pre-2008</td>
<td>99.7%</td>
<td>99.8%</td>
<td>99.7%</td>
</tr>
<tr>
<td>Active Return</td>
<td>.09%</td>
<td>2.9%</td>
<td>.03%</td>
</tr>
<tr>
<td>.03%</td>
<td>.02%</td>
<td>.03%</td>
<td>.3%</td>
</tr>
<tr>
<td>Total Return</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

In addition to a lengthy description of EMF and research into the role that active managers played in the problem, Goetzmann provides a list of their final recommendations:

- **Move to a more top-down, intentional approach to choosing factor exposure since factor exposure drives performance, active management does not.**

- **Base investment philosophy on compensation for taking systematic risk:**
  - Alpha is difficult to capture in large scale.
  - Alpha risk is often factor risk in disguise.

  - Factor risk premiums are long-horizon investments.
  - Fund is already capturing premiums to multiple factor exposures.
  - Factor exposures should be in the Fund’s benchmark.
  - Measure and build your own factors; avoid availability bias.
  - Use the factors to evaluate alternative asset classes.
  - The factors should be:
    - Term risk
    - Credit risk
    - Equity risk premium
    - Value-growth risk
    - Small-large risk
    - Momentum risk
    - Volatility risk
• Place the factors in the benchmark.
• Set long run factor targets.
• Categorize assets by horizon
• Use horizon buckets to set appropriate expectations regarding performance and liquidity.

20. On the Size of the Active Management Industry (Spring 2010)

Doing double duty by stepping in for a scheduled but absent speaker Bernd Scherer, Robert Stambaugh, presented “On the size of the Active Management Industry,” coauthored with Lubos Pastor, Booth School of Business, University of Chicago, NBER and CEPR.

In this presentation Stambaugh explored the question of why the active investment industry is so large when the track record of active manangers is so poor. Many find this situation puzzling. Stambaugh says the industry’s alpha, zero or negative, depends upon industry size, and alpha becomes more elusive as money chases it. As the actively managed sector of the industry underperforms, it should shrink in size, yet it has not: fully 87 percent of all mutual funds are actively managed. Stambaugh suggests that it is investor uncertainty about decreasing returns, and the resulting large confidence interval, that is the cause.

Stambaugh described the equilibrium model of active management he and his coauthor developed. It has competing utility-maximizing investors and competing fee-maximizing fund managers. Their model contains two types of agents: managers of active funds with skill but no capital (M), and investors in active funds that have capital but no skill (N). They model expected industry profits that depend upon the size of the manager’s fund, the industry and the total investable wealth of the investors.

They solve for equilibrium industry size, alphas and fees in the asset management industry, relating the size of the industry to past performance. Their objective is to analyze the investors’ learning about returns to scale.

Using 300,000 samples of simulated active management returns and allocations, they randomly draw intercept and slope from their priors. In each year they solve for equilibrium allocation to active managed funds, construct the returns and update investors’ beliefs. They analyzed their outcomes, and show in their results the learning paths for various returns and betas graphically: the higher the beta, the more rapidly the returns converge. In analyzing the results, Stambaugh first contrasts their work with that of Berk and Green (2004) who developed:

“A simple rational model of active portfolio management that provides a natural benchmark against which to evaluate observed relationship between returns and fund flows active managers do not outperform passive benchmarks because of the competitive market for capital provision, combined with decreasing returns to scale in active portfolio management. Consequently, past performance cannot be used to predict future returns, or to infer the average skill level of active managers. The lack of persistence in actively managed returns does not imply that differential ability across
managers is nonexistent or unrewarded, that gathering information about performance is socially wasteful, or that chasing performance is pointless. A strong relationship between past performance and the flow of funds exists in our model: Indeed, this is the market mechanism that ensures that no predictability in performance exists. Choosing parameters to match the flow-performance relationship and survivorship rates, we find these features of the data are consistent with the vast majority (80%) of active managers having at least enough skill to make back their fees.”

Stambaugh then laid out the differences between his paper and the Berk and Green paper:

- Focus:
  - BG: Capital flows across funds
  - Stambaugh and Pastor (PS): Size of AM industry

- Decreasing returns to scale:
  - BG: At individual fund level
  - PS: At aggregate fund level

- Parameter uncertainty:
  - BG: Alpha unknown, beta known
  - Ps: Both unknown

- Fund managers setting fees:
  - BG: Monopoly
  - PS: Competition

- Equilibrium alpha:
  - BG: alpha = zero and no explicit investor optimization
  - PS: alpha > zero and equilibrium outcome for optimizing investors

Stambaugh says that their model comes closest to the Burk and Green model when that model has one fund, the number of investors is infinite, and when there is no competition for risk. In conclusion he says that they found:

1. The active asset management industry can be large even if the track record is poor due to decreasing returns to scale.

2. Investors’ learning about returns to scale is endogenous:
   a. What they invest depends upon what they have learned.
   b. What they learn depends upon what they invest.
   c. Investors never learn the degree of returns to scale exactly.
   d. Industry size can be suboptimal for a long time.

3. The model also shows:
   a. Industry size crucially depends on the degree of competition.
   b. Alpha is greater than zero.
   c. There is investment externality with new investors imposing a negative externality on existing investors by diluting their shares.

21. The Incubation Bias (Spring 2009)

Richard Evans, Assistant Professor of Business Administration, The Darden Graduate School of Business, University of Virginia, distributed and presented his paper, “The Incubation Bias.”

In this presentation he reported on the performance and marketing success that comes from incubating new mutual funds rather than offering funds without incubation. Evans started by noting that
mutual fund family strategy has at least four dimensions: performance, distribution channel, fee schedules and the breadth of fund offerings. Since the fund family essentially establishes each of these, how then, Evans asks, can a fund family improve the chances that their fund offerings have superior performance? In particular, he focuses on the value of incubation as a performance-enhancement strategy, seeking, in this paper, to answer four questions:

1. Why do fund families incubate?
2. Do incubated funds outperform prior to introduction?
3. Do investors differentiate between incubated and non-incubated funds?
4. Does the inclusion of surviving incubated fund returns in mutual fund databases lead to a bias in returns?

Evans distinguishes two methods of incubation included in his data.

- Public: a small amount of seed money is raised by the fund family internally to start funds which are funded long enough to generate a track record. These funds are registered with the SEC.
- Private: Best-performing private accounts managed by an advisor are converted into public mutual fund offerings. These privately managed assets are typically not governed by the Investment Company Act of 1940, and as a result, the advisor does not file such things as registration statements and prospectuses with the SEC.

Evans finds that the difference in returns between the incubated and non-incubated funds before being offered as a firm product is statistically significant in every case except for the 1-factor alpha. Relative to a non-incubated control sample, these funds outperformed on a risk-adjusted basis by between 1.42% and 3.52% and their Sharpe ratio was more than double. Post incubation the performance of incubated funds is very similar to those that were not incubated. He does check whether the outperformance might have been a result of market conditions during the period and finds that incubated funds still outperform non-incubated funds in annualized risk-adjusted terms.

As a result of his research, he finds that funds that are incubated and outperform during the incubation period subsequently fail to sustain their outperformance. He attributes this to the fact that incubation is not used to identify superior managers or strategies, but, since only successful funds are offered and their results disclosed after incubation, he considers the incubation period outperformance is “contrived.” However, even without subsequent outperformance, since investors respond to incubation period performance, incubated funds attract higher net dollar flows. Evans notes that the total return seems to be more important for the individual investors than alpha.

In Conclusion:

- Evans provides valuable insights into the value of incubation, but cautions that researchers using the performance data take care to control for incubation. Since incubated funds have upward-biased returns during incubation but average returns post-incubation, there is potential for incubation to affect tests of mutual fund performance and thus the data. Since fully 23% of new domestic equity funds have been incubated, his findings are important.
22. **Best Ideas: Finding Outperforming Managers (Spring 2009)**

Randolph B. Cohen, Associate Professor of Business Administration, Harvard Business School, presented “Best Ideas,” coauthored with Christopher Polk, London School of Economics and Bernhard Silli, Universitat Pompeu Fabra and the London School of Economics.

Many have argued that the inability of mutual fund managers to outperform benchmarks is the most persuasive evidence in favor of capital market efficiency: factors related to the structure of the money management industry will cause even good stock pickers to underperform. In the past only the total performance of a fund’s holdings, what Cohen and his colleagues call a watered-down version of manager’s opinions, have been examined. They note several plausible reasons why total portfolio performance may be misleading when examining stock-picking skills.

1. Manager compensation is often tied to the size of the fund holdings, thus leading to incentives to continue investing fund capital after their supply of alpha-generating ideas has been exhausted.
2. The very nature of fund evaluation may cause managers to hold some, or even many stocks, on which they have neutral views since managers may be penalized for exposing investors to idiosyncratic risk.
3. Open-end mutual funds provide a liquidity service to investors.
4. Even if managers were to only hold stocks they expect to outperform, it is likely they believe that some of these bets are better than others.

Cohen and his colleagues examine the performance of stocks that represent managers "Best Ideas," and find that the stock active managers display the most conviction towards ex-ante outperforms. In contrast to other stocks in those manager’s portfolios, they outperform by 39 to 127 basis points per month depending on the benchmark employed. This led Cohen to two conclusions:

1. The U.S. stock market does not appear to be efficiently priced, since even the typical active mutual fund manager is able to identify a stock that outperforms.
2. The organization of the money management industry appears to make it optimal for managers to introduce stocks into their portfolio that are not outperformers, even though they are able to pick good stocks.

While Cohen would like to find the best pick stock ex ante, he and his coauthors use a creative way to determine the portfolio manager’s “Best Ideas.” They use portfolio holdings data and adjust the weights in different ways based on theory as well as simplicity and intuition.

1. They compare the weights in the portfolio to the market capitalization weights of the stocks. The most overweight is considered a “Best Idea.”
2. They use the Capital Asset Pricing Model to capture the return generating process of equity returns to estimate the idiosyncratic risk component of each stock in the CRSP. The manager’s weight in each stock relative to the benchmark will be given by its expected risk-adjusted return divided by the stock’s idiosyncratic variance. The “Best Idea” of a manager is the stock with
the highest tilt in the portfolio. High tilt indicates strong conviction.

Cohen notes that inefficiencies in the pricing of stocks are unlikely to persist for extended periods. Mutual fund portfolios, on the other hand, exhibit inertia: most managers cannot fully adjust their portfolios as a reaction to new information on the value of an asset due to the price impact and the tax implications of their actions. Recent trades, by being incremental changes to manager’s exposures, reflect "fresh" information on their valuation of a particular asset. Cohen and his coauthors take account of this insight by reporting separate results for best ideas that have been recently bought by managers, calling them best "fresh" ideas.

To test their ideas they use a sample that consists of US domestic equity funds reporting from January 1991 to December 2005. Since a crucial assumption of the analysis is that fund managers try to maximize the information ratio of their portfolios, portfolios such as index or tax-managed funds are excluded. From their analysis they find two things. First, the “Best Ideas” generally do not overlap across managers. Second, as a group and over time, fund managers exhibit a slightly decreasing tendency to tilt away from the market and portfolio benchmarks.

For the out of sample performance, they measure the:

- Simple average excess return of the test portfolio.
- Carhart’s
  - Four-factor enhancement of the Fama-French model— a winners-minus-losers portfolio,
  - Six-factor specification adding two additional factors to the Carhart model.
- A standard value-weighted long-short portfolio – long high and short low idiosyncratic risk stocks.
- A factor to capture the short-term reversion in a stock’s performance.

Cohen reports the best ideas of managers covary with small, high-beta, volatile, growth stocks that have recently performed well. Thus, despite considerable evidence that value outperforms growth, as well as weaker but still interesting evidence that low beta as well as less volatile stocks have positive alphas, it does not appear that fund managers systematically find their highest-conviction ideas among these sorts of stocks. They also find:

1. “Best Fresh Ideas” outperform their benchmarks statistically and economically significantly: the best fresh ideas portfolio yields risk-adjusted returns in the range of 46 to 127 basis points per month.
2. The portfolio of stocks that have a substantial tilt tend to be those that performed well over the past year, thus, achieving their high position at least in part because of past growth in their stock price.
3. Superior performance of “Best Ideas” is not transitory in nature. The buy-and-hold cumulative average residuals of the stocks in their best ideas portfolio is increasing even up to 12 months after first appearing in the portfolio.
4. Managers’ best ideas, whether fresh or not, significantly outperform the rest of managers’ portfolios.
5. Less-liquid stocks generate the majority of the alpha of the “Best Ideas” portfolios.

6. The performance is not completely due to the best ideas of concentrated funds.

Both theory and evidence suggest that investors would benefit from managers holding more concentrated portfolios. So why don’t they? Cohen identifies four reasons why managers may over-diversify.

1. Regulatory/legal. A number of regulations make it impossible or at least risky for many investment funds to be highly concentrated.

2. Price impact, liquidity and asset-gathering. The distribution of bargaining power between managers and investors may be a key determinant of diversification levels in funds.

3. Manager risk aversion. While the investor is diversified beyond the manager’s portfolio, the portfolio performance is likely the central determinant of the manager’s wealth, thus creating risk-averse behavior.

4. Investor irrationality. There is ample reason to believe that investors do not fully appreciate portfolio theory and therefore tend to judge individual investments on their expected Sharpe Ratio rather than on what they are expected to contribute to the Sharpe Ratio of their portfolio.

Finally Cohen concluded that their work presents powerful evidence that markets are not efficient and typical mutual fund managers can pick stocks. What lessen their overall performance are institutional factors encouraging them to over-diversify.

23. The Cross Section of Managerial Ability and Risk Preferences (Fall 2008)

Ralph S. J. Koijen, Assistant Professor of Finance, University of Chicago Graduate School of Business, presented “The Cross-Section of Managerial Ability and Risk Preferences.”

An investor's decision to allocate capital to actively-managed funds relies on the assumption that mutual fund managers are endowed with skills that enable them to outperform a passive investment strategy. The widespread view is that only a small fraction of managers are able to justify their fees and expenses and show managerial skill.

Koijen says that the results may be driven by the models used to test for skill: performance regressions using mutual fund excess returns and excess benchmarks returns. He points to a potential flaw: the model ignores the fact that the return is a combination of managerial ability and risk preference. In structural portfolio management models, the manager's ability shapes the investment opportunity set, while the manager's preferences determine which portfolio is chosen along this investment opportunity set.

Koijen finds the following:

- Economic restrictions can be used to disentangle both attributes.
- Fund alphas reflect both ability and risk preferences.
- Second moments of fund returns contain information about the manager’s attributes.
The structural model captures important dynamics of fund strategies.

Heterogeneity matters.

Koijen uses a structural portfolio management model to study the joint cross-sectional distribution of managerial ability and risk preferences. He documents large and skewed heterogeneity in risk preferences, less dispersion in ability, a high positive correlation between risk aversion and managerial ability. Thus, he concludes, ignoring heterogeneity can lead to large welfare losses for an individual investor who allocates capital to actively-managed mutual funds.

Koijen introduces his status model of managerial preferences that nests two standard models together. His model allows for risk aversion both to passive risk and active risk. Thus, unlike the vast majority of delegated portfolio management models, it predicts different risk-taking behavior for small and large funds. The two key consequences are that larger funds take on less active risk and that fund alphas are negatively related to fund size.

To test the model he uses managerial level data from CRSP from 1992 through 2006 assigning a manager-fund orientation identifying nine different styles based on size and value. His sample has over 3600 manager-benchmark combinations and almost 2,000 different funds’ gross returns. These managers can trade three assets as shown below:

The manager can trade 3 assets:

1. Cash account:
   \[ dS^0_t = S^0_t r_f dt \]

2. Style benchmark portfolio:
   \[ dS^B_t = S^B_t (r_f + \sigma_B \lambda_B) dt + S^B_t \sigma_B dZ^B_t \]

3. Idiosyncratic technology of the manager (Active Portfolio):
   \[ dS^A_t = S^A_t (r_f + \sigma_A \lambda_A) dt + S^A_t \sigma_A dZ^A_t , \]
   where \( \lambda_A \) measures managerial ability,
   with \( \left[ Z^B, Z^A \right] = 0 \)

The key difference in this model is the use of optimality conditions to uncover managerial ability. The model points to a desire for under diversification and overinvestment in the active portfolio as the manager seeks status. The level of assets under management controls passive risk taking. Koijen presents the following charts, the first showing the difference between the results of the traditional and structural models and the second showing the correlation between managerial ability and risk aversion.
In answering the question of why heterogeneity and risk aversion are positively correlated, Koijen finds the following interesting results:

- Managers of large funds tend to be less skilled but more aggressive.
- Skilled managers are more experienced, have higher turnover and are more cautious.
• Aggressive managers charge higher expense ratios and hold less cash.
• There is substantial unobserved heterogeneity.
• Large growth/value managers on average are more conservative than small/growth managers.

Summarizing the empirical results, he said that:
• Risk aversion and managerial ability are both right-skewed and that there is more heterogeneity in risk preferences than in ability.
• Risk aversion and managerial ability are positively related.
• Only a small fraction of the cross-sectional variation can be related to observable characteristics.
• The model endogenously generates time variation in risk aversion that strongly co-moves with the equity risk premium -- the correlation is 62%.

24. Patents in the Asset Management Industry (Spring 2008)

Ralph P. Albrecht, Venable LLP, distributed and presented “Do Business Method Patents Hurt or Help?: A Financial Asset Management Industry Perspective” he co-authored with Cameron H. Tousi, Venable LLP. Both authors are intellectual property lawyers. The theme of their paper was a defense of business-method patents in the face of criticism of them. They noted that the literature in this area has generally been thoughtful and well-reasoned, or at least well-meaning. But as practitioners in the field, they have found the “commentary at times too focused on the trees of discord rather than the forest of potential.”

First they describe why patents are needed:

“In a world devoid of dishonest practices, perhaps patent and trademark law would be largely unnecessary. But in the one in which we live, there are two principal ways to protect and grow new ideas and spur innovation. One is to keep a closely-guarded secret – the formula for Coca-Cola – while the other is to broadcast your secret to the world, openly sharing all its details, in a patent application. Each has its advantages, though in the information age trade secrets are going the way of the vacuum tube and buggy whips.”

In his presentation, Albrecht noted that, as with software patents, the dilemma over patentability had been focused on form over substance. What critics of business methods often miss is that it is logically inconsistent not to patent a business method merely because it is implemented on software running on a computing platform instead of solely on a machine. They note that the first business method patent was allowed in 1799. Aside from bearing internal ambiguities and inconsistencies, similar to software patents, such formal distinctions could be overcome by skilled patent practitioners. Thus, they are particularly vulnerable to appellate level challenges through the legal system as well.

The authors say that since State Street Bank challenged Signature Financial’s patent of its hub-and-spoke, business processing, system, and lost, neither the
fears of the harshest critics nor the hopes of the greatest advocates have come true. They suggested that problems cited against BMPs are generally systemic to the entire patent system, not individual to *State Street Bank* and its progeny.

Too few business professionals have been immersed in the patent system long enough to understand its strengths and inherent shortcomings, Albrecht said. The rush to judgment by numerous commentators facilitated neither empathy nor understanding of the dynamics at issue. Consequently, when the financial asset management industry business community giant awakened in 1999, each issued patent, each lawsuit and each judicial act in the field was put under scrutiny. Unlike other fields, however, with business methods the financial stakes were often large, and the innovations often appeared more obvious than in the pure scientific and engineering technologies, regardless of their inherent value.

Albrecht and Tousi are supporters of patents in the financial service industry. They provide a veritable primer on patents in the financial industry by dealing with the following issues:

- The rights of the patent owner.
- What is patentable.
- The process to obtain a patent.
- Patent enforcement and defense.
- The state and future of financial industry patents.

During the presentation Albrecht provided clear insight into the issues and gave the following guidance to the issues that patents raise. He first defined a patent as a limited monopoly that excludes others from making, using or selling a particular product or process. The patentee must clearly describe the invention such that another of ordinary skill could make or use it. Any useful, new, and non-obvious machine, apparatus, composition of matter or process can be patented.

Albrecht said there were two reasons to obtain a patent.

- **Offensive:**
  - Exclude others from making, using, selling, offering to sell, or importing the invention.
  - Protect R&D investments.
  - Occupy field in and/or surrounding key standards.
  - Market advantage – leverage exclusive rights to developments, sue to obtain injunction (shut down infringer) and/or damages.
  - License to obtain license revenues or royalties.
  - Marketing advantage.
  - Enhance or maintain a first mover advantage.

- **Defensive:**
  - Defend against competitors’ patents.
  - Bargaining Chip for Cross license.
  - Allow counter suit if sued.
  - Bolster settlement position.
  - Investors desire to protect the “idea.”
  - Independent development by others may obtain IP rights.

He provided a list of financial industry patents, the most recent of which are shown in the following chart.
Albrecht reported that the most aggressive part of the financial industry in seeking patents has been in credit cards and banking. He provided supporting tables documenting the number of patents and patent publications.

To conclude, he summarized the intent of his presentation: to separate the facts from the myths in the contentious area of Intellectual property law, seeking to protect financial asset management related innovations by viewing the historical jurisprudence, the association with software patents, the criticisms respecting quality and capability, the uniqueness of the financial asset management industry, and the quantitative data available.


Michael L. Goldstein, Managing Partner, Empirical Research Partners, LLC, addressed the major trends in money management, emphasizing the need to anticipate and understand these, since they may dramatically change the industry.

He described himself as a Quant, and related the trends to quantitative analysis. He began with the enormous importance of the Chinese economy and the extraordinary growth it has experienced. The rise of China and other emerging markets is a major change. Emerging markets now
represent half of the global GDP. China’s reported GDP growth has accelerated for six straight years. And an interesting question is how long this can continue.

His next topic was endowment envy. The endowment strategy has gained great respect, as these large portfolios have moved toward levered, high-fee and high expectation investment categories. There is evidence that defined benefit plans are using or seriously considering using 130/30 products (long-short portfolios) in addition to the traditional long portfolios, and it appears that the top concern of pension plans is volatility. The strategies are those of both quantitative and fundamental managers, although most are represented by the former.

Goldstein attributed some of what has gone on in the industry to a declining fraction of the number of general equity funds outperforming the S&P 500 index. This is a benchmark very hard to beat. Unbundling to smaller managers can lead to better returns and these come from taking more risk. Pension plan sponsors have been able to add approximately 40 basis points through manager selections. Fees, however, are an issue. This is particularly true for pension plans that have invested in hedge funds and private equity. Goldstein believes that return assumptions for defined benefit plans are too high, particularly with respect to optimism about the returns of alternative investments.

Liability driven investing is gaining in popularity, with plan sponsors making use of immunization. As plans and benefits are frozen, it becomes easier to define liabilities.

He moved on to defined contribution and IRA investments. This business has taken on more of an institutional character as the success of the bundled model has increased competition, with outside mutual funds most successful in the international and fixed income categories. Life style funds are extremely important and almost 75% of life style funds are managed by the record keeper.

Turning to the mutual funds industry, he said it is still growing at a premium rate with winners and losers about equally distributed. The industry is highly concentrated, with the top 5 mutual fund companies having a substantial share of total assets.

Life style and life cycle funds account for 7% of equity fund sales, up from 1% in 2000. And so far, redemption rates are low.

The globalization of money management is far from exhausted. The foreign equity exposure of US investors has doubled in this decade. And the largest firms are increasingly sourcing their institutional growth outside the US, with success in part a function of expertise in global investing. However, the foreign client bases of US managers are still mostly in Europe and Canada.

Asset weighted fees have drifted down, in part due to changes in the mix of managers. The share of mutual funds outperforming their index when returns are adjusted for hedge fund and fund-of-fund fees has been declining. It is difficult to surmount 20% performance fees.

ETFs and index funds have accounted for 1/3 of equity related fund inflows. And ETF’s pricing umbrella appears quite high. The pricing pressures on the industry will prove long-lasting.
Turning to the hedge fund boom, Goldstein observed that hedge fund inflows continue to be substantial, although launches are beginning to fade. Dollar values of short interest have been rising significantly, and short capacity may become an issue. The goal of low correlations appears challenging since correlations among the US, developed markets, and emerging markets have been rising.

In concluding, Goldstein observed that:

- The financial incentives to try to exploit the tails of the expected return distributions are very large.
- The staffing of hedge funds now matches that of long managers.
- The equity “yield curve” counts more over time and is now quite steep.
- Going forward, the keys to success in quantitative management are innovation, intelligent risk taking and integrating quantitative tools with fundamental research.
- Recognizing regimes matters.


Jonathan Berk, Professor of Finance, Haas School of Business, University of California at Berkeley had made presentation on three previous occasions at Q-Group® seminars, in Fall 1996, Fall 1998 and Fall 2003. He made available a paper by himself and Richard Stanton entitled: “A Rational Model of the Closed-End Fund Discount.”

He began his presentation by referring back to the earlier one in which he had explained the flows into and out of mutual funds. In now modeling the closed-end fund discount he had arrived at a model that solved both the mutual fund flow puzzle and the closed-end fund discount puzzle. In addition, the model explains the unpredictability of fund performance, the inability of active portfolio managers as a whole to beat passive strategies while most active managers actually do display skill, and finally compensation contracts in the portfolio management industry. The focus of the current paper, however, was on the closed-end fund puzzle. The puzzle has been set out in four statements:

- Closed-end funds are issued at (or above) their NAV, more often than not start trading at a premium to NAV, and then decline.
- On average, closed-end funds trade at a discount relative to their NAV.
- The discount is subject to wide variation over time and across funds.
- Discounts disappear as the fund approaches the open end date.

The authors’ objective was to derive a completely rational model that will simultaneously explain all four of these empirical regularities. He cautioned, however, that their objective was not to claim that the model explains the whole anomaly, nor that behavioral explanations have no place.

At the initial public offering of the closed-end fund investors expect managers to earn more for the fund than they charge in fees. Berk’s model assumes that a few skilled managers exist, that these managers sign binding long-term contracts at fund inception, guaranteeing payment of fixed fees, and that the contracts cannot prevent managers from quitting. So investors
rationally expect the average fund to fall into discount. They still get a fair return because in each period, the discount adjusts to ensure this. Since discounts are the \textit{capitalized value} of the expected cost of entrenchment, they shrink to zero as the open end date for the fund approaches. Since discounts adjust to ensure that investors get a competitive return, they reflect the cross sectional variation in management ability, so they have wide cross sectional and time series variation, as can easily be observed.

From these assumptions it follows from the model that the funds are issued at NAV, most funds trade at a discount, the discounts disappear close to the liquidation or opening dated of the funds, and there is a wide variation in discount, both in the time series and cross-sectionally.

The model itself is:

\begin{align*}
    r_t &= \hat{r}_t + \alpha - \frac{1}{2\omega} + \xi_t, \\
    \hat{r}_t &= r - \frac{1}{2\xi} + \xi_t,
\end{align*}

Where

- \( \hat{r}_t \) is the return on the (observable) portfolio at the start of the period
- \( r \) is the expected return on the (observable) portfolio at the start of the period
- \( \xi_t \) and \( \xi \) are independent normal iid r.v. with zero means and precisions \( \xi \) and \( \omega \) respectively.

Berk set up an example for the calibration of a closed-end fund, suggesting reasonably parameters for the model set out above, and then generated graphs of discounts (and premiums) related to manager ability, fund age, and time-to-the-opening date. Perhaps most surprising was the trajectory of the premium representing perceptions of high manager ability. Over time, the premium in such a case rises but then begins to turn down in anticipation of the opening date, when the price will equal the NAV.

In response to questions about the ability of a manager to increase its fee, Berk pointed out that an obvious way for the manager to increase its effective fee was simply to open new closed-end funds and spread the managerial talent over a larger amount of money.

To the question “What cannot be explained?”, Berk’s response was the post IPO 90 day return appears to be highly negative. This seems to come from the average 7% fee charged on the IPO and subsequent price support provided by the investment banks. To this explanation one participant added the observation that sales efforts by those distributing fund shares could be another explanation.

In conclusion, Berk said that with his model of what the rational paradigm predicts, we can begin to identify important departures that the behaviorists can work on.

\section*{Behavioral Aspects of Investor Actions}

27. \textit{The Origin of Behavior (Fall 2010)}

Andrew Lo, Harris & Harris Group Professor, Director, MIT Laboratory for Financial Engineering, MIT Sloan School of Management, presented slides entitled: “The Origin of Behavior” coauthored with Thomas J. Brennan, Northwestern University. Over the years, Lo has presented many papers to the Q-Group®.
Lo begins by acknowledging that this research on human behavior is a departure for him, and perhaps for the members of Q-Group®. Human behavior is studied by many disciplines, he notes, and regardless of the discipline, Psychology, Biology, Sociology, Economics or History, the conclusions should not be contradictory. However, they are, particularly those in Economics and Psychology.

In Economics, the conclusions are based on expected utility, constrained optimization, and the role of expectations, equilibrium and rationality. In Psychology the conclusions are quite different, examining the roles of fear, greed, heuristics, distorted beliefs, memory, and irrationality. These contradictions have important implications for social structure, regulation, and the legal system. This leads, Lo says, to the question behind the research: “What is the Origin of Behavior?”

Lo describes the research as an investigation of the “Evolutionary Origin of Behavior,” asking the following questions:
1. How do certain behaviors come to be?
2. If they are irrational, why do they persist?
3. Are all kinds of behavior created equal?

The result is what he calls a unified framework, and his Adaptive Markets Hypothesis, which can be used for answering the questions. Lo finds that the behavioral dynamics emerge naturally.

Looking at loss and risk aversion, randomization and probability matching from evolution, Lo concludes that some behaviors are rational from the population perspective but may not be at the level of the individual. Lo says it is quite clear the old saying “It’s the economy, stupid” should be “It’s the environment, stupid.”

Lo then turns to a discussion of probability matching behavior: when posed with alternative choices, the population as a whole will match the probability of the event occurring. To make this clear he gives two examples, first using a coin toss analogy and then an anecdote.

Assume you are tossing a coin weighted to result in 75% heads. In a situation where the payoff for being right is equal to the loss of being wrong, we would expect rational action, and the choice of heads 100% of the time. However, the experimental results are the choice of tails 25% of the time, and heads 75% of the time; results identical to the probability of 75% heads, 25% tails. This does not seem rational, but maybe it is.

Lo says that logic is a hard-wired approach to the preservation of the species, or the population as a whole. He uses the following piece of real history to explain this probability matching behavior. Airmen during the war were offered a choice of a parachute or a flak jacket as they left on a bombing mission – they could not take both due to weight and space constraints. Since the majority of deaths occurred from flak, one would think that the rational choice would be a flak jacket, and at the individual level, that is so. However, overall airmen chose parachutes in the exact proportion to the probability of dying from a crash. Why? From a population perspective the result is clear: regardless of whether the plane crashed or was hit by flak, some of the airmen would survive. Parachutes would protect those in a crash, and flak jackets would protect from flak. Population survival trumps individual survival in making choices.
Lo provides an elegant development of the idea using models and concludes by saying:

- Probability matching is explained.
- Risk aversion is evolutionary advantageous explaining the “bird in the hand” and equity risk premium.
- Loss aversion emerges through selection: behavior is hard-wired and rational for the population; randomization and unknown reference points are key.
- The results yield specific empirical predictions about such things as systematic and idiosyncratic risks, and multivariate and multistage choice problems.

28. Why Diversity is Crucial in Nature and in Markets (Spring 2010)

Arne Wood, Martingale Asset Management, introduced Michael J. Mauboussin, Chief Investment Strategist, Legg Mason Capital Management, the provocative Monday evening dinner speaker known for his innovative thinking in many diverse fields. His topic was “Why Diversity is Crucial in Nature and in Markets.”

It’s hard to beat the market and, he says, and most of us don’t know what the heck is going on. He suggested we look to nature for ideas, the one place that has figured out how to solve a lot of hard problems using complex adaptive systems. There are many examples of such systems that have properties distinct from those of the individuals in the system. He used an example of investors in the capital markets: Investors, he said, with heterogeneous perspectives and heuristics, emerge through interaction to create global markets. From nature he suggests we look at ants. In foraging for food, they attempt to find the shortest path, a sort of ant algorithm for routing. He points out that we should have some respect for this individual to group behavior since it has been at least 10 million years in the making. Crowds, he asserts, have wisdom.

There are three conditions for wisdom in crowds: diversity; aggregation; and incentives. Diversity creates the possibility for different thoughts, actions and strategies, aggregation allows for exchanges, such as those of ideas, and incentives are the rewards for taking risk. He describes a diversity breakdown using the action of blind army ants when they lose the phoneme trail. The heuristic is “follow the leader” with the result being the group winds up going in circles, better known as an ant mill, until they, as Mauboussin says, croak. Similar things happen in bees and other species.

For a very human example, Mauboussin relates the tale of the jelly beans. He brings a jar of multi colored jelly beans into class and asks each student to estimate the number of jelly beans in the jar. In one trial, which he says is typical, the class average had a 4 percent error, and only two students outperformed the class average. Despite how small the average error was, the average guess was off by 60 percent. Even given a financial incentive the average was superior. He says this is an example of Scott Page’s Diversity Prediction Theorem: collective error = individual error – prediction diversity, in the jelly bean case, the diversity of the guesses. He concludes that the collective is always better than the average guess, largely because each person thinks he or she is above average and so does everyone else.
Perhaps, he says, the problem with the average estimate is conformity. He described different experiments with individuals, all but one of whom had been coached to give the wrong answer. Most frequently the uninformed individual agrees with the others, even when they are clearly wrong. In fact, he said that while the problem could lie in judgment, action or perception, the problem is perception. Quoting Greg Bern, he said “We like to think that seeing is believing, but seeing is believing what the group tells you to believe.” Furthermore, MRI studies show that the outlier who does not conform shows considerable fear while failing to conform.

Finally he concluded saying:

1. Markets are often efficient, but not for the reasons the textbooks suggest.

2. Crowds are wise under certain conditions: diversity, aggregation and incentives.

3. Crowds are foolish when diversity breaks down.

4. The how’s and why’s of market efficiency are important for practitioners.

Chen and his coauthors take an unresolved question -- whether biases such as loss aversion are the result of social and/or cultural learning and specific environmental experiences, or are universal and result from mechanisms that arise regardless of context or experience. The authors believe that the root cause of a behavioral bias may affect how we think about both its potential scope and the degree to which we believe that market incentives will act to reduce its effects. Chen sees that whether biases are innate or learned may have implications in such research as day trading in different markets.

Traditionally, economists have remained agnostic as to the origins of human preferences and usually assume their stability over both time and circumstance. Over the past few decades, behavioral economists have identified that human decision makers exhibit a number of systematic biases both in the lab and in the field. Two of these biases, reference dependence and loss aversion, have received a substantial amount of empirical attention, from both economics and neighboring disciplines such as psychology and sociology. Evidence that agents treat losses differently from comparable gains have been identified in experimental markets as the endowment effect.

So Chen reported on a study of Tufted Capuchins, what the authors call an extractive forager. Why capuchins? As a species, tufted capuchin monkeys (Cebus apella) have been widely studied in psychology and anthropology. They make excellent subjects because they are relatively quick and adept problem solvers, skilled tool users, and a close evolutionary neighbor to humans, as Chen showed. In fact, modern man has a greater DNA relationship with capuchins that modern women have with modern men.

29. How Basic Are Behavioral Biases
(Spring 2008)

M. Keith Chen, Yale University and Cowles Foundation, distributed and presented a paper reporting research done with Venkat Lakshminarayanan and Laurie R. Santos, Yale University, entitled, “How Basic Are Behavioral Biases? Evidence from Capuchin Monkey Trading Behavior.”
Using the capuchins, Chen reported tests for both adherence to the law of demand and the presence of reference-dependent and loss-averse choice in a monkey population of 7. The authors introduce a fiat currency to a colony of capuchin monkeys, teaching them that small coin-like disks can be traded with human experimenters for food rewards, such as grapes, and are fungible across a variety of possible trades. Using this new ability, the authors conduct a number of revealed-preference experiments: basic tests of rational preferences and recognition of common value.

In the paper they give detailed descriptions of their experiments, including illustrations and pictures. In his presentation, Chen showed a video clip of one of their experiments. Briefly their research shows, that:

- In response to both price and wealth shocks, capuchins adjust their purchasing behavior in ways consistent with the generalized axiom of revealed preferences (GARP): capuchins’ choice closely mirrors our own and admits the standard tools of utility analysis and price theory.
- When faced with decisions involving simple gain-loss frames, capuchins demonstrate both reference dependence and loss aversion. Specifically, they express a strong preference for gambles in which good outcomes are framed as bonuses rather than payoff-identical gambles in which bad outcomes are framed as losses.
- The capuchins weigh losses more heavily than comparable gains, displaying not just reference dependence but loss aversion.

Lest we consider the behavior random, the authors report that the experiments were designed to reject most competing models of naive or unsophisticated choice.

Taken together they say that their results suggest that capuchins’ choice both is very sensitive to changes in prices, budgets, and expected payoffs and, to a lesser degree, displays both reference dependence and loss aversion. Expected rewards carry a much larger effect than gain/loss frames in their experiments. Chen says that since it is tempting to ask whether capuchins’ loss aversion resembles human aversion, he concludes that:

- Price theory works quite well far afield.
- Loss-aversion and reference-dependence are most likely ancient and innate.
- These behaviors are likely to persist and hold across contexts.
30. **Influence: The Ultimate Power Tool**  
(Fall 2007)

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: reciprocation, 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® 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.

31. **What’s New and Old in Behavioral Economics And Finance?**  
(Fall 2006)

Richard H. Thaler, Professor of Behavioral Science and Economics, University of Chicago, made available a paper entitled “The Loser’s Curse: Overconfidence vs. Market Efficiency in the National Football League Draft” by himself and Cade Massey of the Yale University School of Management. He began his presentation by describing behavioral finance as a combination of better models of investor behavior and understanding of the limits to arbitrage. We can consider nonbehavioral finance to involve only rational agents, and efficient markets, meaning that the price always right and that there is no free lunch.

But does the evidence show that the price is right? Research on investor behavior indicates that individual investors are not very sophisticated. In the new
defined contribution pension environment many are saving too little and investing unwisely. And even after the Enron collapse, many employees invest in their employer’s stock.

Thaler described his concept of what he calls Libertarian Paternalism. As an example he described social security privatization in Sweden, launched in 2000 and similar to the proposal of President Bush in the United States. A 2.5% payroll tax goes to individual accounts that are self-directed. Participants were allowed to form their own portfolios by selecting up to five funds from an approved list of 456. One fund was chosen to be a “default” fund for anyone who for whatever reason did not make a choice. Information about the funds, including fees, past performance, risk, etc., was provided to all participants. Funds (except for the default fund) set their own fees.

Some of the participant choices were particularly interesting. The average fee for the default fund was 0.16%, while that for the mean chosen fund was 0.77%. At the end of three years, the default fund had lost 29.9% and the mean chosen fund had lost 39.6%.

The largest market share (aside from the default fund) went to a fund that was invested primarily in technology and health care stocks in Sweden and elsewhere. Its performance over the five-year period leading up to the choice was 534.2 percent, the highest of the 456 funds in the pool. In the subsequent three years, it lost 69.5% of its value.

The lessons Thaler drew from the Swedish experience were that while economists often think that the biases observed in laboratories will be eradicated in open market settings, just the opposite can happen. Markets and advertising reinforced three individual biases: invest at home (for familiarity), chase returns (extrapolate history), and choose active management (reflecting overconfidence).

The second example Thaler presented had to do with the National Football League draft. He considered this to be a “real world” test. The description of how NFL teams pick college players is very lengthy. A brief summary follows. The draft is comprised of seven “rounds” and a round consists of each team picking a player once. Thirty-two teams draft 224 players. Selected players can only sign with the team that picks them. Picks are traded among teams and the question is whether the market for picks is rational and efficient. So how well do teams trade?

All of the teams rely on a draft pick value chart that was devised some years ago. It puts a value of each pick from #1 thru #32 for rounds 1 through 7 plus a round 8 that embraces all additional rounds (for a total of 256 picks). The most valuable is pick #1 in round 1. The least valuable is pick #32 in round 8. Thaler pointed out that there are serious errors, from a rational point of view, in the value chart. The early picks seem to be greatly overvalued relative to the later picks. For one thing, it turns out that the implied discount rate equating the values of the middle picks in two adjacent rounds is 174% per year. This seems irrationally high. Pick #1 is valued at pick #10 + pick #11, and also at picks #29 + #30 + #31 + #32. The equations do not fit the relative values of the picks as determined by Thaler.

For each player drafted we know when the player was drafted, how much he was paid in each year of performance, and a
measure of the performances. The performance value minus the compensation paid can be considered a “surplus to the team” for that player. It turns out that the relationship between performance value and draft pick appears to be quite random. On average the surplus value rises from pick #1 through about pick #50 and then declines. The best value seems to come more or less in the range of pick #25 to pick #75. Consistent with this picture, the value from pick #1 drops much faster than does the value from later picks.

In conclusion, Thaler found strong support for his overvaluation hypothesis. Open markets plus big stakes are not enough to eliminate decision making biases.

32. I Know What To Do, Why Don’t I Do It? (Spring 2006)

Nick Hall, Director, Saddlebrook Wellness Center, gave the opening address at the Spring 2006 seminar. The title of his talk might have been Decision Making Under Stress. In introducing him, Jim Farrell described him as an expert in Neuro Psychology, and referred to the fact that Hall teaches at the FBI academy.

Hall began with a childhood experience of his that gave him an important lesson in making healthy decisions and choices. It taught him to be an optimist. He referred to an optimist as not a person imagining bad experiences to be good, but an optimist in explanatory style, taking personal credit for good outcomes and blaming bad outcomes on others or other circumstances. A pessimist in explanatory style, on the other hand, attributes credit for successful outcomes to others, and accepts blame himself for unsuccessful outcomes. As an example, the successful investor takes personal credit for good results, but attributes poor results to such things as unexpected economic events. The characteristic as optimist or pessimist Hall characterized as permanent, with the optimist making healthy choices in all aspects of his or her life.

No one responds to reality just as it is. Sensory information is transferred by electrochemical transduction into an image in the cerebral cortex of the brain. That image depends on the individual’s beliefs, value system, and past experience. No two people will have exactly the same beliefs, values and experience, so that no two will have identical images produced by the same event. The reality of the event is modified in our brains to leave out certain aspects and to add other aspects consistent with our beliefs.

He provided an example. He read out a series of words, all of them connected to sleep, but not including the word sleep. He asked the participants to write down as many of the words as they could recall. He then asked how many had written down the word sleep, and of course a number of participants had written the word down even though they had not heard it. But all of the words that been dictated evoked an image of sleep, and what the participants remembered was the image of sleep created in their minds.

Hall went on to describe some work he had done with cancer patients. What he called “guided imagery in cancer” meant invoking in cancer patients the image of a healing process. Once that image had been embedded in the brains of cancer patients, the result appeared in most patients to be prolonging their lives. However, in a few cases patients were so disturbed by the image reminding them of their cancer, that the development of the image had to be stopped with them.
He turned next to sources of belief. It can be important for us to know what those sources are. Indeed, even more important may be knowing just what our beliefs are and he described working with executives who had great difficulty identifying their beliefs. Consistency of beliefs with values can be quite important, and he illustrated this point with a story about a police officer for whom the conflict between beliefs and duty almost cost him his life.

He suggested three questions a person might ask him or herself about beliefs. The first is “Is this belief justified? Have things happened in my life that warrant my clinging to it?” The second question is “Is this belief serving a useful purpose? Helping me advance? Improving my relationships?” And finally a third and most important question “Does it make me feel good?” If the answer to any of the three questions is “no,” then there probably is a conflict between beliefs and values and the person should try to find out why.

Another piece of advice was this: In a crisis, put a brake on your emotions and take control. Repeat three times: “I am glad I am not …” completing the statement with the description of a circumstance much worse that the present crisis.

What defines happiness? His answer was the ability to be satisfied with what you have and are.

Economic Crisis
33. Liquidity Risk and Interbank Markets (Fall 2010)


The subprime mortgage crisis in the United States spread rapidly to other domestic and foreign financial markets. González-Hermosillo said rapid transmission raises several questions that are of great importance to central banks and financial regulators:

- Through which mechanisms were the liquidity shocks transmitted across US channels and how did they influence various financial markets?
- What was the relative strength of these potential linkages?
- Did the episode of funding illiquidity in structured investment vehicles (SIVs) and conduits turn into an issue of bank insolvency?

This research examines the linkages between market and funding liquidity pressures, and their interaction with solvency issues for key financial institutions during the 2007 subprime crisis. It builds on the results presented in Chapter 3 of the IMF Global Financial Stability Report (2008), and introduces methodological refinements to produce more accurate estimates of the transmission of liquidity shocks. In addition, it facilitates the evaluation of the transmission of the liquidity shocks that spread from US conduits and banks’ off-balance sheet SIVs to other credit and equity markets in the United States. They find that:
Increasing financial integration and innovation can turn market and funding liquidity pressures into issues of insolvency.

What started as a liquidity crisis turned into a solvency issue.

Central banks intervened in many of the largest complex financial institutions that had to strengthen their balance sheet positions through capital injections from other investors.

González-Hermosillo reviews the salient features of the recent turmoil in global financial markets for clues as to liquidity shock transmission across differing asset classes. She makes a point to distinguish between market liquidity, the ease of trading without significantly affecting the asset price, and funding liquidity, the availability of funds so solvent agents are able to borrow to service obligations. The most recent episode of turbulence, beginning in the summer of 2007, started with the deteriorating quality of US subprime mortgages – a credit, rather than a liquidity event. This was amplified by asymmetric information, due to the complexity of the structured mortgage products, and the resulting widespread repricing of risk different asset classes and financial markets.

To examine the spread, the authors use a model with five variables that summarize the key linkages: overall market liquidity, funding liquidity, default risk and volatility. The proxies for these linkages are:

1. **Funding liquidity in the ABCP market segment**: the spread between the 3-month ABCP yield and 3-month US Treasury bills.

2. **Bank funding liquidity**: the spread between the 3-month US interbank Libor rate and overnight index swap (OIS).

3. **Market volatility**: the movement of S&P 500 stock market returns.

4. **Overall market liquidity**: the spread between the 2-year on-the-run and the off-the-run US Treasury bond yields.

5. **Default risk of banks**: the credit default swap spreads of 12 large complex financial institutions.

The econometric techniques used by the authors allow them to analyze the co-movement of markets by inferring the correlations of the changes in the spreads, which are essential in understanding whether the recent episode of financial distress has become systemic. Their estimates are made using a multivariate GARCH framework that takes into account the heteroskedasticity in the data, in addition to providing the natural interpretation of the conditional variance as a time-varying risk measure. The data are from January 3rd 2003 until January 9th 2008. They conduct unit root tests for the crisis period and formally identify non-stationarity in the data.

González-Hermosillo provides the following figures to illustrate the historical spreads for ABCP, CDS and Libor-OIS. Between 2003 and the summer 2007, the data exhibit approximate constancy. The LIBOR spread remained at about 10 basis points, whereas both the ABCP and CDS stayed below 50bp. However, after the crisis began in July 2007 all spreads jumped and remained high. In addition, there is evidence of a strong correlation reversion by the long run means in ABCP/Libor and the ABCP/CDS spreads. The results provoke interesting questions. The first
question is whether the data generating process underwent an unobserved structural shift in the levels of the correlations during the US subprime crisis. To test whether the mean reverting drift is potentially spurious, the authors modified the model to account for a structural break.

Using a modified DCC model to allow for a structural break using the standardized residuals of the respective sub-samples they find a distinct possibility of spurious reversion and an understatement of the duration and the severity of the periods of market distress.

González-Hermosillo concludes with the following:

1. Proxies for funding and market liquidity, stock market volatility and bank default risk, exhibited extraordinary co-movement during the subprime crisis.

2. The pre-crisis period correlations were fairly small suggesting that new channels for transmission of liquidity shocks were established during the second half of 2007.

3. The pronounced interaction between market and funding liquidity are consistent with the emergence of re-enforcing liquidity spirals during the crisis: financial institutions were exposed to refinancing needs in the
form of issuing ABCP, a situation where market illiquidity in complex structured products led to funding illiquidity.

4. Increased correlations between the asset-backed commercial paper and Libor spreads reduced the possibility of funding from the interbank money market, thus highlighting systemic risks.

5. Many European banks with large exposures to American asset-backed securities had difficulties accessing wholesale funding, leading to subsequent market illiquidity in different market segments.

6. Over time the subprime crisis became one of insolvency as banks such as Northern Rock, IKB and Bear Stearns had to be rescued. This is captured by the implied correlations between the credit default swaps and other variables in the model, which show clear signs of a structural break during the crisis.

More importantly for the present,

7. Seemingly unrelated stock and bond markets were affected during these times of severe stress.

8. These transmission mechanisms were not restricted to the financial markets in the United States, but were also observed across other advanced and key emerging market economies.

34. Inexperienced Investors and Bubbles (Fall 2009)

Robin Greenwood, Harvard Business School, presented “Inexperienced Investors and Bubbles,” work he coauthored with Stefan Nagel, Stanford Graduate School of Business.

Greenwood was concerned with the factors that contribute to the creation of bubbles. He posed the question that motivated the study: “Are inexperienced investors more likely than experienced investors to buy overpriced assets during financial bubbles?” He began with some anecdotal historical evidence on the role of inexperienced investors in bubbles such as the Dutch Tulip Mania. This, and evidence from surveys and experimental asset market tests, suggested that inexperienced investors play an important role in bubbles.

All of this, he said, leaves three important, but unanswered, questions:

1. Does inexperience affect market decisions outside the laboratory?
2. Does inexperience affect professional investors’ decisions?
3. How do inexperienced investors form their expectations?

To get answers, Greenwood and Nagel studied mutual fund managers during the technology bubble that peaked in 1999. Using age as a proxy for experience, they hypothesized that young managers were more likely to:

1. Buy tech stocks during the tech bubble.
2. Show trend-chasing behavior.
3. Receive large investor inflows.
4. Underperform.

To test their hypotheses they used information on manager characteristics and data on US, non-specialty, equity funds in existence in December 1997. To answer the question of technology bias, they used
portfolio holdings data and the average price/sales ratios of stocks held by a fund as a proxy for technology concentration. Their results by age of manager and year clearly show that the younger the manager group, the more heavily the bet on high price/sales stocks, with the youngest managers making outsize bets on technology at the market peak as shown in the chart below. When the portfolios are sorted by portfolio benchmarks, the results are more striking.

**Fact: Young managers bet more heavily on tech**

Panel A: Value-weighted log P/S

With regard to the prediction that inexperienced managers are more likely to increase technology weightings following high returns, they found that younger managers were trend chasers, and, perhaps more importantly, investors followed them as shown in the chart below. Indeed, the cumulative abnormal returns for the youngest two manager groupings persist to the end of their study period, 2002.

**Fact: Young managers get inflows**

Panel B: Abnormal Flows by month (as fraction of TNA)

Of course, other explanations for this evidence could exist and Greenwood pointed to four: mechanical effects, career concerns, herding, and window dressing. Only technology-specific human capital provides a partial explanation. While younger managers, allegedly more technologically savvy than older managers, were disproportionate investors in technology stocks during this bubble, they showed no skill at stock selection. This is shown below.

**Fact: Young managers don’t outperform**

Panel B: Cumulative vw. holdings-based returns, net of benchmark

Greenwood concluded that their evidence is consistent with previous experimental research that found a role for
investor inexperience in propagating bubbles, and he speculated that a bubble can happen if a significant fraction of the investor population has not experienced bubble and crash before. Experience is important.

35. The Failure Mechanics of Dealer Banks (Fall 2009)

Darrell Duffie, Stanford University, presented “The Failure Mechanics of Dealer Banks.” He had previously presented papers at the Fall 1997 and Fall 2005 seminars of the Q-Group®. To begin, Duffie listed the typical lines of business of the large bank holding company before the financial crisis: commercial banking; securities and over-the-counter derivatives dealing; proprietary trading of securities and derivatives; prime brokerage; asset management including internal hedge funds; merchant banking; investment banking. He focused on proprietary trading, prime brokerage and asset management.

This variety of activities under the umbrella of any one holding company presents a complex array of potential benefits and costs. The clear benefits come from the economies of scope in information technology, marketing, and financial innovation. However, Duffie said, this comes at the cost of complexity that some senior executives and boards simply found too difficult to comprehend much less control. The constellation of companies that he considered too complex included those that were hosted at an April 1, 2009 meeting of the Federal Reserve in New York to discuss over-the-counter derivatives.

The simplistic, and most obvious, cause for the failure of a financial institution is an excess of liabilities relative to assets. However, the direct test of ability to continue operating is whether the financial institution can meet its transactions obligations on any given day. An institution whose liabilities are significantly in excess of the market value of its assets can, under the right conditions and behavior, regain solvency over time.

In imperfect markets several types of frictions can lead to a failure of a dealer bank to maintain transactions solvency, whether or not its assets are in principle sufficient to cover its liabilities in an orderly liquidation of its balance sheet. However, Duffie pointed out, once a crisis begins the forced sale of illiquid assets in order to meet cash obligations can generate additional losses.

1. Liquidation values of assets can be further reduced by adverse selection. The same principle limits the bank's ability to raise cash by issuing debt or equity. In a financial crisis the potential bidders who would normally be in the best position to make use of the assets are themselves likely to be in a cash constrained position, and indeed may be sellers

2. Potential value of assets as collateral for secured borrowing is reduced. In a liquidity crisis, the dealer can be given discriminatory terms for haircuts and collateral pricing. Indeed the ability to move through a liquidity crisis diminishes as the inventory of unpledged high quality collateral, such as Treasury securities, is reduced.

3. The repo market can cease to provide the financing necessary to keep assets on the dealer bank's balance sheet. At this point, even a resale of assets is unlikely to stave off failure. Bankruptcy can follow quickly, as it did for Lehman.
4. Short-term tri-party repos are a particularly unstable source of financing given concerns over a dealer's solvency. Because tri-party clearing banks have an incentive to limit their exposures to dealer banks through both repo and non-repo positions, they may have an incentive to limit the access of a weakened dealer bank to repo financing and to clearing account functions.

5. Large dealer bank's liquidity can be worsened by the flight of prime brokerage clients, and by various defensive actions by over-the-counter derivatives counterparties, who may rationally seek to reduce their exposures by cash-draining transactions, including new trades and novation to other dealers.

The following chart of Bear Sterns’ liquidity position over its last days shows the impact of the factors that accelerated its collapse.

Duffie pointed to various proposed policy changes that may forestall such problems in the future:

1. New resolution mechanisms to mitigate disruptive fire sales.
2. A lender of last resort for a wide range of collateral.
3. An effective central clearing for OTC derivatives.
4. Dedicated repo or other repo market infrastructure measures.
5. Dependence of capital requirements on liability maturity structure.
6. Distress-contingent convertible debt.

He spent considerable time discussing the OTC central clearing mechanism, and various proposals here and in Europe. In addition he considered distress-contingent convertible debt and how conversion would be triggered and whether it would trigger for the financial community as a whole, or for one distressed institution at a time. Duffie discussed the issues of funding from the repo market and the daylight lending arrangements that exist. Finally, he discussed the need to reconcile the benefits of stability from higher capital requirements with some loss of efficiency in the provision of financial services: higher capital requirements will lead to higher costs of capital.

36. Depression Babies: The Effect of Experiencing Macro-Economic Shocks On Individual Risk Taking (Fall 2009)

Ulrike M. Malemendier, University of California, Berkeley, presented “Depression Babies: Do Macroeconomic Experiences Affect Risk-Taking?” work she coauthored with Stefan Nagel, Stanford University.

Malemendier began the presentation with the two questions that motivated the research:

1. Does the personal experience of a large stock market and macroeconomic shock have a lasting impact on individuals’ risk attitudes?
2. If it has a lasting impact on risk attitudes, does it affect tangible finance and macro variables such as stock market valuation?

As a first step, she contrasted the traditional and nontraditional finance model approaches to dealing with these questions. Traditional finance models, she said, assume investors have stable risk-attitudes and rationally update their beliefs. These investors’ “personally experienced outcomes” are no different from information about these outcomes. For these investors, the impact of living through an economic depression or a period of high inflation has no greater impact on their investment behavior than reading about it. The nontraditional models from behavioral finance and experimental economics suggest that personal interaction with other players affects behavior more than does observing other players’ behavior.

The data that were used in the study came from the Survey of Consumer Finances and included individual investors’ stock and bond market experiences over their lives and sample asset holdings data by high income households from 1964-2004. An elicited measure of risk aversion, stock market participation from 1964-2004, bond investment from 1968-2004 and the percentage of liquid assets invested in stocks from 1983-2004 were used as measures of risk taking. The nature of the data is shown in the following table with the 10th percentile being the most risk adverse group. Malemendier concentrated on the differences in real stock and bond returns for the two percentiles. In other tables she showed the percentage of liquid assets for the 10th percentile, 5.9 percent, the median, 43.7 percent, and the 90th percentile at 90.3 percent.

<table>
<thead>
<tr>
<th></th>
<th>10th percentile</th>
<th>Median</th>
<th>90th percentile</th>
<th>Mean</th>
<th>Stddev</th>
<th>#Obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A: All households 1964 – 2004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid assets</td>
<td>696</td>
<td>9,820</td>
<td>205,590</td>
<td>119,858</td>
<td>721,755</td>
<td>33,600</td>
</tr>
<tr>
<td>Income</td>
<td>16,819</td>
<td>48,849</td>
<td>109,957</td>
<td>65,679</td>
<td>178,229</td>
<td>33,600</td>
</tr>
<tr>
<td>Experienced real stock return ($= 1.25)</td>
<td>0.059</td>
<td>0.086</td>
<td>0.110</td>
<td>0.085</td>
<td>0.021</td>
<td>33,600</td>
</tr>
<tr>
<td>Experienced real bond return ($= 0.75)</td>
<td>-0.002</td>
<td>0.012</td>
<td>0.046</td>
<td>0.018</td>
<td>0.019</td>
<td>33,600</td>
</tr>
<tr>
<td>Stock market participation</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.285</td>
<td>0.451</td>
<td>33,591</td>
</tr>
<tr>
<td>Bond market participation</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.322</td>
<td>0.467</td>
<td>32,269</td>
</tr>
<tr>
<td>Elicited risk aversion (1983-2004)</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3.120</td>
<td>0.834</td>
<td>22,316</td>
</tr>
</tbody>
</table>

To test whether “macroeconomic/finance histories” systematically affect investors’ risky choices, the authors related variations in lifetime experience to a weighted average of stock or bond returns. They found that:

- In the early 1980s, young households that had experienced low 1970s stock returns had lower stock-market participation, a lower allocation to stocks and reported higher risk aversion than did older households. The older households had experienced
the low 1970s stock returns, but had also benefited from the high returns from the 1950s and 1960s.

- In the 1990s the pattern reversed: young households had higher rates of stock-market participation and lower reported risk aversion than older households. The young households had experienced the 1990s boom years and had higher life-time average returns than older households. The chart below shows this over time and for different groups.

Malemendier reported finding a high positive correlation between aggregate life-time average returns and stock-market valuation levels implying plausible time variation in aggregate demand for risky assets. In addition, personally experienced stock-market returns possibly affect equity valuation via changes in investors’ willingness to take risk. She concluded with the following observations:

- Stock return experienced over an individuals' life affects risk attitudes and willingness to take stock risk.
- Bond return experience affects willingness to take bond risk.
- Individuals put more weight on relatively recent returns, but even very distant ones have substantial effects.
- This work showed a systematic departure from standard model (stable risk attitudes) and a potential unified framework for different measures of risk-aversion.
- The research provided a potential explanation for variations in stock market valuation levels and expected returns over time.

Malemendier and her coauthor related their models’ parameters to the current market crisis, and ended with a discussion of further research that needs to be done to explain their findings and extend them to other environments.

### 37. Regulatory Reform in Light of the Current Crisis (Spring 2009)

Richard R. Lindsey, CEO, The Callcott Group LLC and the Courant Institute, NYU, presented “Regulatory Reform in Light of the Current Crisis.” Lindsey had previously presented a paper at the Fall 2003 seminar of the Q-Group®.

To begin, Lindsey said that “if you don’t have a financial system, you can’t have a financial crisis.” That provides a focus for his examination of the financial system, the problems that allowed the crisis to happen, and what should be done.

In the current crisis, Lindsey says, regulators stumbled, for three reasons:

1. They cannot be expected to prevent a crisis. The regulators have an optimal control problem, attempting to minimize crisis while maximizing the growth of the financial system.
2. They can be expected to follow regulator’s “Hippocratic Oath” of do no harm. In this crisis the problem was not risk but the introduction of increased uncertainties.

The US financial regulatory scheme is outmoded. He notes that the SEC and the Fed did what they were supposed to do, protect investors and maintain financial stability. However, the system not designed to deal with the new forces in the markets.

Lindsey followed with information on the number of banking crises over time and the mean time to recovery, shown below. The mean time to recovery is what impacts GDP in the future.

Mean Recovery Time

![Mean Recovery Time Chart]

He then asked whether the present crisis is different from others and says that there are three causes of financial instability. These causes are usually associated with problems in developing countries.

1. Unsustainable Macroeconomic Policies
   a. Monetary and fiscal policies are too expansionary to be consistent with currency level.

2. Fragile Financial Systems
   a. Dependence on short-term debt.
   b. Highly-leveraged balance sheets for banks and financial institutions.

3. Institutional Weaknesses
   a. Weakness in corporate governance.
   b. Short-sighted governments

b. Governments treat banks as a captive market for public debt issues.
i. Unwilling to distance themselves from financial institutions.

ii. Denying regulatory agencies the autonomy needed for effective supervision.

c. Flaws in the structure of international financial markets largely beyond the control of individual countries.

Lindsey noted four recent and large structural changes in the financial markets:

1. Development of markets for credit and risk intermediation that allow unbundling, sharing, and selling component parts of a security, thus breaking the relationship between sources and uses of resources.

2. Changes in the activities and risk profiles of financial institutions, allowing them to trade risk but exposing them to potentially sudden and extraordinary losses.

3. Increased anonymity of these increasingly global market participants.

4. Technological advancements that have reduced the costs of gathering, processing and transmitting information, and the creation of new products. Lindsey notes that there are roughly 100 new financial products introduced per year, few of which are sustainable. The problem is that there are no systems developed for the new product challenges.

He then wondered if the goals of regulation to promote financial market stability and support systemic insulation have changed and what regulators should do about it. He discusses the current regulatory system and its components, coming to the conclusion that change is needed. He then presented the outstanding proposals from 6 sources: Paulson’s specific proposals to preempt state laws, Dodd’s proposal that is less preemptive and more proscriptive, that from The Group of Thirty, Volker’s working group, who consider changes from a basic set of assertions about the system, Hoenig’s 1996 proposal to increase the stability of financial systems and reduce the moral hazard issue, and that of White from the Milken Institute. White uses simple heuristics to describe his plan:

“"If regulators can’t understand an activity of a financial institution well enough to set sensible capital requirements, the activity should not be permitted. They must scrutinize conflicts of interest, assess the competence of senior managers and replace them if they put the financial system at risk, and should have receivership powers.”

Lindsey points out that many of the ideas in Geitner’s recent speech were in the proposal by White, including the quirky ones.

Lindsey then articulated his own plan. It is based on the following:

1. Rethink why we are regulating the financial system.

2. Articulate the core principles and objectives necessary for success of the financial regulatory system.

3. Identify structural gaps or weaknesses and fundamental principles.

4. Distinguish between fundamentals and philosophy.
5. Cover the gaps in the system:
   a. Hedge funds; funds of funds; private equity funds; and venture capital funds
   b. Insurance companies; GICs
   c. Highly leveraged institutions; GE Capital; Cargill; Harvard Endowment
   d. OTC Derivatives; CDSs; CMOs; CDOs
   e. Off-balance sheet transactions; SPVs, SPCs; SPTs
   f. Rating agencies

6. Remember the fundamentals:
   g. Safety and Soundness
   h. Investor Protection
   i. “Rule of Law”

He started with the contention that there is a vicious cycle in risk capital. Risk capital is supplied by leveraged financial institutions (LFI) and shocks to LFI risk capital reduce LFIs’ willingness to supply it. The shocks can come from several sources: changes in LFI capital, risk levels, and assets’ trading liquidity. Any constriction of supply and deleveraging with lower prices magnifies the shock.

Froot was careful to point out what institutions he includes as LFIs: non-bank financial intermediaries, including former investment banks and some insurers, hedge funds, insurance, and reinsurance companies. He pointed out that the shocks can result in declining prices and stressed intermediaries and can lead to:

- Fear, bank runs, market and even consumption runs.
- Demand for liquidity, safe and available purchasing power, that is overwhelming.
- Fundamentals that become endogenous to lower asset prices and the state of markets.

Some interpret this as evidence of a backward bending supply curve.

Froot uses as an example how risk shocks are managed in the market for catastrophic risk. He points out that the catastrophic events are exogenous and random and not the result of underlying shocks. With potential catastrophic losses, the actuarial probabilities of risk and the size of loss can be estimated objectively using models that do not depend on human behavior. The costs of the catastrophes and the cost of risk capital can be measured. Not so with the current financial crisis.
The financial crisis has been amplified by leverage. To emphasize the problem caused by leverage, Froot lays out the typical LFI levered balance sheet. If there is a shock to security values, to maintain leverage the LFI must reduce assets to free up capital or issue equity at lower prices. Since security sales take place with less capital committed to market making in this decline in economic activity, a vicious cycle begins, necessitating further securities sales, but at even higher price elasticities. This, Froot reminds us, was an issue with Bear Stearns, but in the case of Lehman Brothers it became an explosive problem as risk capital became extremely dear. To delever, LFIs needed to sell the assets into those markets where they served as market makers. The result was a collapse of liquidity in these markets. Lower prices led to still lower prices and greater need to sell. This resulted in an even higher price of risk capital and lower capacity. The indirect effects of this were fear, runs on banks, uncertain markets, and decreases in consumption.

Illiquidity was not as substantive a problem in the equities markets, and Froot asserts that the equity liquidity premium has not substantially increased. However, in the fixed income market volumes have fallen, notably in those portions of the market with large dealer inventories. Froot provided a number of charts regarding liquidity in the markets. The fixed income data are shown below:

In the current crisis, the markets have seen substantial disruption in function and decline in activity that was greater in those markets where dealers held more inventories. In addition, the markets had reduced price transparency, and dealer-intermediated illiquid asset prices fell more because of impairment of the dealers. Froot gives a concrete example showing that the basis difference between collateralized debt obligations (CDO) and underlying bond prices has grown unusually: spreads have
been about 400bps, and for a corporate bond with 7-year duration this represents a relative under pricing of 25%-30%. There are three potential explanations: the illiquidity of bonds is less than that of CDOs; CDOs have additional counterparty and contractual risks; CDOs do poorly compared with debt in a voluntary debt exchange. However, CDOs settle regularly, thus preventing accumulation of counterparty exposure.

Froot uses regressions to pry apart the sources of the spreads. His analysis is shown in the following chart. He points out the impact of the rating agency and the market capitalization on spread.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Constant</td>
<td>385.3</td>
<td>290.0</td>
<td>206.8</td>
<td>223.6</td>
<td>249.9</td>
<td>457.9</td>
<td>1639.2</td>
</tr>
<tr>
<td>(30.99)</td>
<td>[11.48]</td>
<td>[7.96]</td>
<td>[6.92]</td>
<td>[7.59]</td>
<td>[12.09]</td>
<td>[31.35]</td>
<td></td>
</tr>
<tr>
<td>Liquidity Decile (by Volume)</td>
<td>11.7</td>
<td>9.9</td>
<td>10.5</td>
<td>10.5</td>
<td>3.6</td>
<td>-5.6</td>
<td></td>
</tr>
<tr>
<td>(7.85)</td>
<td>[6.44]</td>
<td>[6.83]</td>
<td>[6.38]</td>
<td>[6.84]</td>
<td>[2.19]</td>
<td>[-3.38]</td>
<td></td>
</tr>
<tr>
<td>Log Mean Abs Price Discrepancy*</td>
<td>14.5</td>
<td>7.6</td>
<td>7.1</td>
<td>5.8</td>
<td>8.2</td>
<td>-3.9</td>
<td></td>
</tr>
<tr>
<td>(4.32)</td>
<td>[2.25]</td>
<td>[2.06]</td>
<td>[1.68]</td>
<td>[2.39]</td>
<td>[-1.14]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rating (1=AAA, 9=C)</td>
<td>32.2</td>
<td>32.2</td>
<td>31.4</td>
<td>15.7</td>
<td>-68.7</td>
<td>-19.00</td>
<td></td>
</tr>
<tr>
<td>(13.31)</td>
<td>[13.30]</td>
<td>[12.97]</td>
<td>[5.68]</td>
<td>[-19.00]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRACE-eligible Dummy</td>
<td>-14.5</td>
<td>-26.8</td>
<td>-15.6</td>
<td>-10.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(-0.87)</td>
<td>[-1.61]</td>
<td>[-0.93]</td>
<td>[-0.62]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On the Run Dummy (&lt; 180 days)</td>
<td>-84.8</td>
<td>-93.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(-5.36)</td>
<td>[-5.41]</td>
<td>[-5.36]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log Debt Outstanding*</td>
<td>-43.2</td>
<td>-34.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(-10.61)</td>
<td>[-8.85]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log Market Cap*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(-160.0)</td>
<td>[-32.21]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Trading can be investor to investor.
2. Electronic capabilities allow decentralized, competitive market, thus reducing the returns-to-scale problem plaguing dealers.
3. Costs reflect at least informational asymmetries.
4. The government should and can efficiently coordinate the transition of the market structure from dealer to exchange centricity.

Froot concluded that the under pricing of illiquid instruments can be alleviated through more efficient risk-based funding of bonds, and that system redesign should be a high priority. The system must be transparent, set exogenously, and the skill sets and trading behaviors of bond investors must be endogenous. In addition, he says that monopolistic competition among dealers is not conducive to enhanced liquidity. The system should take these things into account:

Brett Hammond, TIAA-CREF, moderated a panel discussion to bring out the expertise from a diverse ground of investment professionals in the group. He asked some seminar participants to lead off a discussion of the critical factors driving the market, the economy, and their segment of the market before turning to comments and questions.

He began the prepared remarks by asking several academics to give their views.

Kent Smetters, Associate Professor of Insurance and Risk Management Wharton School, University of Pennsylvania, provided the group with some summary slides:

1. Showing the position of the home owner and lenders in the collateralized lending market.
2. Providing a diagram of the senior and sub tranches and how they were structured.
3. Pointing out the role of rating agencies and the problem created by credit default swaps.
4. Noting that the withdrawal of insurance resulted in big spreads, having a huge impact on equity markets.
5. Concluding that rating agencies did a terrible and are now doing an equally poor job with sovereign debt.

Going forward, he says we:

   a. Don’t have the theoretical framework to deal with the situation.
   b. Need to pause and breathe.
   c. Must have some increased transparency of 144As
   d. Black letter mortgages -- simplify the forms.

Smetters gave the following comments:

1. The recession will be stretched out for at least 5 years.
2. There will be lots of government crowding out much like what was seen in Japan’s lost decade.
3. Obama’s plan should have incentivized the private sector.

Kenneth Froot, Harvard Graduate School of Business Administration, was asked, what are the key drivers and when are we getting there?

Froot said that we are deep in the tertiary drivers, expectations are very important, even though there is lots of liquidity in the markets right now. He warned that not all the shoes have dropped and we may see a country default. Such a default could trigger more on the expectations side. A bad political risk event is scary and can have very big implications.

Philippe Jorion, Chancellor’s Professor, University of California, Irvine, said that risk management and financial engineering had put too much emphasis on trying to measure risk, when many risks are not known. It will be a much harder job for risk management going forward.

Hammond then turned to practitioners for their views.

Vanguard’s Sandip Bhagat said that we are searching in an abyss: the real decline in the stock market has been about
63%. In the Great Depression nominal returns were negative 72%. Thus, we are approaching that level. All this is predicated on the fear that the banking system will come to a grinding halt. The administration has been slow in getting liquidity into the system, and if we don’t get out of the self-fulfilling prophecy, it will be a disaster. As for investing styles, lots of faith in enhanced indexing has been lost. Future flows seem to be headed into passive strategies.

Bennett Golub, Blackrock, Inc., asked, if you are an investor in securities that are event or default driven, how can you possibly know what is going to happen? Changes are so big you don’t know what to do with the historic data: human behavior is changing as are government rules. What will change and when? As a consequence, risk premia must be higher.

Another problem, he noted, is valuation. In present circumstances, how do you manage risk when you don’t know what something is worth (and can’t know how volatile it will be)? An ancillary problem is how to use third party data for valuation and how to know if the data are reasonable.

Finally, he forecasts that in upper level tranches will begin to see new liquidity and arbitrage between segments occur.

From these preliminary comments, considerable discussion continued. Larry Harris, University of Southern California, said of uncertainty, that when people don’t know the context in which they are making decisions, they make bad or no decisions. He sees some transactions in the housing market that may be signaling a bottom. He said that he tells his students “none” when they want to know how much capital has been destroyed. We are, he says, arguing about the ownership and usage of assets.

Jim Scott, GM Asset Management, said that there was too much leverage in the system and pressures to keep leverage high are very strong. He pointed out that Canada didn’t have a subprime problem because down payments on property are 20% with full recourse loans. You don’t take as much leverage when have to take responsibility for losses.

Marty Leibowitz, Morgan Stanley, said that the problem is the extent to which risk capital is cycling off into lower risk fixed income assets. After the Great Depression even sophisticated investors were adverse to equities.

Mary Cahill, Emory Investment Management, said the whole thing has a lot has to do with human behavior. What would you expect when people were pressured to get 20% returns (it requires leverage). Smart people, and some not so smart people, were going into the investment business. Risk, she said, is all over the place in her business, while past conversations were looking for consensus, some people never want to invest in equities again.

Joann Hill, Profunds Group, said that the market is dominated by urgent sellers. Fundamental risk is in the background, innovation will come with transparent and liquid products. She said that all of us in the room should wade in on the regulation of derivatives, making sure the benefits of them are not thrown out with the less transparent options.

Mike Hogan, Delaware Investment Advisors Delaware Investments, asked the
question, does the US have the capacity to become the financial intermediary of the world?

Randolph Cohen, Harvard Business School, said, for the first time he can tell his students that the equity risk premium has been 5% over the long term and the forecast is for 5%. This is a symmetric situation. To which someone asked whether the symmetry of historic and forecast returns signals an equity bottom? Another commented that the equity risk premium has been overstated, and what we have seen is just a healthy correction.

Arnie Wood, Martingale Asset Management, pointed out agency problems in this business: very few people trust each other, endowments don’t trust managers, sponsors don’t trust endowment managers, etc. Hedge funds have seen a large drop in inflows regardless of the performance. Fees are likely to come down, some nice opportunities exist and at the moment, all kinds of strategies are giving clear buy signals.

At this point Brett Hammond wrapped up the session, complementing those involved in the lively discussion and saying he wanted to have the last word, he thanked all of his participants.

In this presentation Allen provided more insight into the continuing economic and market crisis. Allen says that the received wisdom about the current crisis is that it was due to the origination of mortgages, the securitization of them, the provision of ratings for securitizations, and the failure of risk management systems. In spite of these widely held conclusions, he says the large global impact of the crisis suggests the problems with subprime mortgages were a symptom rather than the cause. The main problem, he concludes, was a bubble, first in stock prices and then in property prices. The current crisis comes from the fallout from the enduring collapse in prices, exacerbated by the loose monetary policies of central banks, particularly the US Federal Reserve. The policies, he concludes were wrong minded, being focused on consumer-price inflation while ignoring asset-price inflation. The policies of the IMF added to the crisis as they led to a desire among Asian governments, finding themselves with no voice in the IMF, to build reserves to protect themselves. As a result of price collapses, and poor central bank and IMF policies, the decisions about asset values were based on the wrong asset prices for more than a decade. The result of this overvaluation of prices in the US was a lowering of savings rates and increased in borrowing. Thus was the trap set from the belief that asset prices would continue to rise.

As a result of this boom and bust, Allen believes it is very hard to determine the correct prices of stocks, property, and commodities now and what they will be in the future. Thus, individuals do not know their wealth and how much they should save. Companies find it difficult to make production forecasts and investment decisions. He enumerated the most important failures to date: inefficient

40. The Global Financial Crisis (Spring 2009)

H. Franklin Allen, Nippon Life Professor of Finance, Wharton School, University of Pennsylvania, presented “The Global Financial Crisis” based on a paper of the same name that he coauthored with Elena Carletti. Allen had previously presented a paper at the Spring Q-Group® seminar in 2003.
liquidity provisions; mispricing due to limits to arbitrage; contagion. On each of these points he expands his analysis in the accompanying paper and relates his conclusions to the research of others.

Allen concluded that going forward central banks and governments need to be much more focused on preventing bubbles and global imbalances than in the past. In addition, banking regulation needs to focus on correcting genuine market failures rather than being imposed ad hoc as has been done historically.

To give some perspective, Allen compares the current crisis with the one in Japan that began in the 1990s. Prior to the crisis the Japanese economy boomed, resulting in huge increases in stock and property prices. The Nikkei index, now trading near 8,000, peaked at just under 40,000 at the end of 1989. Property prices peaked in 1991 then declined 70-75% from their peak. Both declines caused major problems in the banking system that spilled over into the real economy: growth fell from among the highest in the world to the lowest. US declines to date have not even come close to those experienced by the Japanese economy, Allen says.

Allen looks at Japan’s very different economy in terms of the way firms and banks reacted to the downturn. In particular, he noted, companies place great weight on the interests of employees and other stakeholders and not much on shareholders. Because of this, Allen says, Japan stopped growing fast in the 1990’s but the economy did not have a long lasting and deep recession. He questions how much of this was due to firms’ reluctance to lay off workers and of banks to call in loans. To demonstrate the difference in attitude Allen provides the results of a survey of managers around the world that asked this question, which of the following two would be the most prevalent view in your country? The choices were:

1. Executives should maintain dividend payments, even if they must lay off a number of employees, noted in white in the following chart.
2. Executives should maintain stable employment, even if they must reduce dividends, shown in color.

![Job Security or Dividends](chart)

The attitudinal differences are abundantly apparent and Allen wonders how strong the feedback effects will be now that the US is in recession and firms are laying off many people.
As for the actions of the central banks and governments in the current crisis, they are concerned about getting banks lending again and are spending huge amounts to "solve the problem." However, Allen wonders, is the problem the fear of lending or liquidity hoarding in anticipation of deflation? Governments have been assuming that if they can get the financial system to operate properly the problem will disappear. However, the issue of price uncertainty after the bursting of the bubble will remain and may take a long time to resolve. This is the heart of the problem.

To conclude, Allen says that:

- Current government policies will have little effect on this problem and may exacerbate it. This crisis will probably not be over quickly because establishing correct prices is likely to take some time.
- It is better temporarily to nationalize the banks than to follow the current policy of providing capital injections.
- A severe recession is better than a loss of confidence in the fiscal integrity of the state.

In his paper Allen expands on the basic notions in the presentation and says despite the fact that the fall in US property prices was the fundamental cause of the crisis, most surprising was the role of liquidity. He uses insights from the academic literature on liquidity and crises to try to understand the role of liquidity during the past year, focusing on four possible effects of liquidity: on pricing, on interbank and collateralized markets, on fear of contagion, and on the real economy.

He says that there have been three surprising things about this crisis:

1. Pricing of AAA tranches of securitized products below what fundamentals would suggest. Once the link between prices and fundamentals is broken, arbitrage becomes risky and the usual forces that drive prices and fundamentals together no longer work and sometimes for protracted periods.

2. Operation of the money markets. Interbank markets for terms longer than a few days experienced considerable pressures and the way collateralized markets operated changed significantly: haircuts changed and low quality collateral has become more difficult to borrow against.

3. The controversial use of public funds in the arranged merger of Bear Stearns with J. P. Morgan was justified by the possibility of contagion. The literature on the likelihood of contagion between banks based on simulations concludes that contagion in banking is unlikely. Similar studies in the context of counterparty risk in derivatives markets need to be done as well.

41. Credit Contagion from Counterparty Risk (Spring 2009)

Philippe Jorion, Chancellor’s Professor, University of California, Irvine, presented “Credit Contagion from Counterparty Risk” co-authored with Gaiyan Zhang, University of Missouri at St. Louis. Jorion had previously presented papers at the Fall 1994 and Spring 1999 meetings of the Q-Group.

Jorion examined another part of the puzzle that is the current crisis. He and his coauthor examine why the standard credit
risk models cannot explain the observed clustering of defaults, sometimes described as credit contagion.

He began his presentation with a graphic description of the mechanism of credit contagion.

In recent years there have been technical advances in portfolio credit risk models that allow financial institutions to measure the distribution of potential credit losses at the top level of the institution, at least in theory. Such information can be used to infer economic capital, which is the amount of equity the institution should carry to absorb a large loss over a specified horizon, with a high level of confidence. These new credit models have been in widespread use in the financial industry, for example when structuring Collateralized Debt Obligations (CDOs). The models also are the basis for the recently-established regulatory capital charges for commercial banks and the new Basel II regulatory capital charges. Calibration of these models, however, is notoriously difficult, in large part because default correlations cannot be directly measured for specific obligors. Instead, default correlations are modeled indirectly, typically using a reduced-form model of default intensity or a structural model of the value of the firm based on a Gaussian copula. Standard models typically assume a factor structure where correlations are induced by a common factor, often interpreted as the state of the economy. This common feature largely explains why recent comparative studies of industry portfolio models show remarkable similarities in their outputs, even though they do not fully capture the clustering in default correlations.

Jorion and his coauthor look specifically at the channel of credit
contagion which is counterparty credit risk. The authors position their work as part of an emerging literature that attempts to build bottom-up models of default correlations that focus on structural interactions between creditors and borrowers. There has been little empirical evidence of counterparty effects that arise from trade credit between industrial partners or from the lending by financial institutions that has been so damaging in the current crisis. Jorion and his coauthor move to fill this gap.

Counterparty risk is quite different from industry or factor effects. To examine it requires detailed information about counterparty exposures. This study uses unique data to identify detailed credit exposures: a sample of bankruptcy filings listing the top unsecured creditors, credit amounts, and credit types for over 250 public bankruptcies from 1999 to 2005. Using these data, the authors can examine the impact of counterparty risk on different types of creditors, industrial firms and financial firms. From their analysis they find:

1. For industrial firms most exposures take the form of trade credit – direct lending in a supplier-customer relationship.

2. For financial firms where exposures take the form of loans or bonds, exposures are generally larger in dollar amounts than for industrial creditors, but less so in relative terms for financial creditors. The average exposure in the sample is 0.16% of equity. Counterparty risk is likely to be smaller for financial firms as lenders or bondholders because:
   a. Limits are imposed on the amount of lending to one borrower and banks are forced to diversify.
   b. Financial institutions can choose to whom they lend.
   c. Bank loans are generally secured, leading to higher recovery rates than unsecured debt.

Jorion illustrates the economic importance of counterparty credit risk by showing its effect on the distribution of defaults in a portfolio. Using simulations calibrated to the empirical data, he shows that the excess clustering observed in defaults can be explained by counterparty risk.

The authors look further at the impact of contagion on stock prices. They examine how a borrower’s financial distress affects its creditors in a large sample of bankruptcy announcements listing the top creditors. They find that creditors experience negative abnormal equity returns and increases in their credit spreads. This loss of value reflects both the direct credit exposure at default and the loss of valuable customer relationships. Conditional on having experienced a credit loss, creditors with large exposures are more likely to suffer from financial distress as well. The conditional probability of subsequent downgrades is significantly higher than that of the control sample. The authors also find that the wealth and distress effects are stronger for industrials than for financials. They explain this by the fact that industrials are less diversified and also suffer a greater loss of on-going business relationships.

The results found in this study, Jorion says, should be useful in developing more realistic portfolio credit-risk models in the future.
42. Do Arbitrageurs Amplify Economic Shocks? (Spring 2009)

Harrison Hong, John Scully '66 Professor of Economics and Finance, Princeton University presented “Do Arbitrageurs Amplify Economic Shocks?” which he coauthored with Jeffrey D. Kubik, Syracuse University, and Tal Fishman, Parkcentral Capital Management.

In this paper Hong reports on work in which he and his coauthors test the hypothesis that arbitrageurs amplify fundamental shocks in the context of short arbitrage in equity markets. He says that the ability of speculators to hold on to short positions depends on asset values: shorts are often reduced (increased) following good (bad) news about a stock. As a result, the prices of highly shorted stocks are excessively sensitive to economic shocks.

This amplification mechanism is believed by many to be a key ingredient behind recent financial crises. Hong gives some previous examples of the destabilization:

1. The market turmoil of 1998 widely blamed on the forced selling of the large hedge fund Long Term Capital Asset Management.
2. The turmoil in the Summer of 2007 attributed to the forced selling of many multi-strategy quantitative funds.
3. The forced unwinding of highly levered trades for the extreme volatility in financial markets throughout the crisis since the collapse of Lehman Brothers.

Hong says that despite the wide attribution of the importance of this amplification mechanism in financial markets, there is relatively little systematic evidence on whether or not fundamental shocks are amplified by such speculative activity.

Hong and his coauthors tackle the issue in the context of short arbitrage in equity markets. There are several reasons why short selling in equity markets is an ideal setting in which to study this issue. First, the magnitude of arbitrage activity (on the short side) can be measured. Second, in practice the ability of arbitrageurs to hold on to short positions depends on asset values. Third, there is substantial anecdotal evidence in support of this amplification mechanism in the context of short arbitrage.

To capture this amplification caused by short-covering, they develop a simple three date model of asset price dynamics in which arbitrageurs have a profitable opportunity to short an over-priced stock subject to positive sentiment. They derive three key predictions, which are tested using monthly data on short sales in U.S. equities from the period 1994 to 2007:

1. Price sensitivity to earnings news is higher for a stock with positive short selling (i.e. arbitrage presence) than for a stock with no short selling (i.e. no arbitrageurs).
2. The change in the short interest ratio of a stock should be negatively correlated with the earnings surprise.
3. Arbitrageurs are forced to get out of short positions that turn out to be profitable.

To identify the amplification mechanism, they consider two quasi experiments, and find two things. First, since it is easier to short NASDAQ than NYSE stocks for regulatory reasons, short interest ratios should be and are
substantially higher for NASDAQ stocks. Second, Hong says that others have found an increase in the short ratio concentrated among small stocks since 2000, arguing that this is due to the rise of hedge funds. Hong says, and the authors find, that if their hypothesis is correct, these destabilizing effects ought to have increased among small stocks since 2000, but not for large stocks that did not see such growth. A graphic display of this small-large stock shorting differential is shown below.

Hong and his coauthors build on a body of previous work by others, stating three notable advantages to their work: they have more and better ways to rule out alternative explanations; the horizon in which earnings shocks affect stock prices is a bit more straightforward than the impact on other asset classes; they have better data to more precisely measure the predictions.

Hong uses earnings announcements as shock (measurable in contrast to sentiment). He says that the return should be higher on good news for stocks with short selling and short covering should follow good news. He uses monthly data on short sales in U.S. equities from 1993 to 2007 and three propositions are tested:

1. Earnings response is greater for shorted stocks than for un-shorted stocks.
2. For shorted stocks, the change in short ratio is inversely related to the earnings surprise and share turnover around earnings announcements is more sensitive to (the absolute value) unexpected earnings for highly shorted stocks than for little shorted stocks.
3. If sentiment increases proportionally with unexpected earnings news, then for highly shorted stocks the expected return to shorting can be higher after unexpectedly good earnings news. Another way to think about this is post
event drift: there should be less drift in highly shorted stocks compared to other stocks.

Hong found that controlling for a host of other stock characteristics, the price of a highly shorted stock is more sensitive to earnings news than a stock with little short interest, short interest changes in the predicted direction in response to earnings news, and, for highly shorted stocks, returns to shorting are actually somewhat higher following good earnings news. Finally, these differential sensitivities are more pronounced for NASDAQ stocks which are easier to short than NYSE stocks, at least since 2000. These findings are broadly consistent with theories which emphasize the limits of arbitrage in affecting asset price dynamics.

Finally, Hong reminds us that understanding the potentially destabilizing effects of speculators on asset markets is of paramount importance in light of the rise of hedge funds in the last decade.

Goetzmann began by discussing the motivation for the unusual essays in this book: the desire to place our current age of financial revolution in historical perspective. While innovations in the modern world of finance have come to be almost expected, the continuing process of innovation is in fact built on surprisingly few basic principles: an intertemporal value transfer (time value of money), the ability to contract on future chance outcomes, and negotiability.

The essays come from many different disciplines and trace the evolution of basic principles of finance through 4,000 years of history, along the way contrasting developments in China with those in the West. The essays focus on primary documents of finance, financial instruments, and contracts that have survived through history. The book tells a remarkable story of invention.

Goetzmann moved to an interpretation and understanding of the relationship of each invention to historical and modern financial instruments and markets. He says, “Put a financial engineer on a desert island (or an emerging market!) and give him only a few tools, such as the means to calculate the time value of money, the ability to contract on random outcomes, and a legal structure that allows the transferability of financial claims, and most of today’s financial instruments could be reconstructed.”

One of his first questions is “Why didn’t the industrial revolution begin in China?” The Song dynasty (960-1127) had superior eastern science, an organized central government, wide rule of law, a meritocratic society and unprecedented literacy. Just the situation that should have produced great innovation. The answer?

43. The Origins of Value: The Financial Innovations that Created Modern Capital Markets (Fall 2008)

Finance was missing. What did develop was property rights (around 1,000 BC), securitized lending (700 AD), and sophisticated accounting. The earliest accounting tools Goetzmann said were bamboo rods. But China never indigenously developed bonds or markets. Europe’s advancement in financial technology was sparked in the late Middle Ages by deficit financing of municipal governments and coincided with the mathematics of expected value that led to chance calculus and risk-based financial tools.

While Goetzmann spent most of his time on the differences between development in Europe and China, he discussed a number of specific innovations. The roots of finance are traced back to the roots of civilization itself: written loan contracts from Mesopotamia are more than 3,000 years old. Civilization has long had an ambiguous attitude toward interest on money lending, and the clash of finance and religion may be due to the seeming parallels between the term of a loan and the term of a life: life itself was considered a loan from God and death was the completion, or repayment. Thus, for at least a millennium, finance was viewed as a technology contrary to divine plan. Usury laws in the Roman Catholic Church frowned upon the taking of interest during the 13th through 18th centuries, a period of great dynamism and invention in finance, and there is an Islamic Sharia proscription against lending despite the fact that the mathematics of compound interest almost certainly entered Europe from the Middle East.

The ability to contract on future chance outcomes — contingent claims— is the second foundation of finance studied in the book of essays. Goetzmann contends that this, coupled with inter temporal wealth transfer, is largely responsible throughout financial history for creative innovation. The earliest written contingent contracts were reported in Mesopotamian cuneiform records. However, the most exciting developments in contingent contracting took place in Holland in the 17th century with the creation of option contracts on shares. Early Dutch options are the direct precursors to the worldwide derivatives markets of today.

Goetzmann reports that Schiller, in his essay in the book, extends the impact of this innovation to the invention of inflation-indexed securities in the early United States and serves as a historical precursor to Professor Schiller's personal quest to allow people to hedge themselves against the risks of an unknown future: crashes in their national economies, inflation shocks, unemployment shocks, and even housing price declines.

Goetzmann says that contingent claims technology not only allows society to address immediate, foreseeable risks, but it also deals with the "meta-uncertainty" of an evolving future. What worries one generation about the future may not be what concerns the next. The principle of contingent claims is flexible enough to adapt to these changing concerns. What innovations in contingent claims will the current century bring? It is hard to tell, but the technology of derivatives will almost certainly allow future risks to be parsed, hedged, and traded, and may yet be used to address some of the most complex challenges of the evolving global financial architecture.

Goetzmann reports an especially interesting example: the 1953 London Debt Agreement representing the final step in the restructuring of Germany's debt from the
First World War is described in Chapter 19 by Timothy Guinnane. In the mid-twentieth century, as a result of the Cold War, West Germany was effectively burdened with the obligations of the entirety of the nation's earlier war reparations. In recognition of the de facto split between East and West Germany, the international community limited the scale of these payments until such time as Germany was reunified. Securities were issued at that time which were truly "state-dependent" that is, their value as bonds were conditional upon the structure of the modern German state. The fall of the Berlin Wall triggered a change in the loan terms, as envisioned for decades before by the negotiators in London. As such, it allowed the German economy to develop vigorously following the Second World War, but without the all-or-nothing repudiation versus repayment framework that had proved so economically disastrous in the 1920s.

Goetzmann goes on to note that loans and contingent claims are certainly feasible without a secondary market, but the ability to trade contractual claims to a third party dramatically enhances the power of financial technology. True negotiability first developed in China and reached its most dramatic expression in the eleventh century in the form of paper money. The Chinese not only invented paper money, they invented fiat money that is negotiable just because the government says so. It is an irony that paper money in China was an experiment that lasted for approximately four hundred years and disappeared in the fifteenth century, just as financial markets were developing in Western Europe.

Goetzmann points out that the financial architecture needed to create improvements in market liquidity depends as much upon individual insight and fortuitous events as upon the forces of supply and demand that ensure its success. A capital market like the modern New York Stock Exchange is an institution that brings together buyers and sellers to trade financial contracts. The power of such a market is that it simultaneously allows thousands, perhaps even millions of anonymous investors each day to rebalance their holdings of financial claims to suit the need for savings versus short-term cash use, as well as allowing them to speculate on or hedge against future events. Two authors, Sylla and Downing, discuss how the NYSE developed in response to historical forces and events. Its current preeminence was not preordained, but evolved along with the institutional framework of the US financial, legal, and regulatory systems.

He notes that there are few moments in financial history when it is possible to identify how a particular innovation came to be. The Niall Ferguson chapter reports the birth of the first Eurobond-loans issued in Europe's money center markets by countries promising to repay in a currency not their own. The Prussian loan underwritten in London in 1818 by the house of Rothschild, and the even more ambitious Russian loan floated in multiple European currencies by the Rothschilds in 1822, profoundly changed the nature of international relations.

The recent privatizations in Russia and China, and the dramatic emergence of equity markets in Moscow and Shanghai provide a real-time test of whether the framework can be adopted without the institutional developmental process. The near-collapse of the Russian equity market in the late 1990s and the tiny "float" of Russian equities compared to the size of the economy suggest that liquidity may result from process, not framework. In the new
regulatory regime, the much hoped for liquidity of Russian shares is still elusive, although the active merger and acquisition market suggests that firm ownership - at some level - has become negotiable. Goetzmann contrasts this with the gradualism and process-orientation of the Chinese experiment with capital markets that has led to a huge volume of trade in Chinese shares, despite the fact that most companies are still majority state-owned. For both experiments the historical experience may provide some guidance.

Frictions and difficulties in trade sometimes cause markets to break down. They also can motivate important insights and invention. The Geert Rouwenhorst essay describes how the first mutual funds in Holland developed in part as a means of providing smaller investors access to financial securities that would otherwise be difficult to obtain. A striking example is the Russian government bond fund shares issued by Hope and Company in the early nineteenth century. Dutch investment bankers effectively created a market in Holland for Russian government debt by going to Moscow and subscribing directly to a set of loans, and then issuing loan-backed bonds themselves in Amsterdam. This saved investors from a similar trip halfway across the continent and consequently created an international market for Russian paper. These same bankers, incidentally, repackaged the early loans of the young United States as well. In both cases, they effectively turned cumbersome, illiquid financial contracts with governments into liquid instruments of smaller denomination that could easily be bought and sold in a capital market: the process of securitization.

These sovereign debts demonstrated that liquidity was a transnational phenomenon: government funding need not be constrained by borders but the cost of such freedom was that obligations must be denominated in a coin of a different realm. This introduced a level of interlocking monetary dependency among European nations and their allies which arguably led to the global adoption of the gold standard decades later, as well as a redefinition of national power based upon the ability to tap global money markets for financing military adventures. Historian Ferguson focuses on the process by which this innovation came to be — the confluence of personalities, politics, and world events that led to a major innovation in the global financial architecture of the nineteenth century.

44. What Happened to the Quants in August 2007? (Spring 2008)

Andrew W. Lo, MIT and AlphaSimplex, presented and distributed “What Happened To The Quants In August 2007?” The presentation was based on a paper co-authored with Amir E. Khandani, MIT.

This paper looks at events of the week of August 6, 2007, a week when something remarkable occurred. One segment of the hedge fund industry had significant losses. Most of the hardest-hit funds employed long/short equity market-neutral strategies, sometimes called statistical arbitrage. The most remarkable aspect of the hedge-fund losses was the fact that they were confined almost exclusively to funds using quantitative strategies. With laser-like precision, model-driven long/short equity funds were hit hard on Tuesday August 7 and Wednesday August 8, 2007, despite relatively little movement in fixed-income and equity markets during those two days and no major losses reported in any other
hedge-fund sector. On Thursday August 9th, when the S&P 500 lost nearly 3%, most of these market-neutral funds continued their losses, calling into question their market-neutral status. These strategies, by construction, do not have significant market beta exposure and they should have been immune to most market gyrations.

On Friday, August 10th, the combination of movements in equity prices that caused the losses earlier in the week reversed, returns rebounded significantly but not completely. However, faced with mounting losses on the 7th, 8th, and 9th that exceeded all the standard statistical thresholds for extreme returns, many of the affected funds had cut their risk exposures causing them to miss out on some of all of the reversals on the 10th. This greatly exacerbated their losses.

On the basis of these events, the authors found themselves left with the following questions:

- What is the future of quant?
- Is “quant dead”?
- Can “it” happen again?
- What can be done about it?

Lo described attempts to shed some light on what happened by examining indirect evidence about the profitability of long/short equity strategies over the past decade and during the difficult week in August 2007. First, the authors, and Lo in his presentation, provided a disclaimer, stating that their research should be interpreted more like an evolving case study and not formal academic research since the answer to the question of what happened to the quants in August 2007 is indeed known, at least to those directly involved. However, since the authors did not have ready access to any of the primary sources, they say that it is unlikely they will ever obtain the necessary information to conduct a conclusive study of the events of August 2007. They end the disclaimer by saying that, “It is precisely this well-known lack of transparency of hedge funds, coupled with genuine intellectual curiosity and public-policy concerns regarding systemic risks in this dynamic industry that led us to undertake this effort.”

For their analysis they use individual and aggregate hedge-fund data from the TASS database and the Credit Suisse/Tremont hedge-fund indexes to develop a broader understanding of the evolution of long/short equity strategies over the past decade. As can be seen below, the returns for these strategies have declined over time.
Lo then reported on the process they used to address the questions, in a particular market neutral strategy where long positions exactly offset short positions. Lo calls this a basic mean-reversion strategy (a technique that Lo used in previous papers): buy yesterday’s losers (relative to the prior day’s market average) and sell yesterday’s winners (relative to the prior day’s market average) in proportion to the amount of yesterday’s gains/losses. It is also called a contrarian strategy and is trivial to implement. For example for $100MM of capital you hold $100MM long, $100MM short (leveraged to Regulation T’s 2:1).

To begin their analysis they simulate the performance of a specific long/short equity strategy to see if they could replicate the performance swings during the week of August 6, 2007. They then used this strategy to compare and contrast the events of August 2007 with those of August 1998, the period that included the collapse of Long-Term Capital Management.
Lo reported the degree of leverage that would have been necessary to create the outcomes shown above as 4.5 times.

He presented a table showing that the cumulative returns over the 3 days represented a loss of over 7.6 standard deviations. The reversal on Friday, August 10, was another extreme outlier at 11.4 standard deviations. This reversal, the
authors say, is a telltale sign of a liquidity trade.

Lo put further perspective on the losses by looking at August 1998. Similar data show that in September 1998 the turmoil in fixed-income markets had little or no effect on the profitability of the long/short equity strategy. In contrast to the events of August 2007, when an apparent demand for liquidity caused a fire resale liquidation observed in the contrarian strategy's daily returns, the well-documented demand for liquidity in the fixed-income arbitrage space of August 1998 had no discernible impact on the very same strategy. This is a significant difference that signals a greater degree of financial-market integration in 2007 than in 1998. It shows that crisis in one sector can have dramatic repercussions in several others.

Lo provide several possible explanations for the difference between August 1998 and August 2007:

- Fewer multi-strategy funds and proprietary-trading desks engaged in both fixed-income arbitrage and long/short equity in 1998.
- The amount of capital engaged in long/short equity strategies, particularly market-neutral statistical arbitrage strategies, was not large enough to cause any significant dislocation even if such strategies were unwound quickly in August 1998.
- Long/short equity funds did not employ as much leverage as they were apparently using in 2007.

And followed with a discussion of how each may be true to some degree.

From these empirical results, the authors reach these tentative hypotheses about August 2007:

- Losses were due to rapid and large unwinding of quant funds (market-neutral).
- Liquidation was likely forced because of fire sale prices (sub-prime?)
- Initial losses caused other funds to reduce risk and de-leverage.
- De-leveraging caused further losses across broader set of equity funds
- Friday rebound consistent with liquidity trade, not informed trade.
- Rebound was due to action in long/short, 130/30, long-only funds.

Lo reported on the conclusions from their analysis:

- Systemic risk of hedge funds is increasing
- Higher illiquidity exposure
- Lower expected-return environment
- Large asset inflows, many new managers
- Greater proportion of inexperienced investors
- Higher liquidation probabilities
- Huge financial incentives for brokers

The lessons we should take from this analysis are:

- Quant is not the issue; liquidity and credit are the issues
- Long/short equity space is more crowded now than in 1998
- Hedge funds provide more significant amounts of liquidity today
Hedge funds can withdraw liquidity suddenly, unlike banks.

Financial markets are more highly connected new betas (e.g. betas that reflect the systematic exposure to a certain kind of investment that cannot be diversified away).

In periods when there is regime shifting, the transitions can be abrupt.

As for the future, the authors develop a Doomsday Clock for the hedge-fund industry's impact on the global financial system. If it was calibrated to 5 minutes to midnight in August 1998, and 15 minutes to midnight in January 1999, then the authors’ current outlook for the state of systemic risk in the hedge-fund industry is about 11:51 pm. Lo concluded with “For the moment, markets seem to have stabilized, but the clock is ticking...”

45. High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence (Fall 2007)

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® 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.

\[ r_i = \alpha_i^L + \beta_i^L MKT^L + \delta_i^L SMB^L + \gamma_i^L HML^L + \epsilon_i^L \]

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 US 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 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.

$$r_i(t, t + 1) = c + \gamma \sigma_i(t - 1, t) + \lambda \beta_i(t, t + 1) + \lambda z_i(t) + \varepsilon_i(t + 1)$$

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.

<table>
<thead>
<tr>
<th></th>
<th>U.S.</th>
<th>Canada</th>
<th>France</th>
<th>Germany</th>
<th>Italy</th>
<th>Japan</th>
<th>U.K.</th>
</tr>
</thead>
<tbody>
<tr>
<td>g</td>
<td>-2.014</td>
<td>-1.224</td>
<td>-1.439</td>
<td>-2.003</td>
<td>-1.572</td>
<td>-1.955</td>
<td>-0.871</td>
</tr>
<tr>
<td></td>
<td>36.10%</td>
<td>25.20%</td>
<td>17.80%</td>
<td>18.50%</td>
<td>16.90%</td>
<td>16.50%</td>
<td>17.40%</td>
</tr>
<tr>
<td>Economic Effect*</td>
<td>0.73%</td>
<td>-0.31%</td>
<td>0.26%</td>
<td>-0.37%</td>
<td>-0.27%</td>
<td>-0.32%</td>
<td>-0.15%</td>
</tr>
<tr>
<td>*moving from 25th to 75th percentiles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

46. Cross Sectional Variation of Stock Returns: Liquidity and Idiosyncratic Risk (Fall 2007)

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.

47. Capital Allocation (Fall 2006)

Stewart C. Myers, Gordon Y. Billard Professor of Finance, MIT Sloan School of Management, made available by himself and Li Jin an article entitled “R² Around the World: New Theory and New Tests.” The R² referred to is the statistic associated with a regression of the returns on a firm on the returns on an index. A high R² therefore indicates high statistical significance to the beta coefficient. Put another way, a high R² indicates a high degree of market risk relative to idiosyncratic risk.

Opaqueness (inadequate disclosure) is an obvious source of a high R². It is also to be expected that protection of investor property rights would mean less reliance on
market risk by those investors, and in fact the \( R^2 \) is lower in developed countries where property rights are well protected. There is some question then as to whether the level of the \( R^2 \) is dependent on opaqueness or on protection of investors or both. An important part of the research was distinguishing between the two effects. It turns out that it is opaqueness rather than poor protection of investors that generates high \( R^2 \)s. Poor protection without opaqueness is not enough to explain the high \( R^2 \).

The assumption is that insiders will take as much of the cash flow of the firm as they are able to, subject to the ability and incentive for investors to take some action against them.

The more opaque the firm, the greater the amount of hidden firm-specific news that may arrive in a given span of time. The investors simply know little about what is going on within that firm and are poorly equipped to arrive at a sense of idiosyncratic risk. Therefore, they are forced to rely more heavily on market risk than would be the case when the firm is transparent.

While opaqueness is good news for the insiders because they can capture more cash flow when the firm-specific news is good, it is also bad news for insiders because they will capture less cash flow when the firm-specific news is bad, since they must absorb a larger portion of the loss in order not to alarm the investors unnecessarily. The amount of bad news that insiders are willing to absorb is limited, however. Insiders have an abandonment put. They can abandon the firm to investors or incur a cost to convey bad news credibly to investors. The exercise of the put releases cumulative bad news all at once and there is a crash. A crash is identified as a large negative outlier in firm-specific return. Increased opaqueness leads to a high frequency of crashes.

The theory predicts that other things equal, \( R^2 \) should be higher in countries where firms are more opaque, and crashes should be more common for firms in opaque countries.

Five proxies for opaqueness were developed. One was a measure of disclosure, one was the number of auditors per $1 billion of stock market capitalization, one was a measure of inclusion of accounting items in financial statements, one was a measure developed by others, and the fifth was a measure of the dispersion of analysts’ earnings forecasts.

In concept, the model is one in which insiders will take as much cash as possible out of the firm up to the point where further capture will jeopardize their right to manage the firm. Outsiders may decide to take over, in a costly collective action. The net benefit will be less than the intrinsic value of the firm. The greater investor protection conditions, the closer the benefit will be to the intrinsic value.

Measuring \( R^2 \) involves fitting the market model for each stock in each year. The model is:

\[
r_{it} = \alpha_i + \beta_{1i}r_{mt} + \beta_{2i}r_{us,ti} + \text{error}
\]

Weekly data are used and a correction for non-synchronous trading involves two leads and lags for \( r_m \) and \( r_{us} \). \( R^2 \)s are averaged within each country and year, using equal weights or variance weights. Two methods are used to determine crash frequency. COUNT is the number of residual returns exceeding \( k \) standard deviations above and
below the mean. COLLAR means determining the profit or loss from buying a deep out-of-the-money put on the residual return and selling an out-of-the-money call on the residual return.

It turned out that over the period 1990-2002 there was a fairly steady decline in the values of $R^2$ for the thirty countries for which data were available. It also turned out that crash frequency predicts $R^2$. High crash frequency by both measures predicted high $R^2$ with high statistical significance.

Moving to how well the proxies explained $R^2$ and crash frequency, Myers was able to show from regression analysis that the coefficients on the proxies all had the correct sign and that the t-statistics were satisfactory.

In conclusion, opaqueness, not investor protection, determines the $R^2$. And opaqueness is correlated with more crashes.

48. **Roughing it up: Including Jump Components in the Measurement, Modeling and Forecasting of Return Volatility (Spring 2006)**

Francis X. Diebold, W.P. Carey Professor of Economics, School of Arts and Sciences, University of Pennsylvania, made available a paper by himself, Torben G. Andersen, Tim Bollerslev entitled: “Roughing It Up: Including Jump Components in the Measurement, Modeling and Forecasting of Return Volatility.”

Diebold began by reviewing important advances in volatility measurement and modeling, pointing out that all of them were inadequate for purposes of volatility forecasting. An important improvement lay in the separation of jump and diffusive movements as components of total volatility. The answer to the question why should we care about this separation, was improved understanding of the price discovery process, and improved forecasts of realized volatility for asset pricing, asset allocation, and risk management.

He introduced his work stating “we seek to further advance the non-parametric realized volatility approach through the development of a practical non-parametric procedure for separately measuring the continuous sample path variation and the discontinuous jump part of the quadratic variation process. The approach builds directly on the new theoretical results involving so-called bi-power variation measures constructed from the summation of appropriately scaled cross-products of adjacent high frequency absolute returns. The result is to shed new light on the dynamics and comparative magnitudes of jumps across three different markets: the DM/$ foreign exchange market, the S&P 500 market index, and the 30-year US Treasury yield. The authors’ new HAR-RV-VJ forecasting model incorporating jumps builds directly on a heterogeneous AR model for the realized volatility, or the HAR-RV model in which the realized volatility is parameterized as a linear function of the lagged realized volatilities over different horizons.”

Diebold presented results for the three markets. The DM/$ volatilities range from December 1986 through June 1999, for a total of 3,045 daily observations. The underlying high-frequency spot quotations were kindly provided by Olsen & Associates in Zurich, Switzerland. The S&P 500 volatility measurements are based on tick-by-tick transactions prices from the
Chicago Mercantile Exchange (CME) augmented with overnight prices from the GLOBEX automated trade execution system, from January 1990 through December 2002. The T-bond volatilities are similarly constructed from tick-by-tick transaction prices for the 30-year US Treasury Bond futures contract traded on the Chicago Board of Trade (CBOT), again from January 1990 through December 2005. After removing holidays and other inactive trading days, they have a total of 3,213 observations for each of the two futures markets. He showed the results in panels, displaying from December 1986 through June 1999 a plot of daily realized volatility, the daily jump component of the volatility and the statistically significant jumps.

The next step was forecasting. The authors relied on the simple-to-estimate HAR-RV class of volatility models. The HAR-RV formulation is based on a straightforward extension of the so-called heterogeneous ARCH, or HARCH class of models in which the conditional variance of the discrete sample returns is parameterized as a linear function of the lagged squared returns over the identical return horizon together with the squared returns over longer and/or shorter return horizons. The model, for daily, weekly and monthly volatilities is represented by:

$$RV_{t+1} = \beta_0 + \beta_D RV_t + \beta_W RV_{t-5,t} + \beta_M RV_{t-22,t} + \beta_J J_t + \varepsilon_{t+1}$$

The estimates for $\beta_D$, $\beta_W$, and $\beta_M$ confirm the existence of highly persistent volatility dependence. Interestingly, the relative importance of the daily volatility component decreases from the daily to the weekly to the monthly regressions, whereas the monthly volatility component tends to be relatively more important for the longer-run monthly regressions. Importantly, the estimates of the jump component, $\beta_J$, are systematically negative across all models and markets and with few exceptions, overwhelmingly significant. Thus, whereas the realized volatilities are generally highly persistent, the impact of the lagged realized volatility is significantly reduced by the jump component.

Comparing jump intensities across the three markets studied, the foreign exchange and the T-Bond markets generally exhibited the highest proportion of jumps, whereas the stock market had the lowest. Intuitively, just as the stock market crash of 1987 and the correspondingly large negative daily return on October 17 is not visible in the time series of annual equity returns, many of the jumps identified by the high-frequency based realized variation measures employed here will invariably be hidden in the coarser daily or lower frequency returns.

In concluding, the authors commented that they provide a simple and easy-to-implement practical framework for
measuring “significant” jumps in financial asset prices. Applying the theory to more than a decade of high-frequency prices from the foreign exchange, equity, and fixed income markets, they find that the procedure works well empirically. The non-parametric measurements suggest that jump dynamics are much less persistent (and predictable) than continuous sample path dynamics. In addition, the high-frequency data underlying the estimates allow identification of many more jumps than do the parametric models based on daily, or coarser frequency data hitherto reported in the literature. It also appears that many of the most significant jumps are readily associated with specific macroeconomic news announcements. Finally, when separately including the continuous sample path and jump variability measures in a simple linear volatility forecasting model, they find that only the continuous part has predictive power, in turn resulting in significant gains relative to the simple realized volatility forecasting models advocated in some of the recent literature.

The ideas and empirical results presented are suggestive of several interesting extensions. First, it seems natural that jump risk may be priced differently from easier-to-hedge continuous price variability. Hence separately modeling and forecasting the continuous sample path, or integrated volatility, and jump components of the quadratic variation process, is likely to result in important improvements in derivatives and other pricing decisions.

Economics

49. The Next 100 Years: A Forecast for the 21st Century (Fall 2010)

The Monday dinner speaker, Dr. George Friedman, Chairman, Strategic Forecasting, Inc., spoke about what we could expect in the next 100 years.

Friedman started with a startling perspective on war. He said that even though we regard war as a rare and unpredictable event, for 11% of the 19th century the United States was at war. In the 20th century there was an increase to 17%. Furthermore, for only 10% of the 21st century have we been at peace. Patterns exist and he predicts the next war for the US will occur about 2030.

The role of war is, for Friedman, quite clear. War changes the power structure: it was not FDR that ended the Great Depression but WWII, and the only country to profit from the war was the United States. For the last century, Friedman says, the US has been smashing itself into the world. Now, for the first time in 500 years, no European country is a world power. The only deep power, military, economic, etc., is the US.

As for the whether the US is in a precarious situation due to its current debt levels, as many believe, what we forget is that size matters, and the US is large, and is in control of world trade, which the US has through its Navy. Relative to China, the US has a Navy to which the Chinese aspire, and the US can enforce its will, which it has no current interest in doing. Friedman says that currently the US exerts negative control
globally. Furthermore China is hostage to its customers in the US: China has 1.3 billion people, and 400 million households earn less that $2 per day and an additional 600 million household earn between $2 - $5 per day. Thus, Friedman says, the Virtuous Circle is not working in China.

Friedman then says that children are the new ultimate sign of conspicuous consumption. Age for first children is rising and as countries evolve, the birth rate, as children are no longer needed in the agricultural sector, drops to replacement or lower. This exerts significant pressure on countries: in Europe the system is challenged to create more workers, consumers, soldiers, and people.

Beyond the obvious, the problem with declining populations is not clear. What, Friedman asks, happens to land prices and the labor/capital relationship? Will capital chasing labor replace the historic norm? As the population declines, longevity is increasing, partly due now and in the future to increased disease management. Longer years spent in education (about 23 years) and increased longevity result in more of a lifetime being spent as a consumer rather than producer: retirement at 65 was fine, Friedman says, when life expectancy was 62. As for substituting immigration for a higher birth rate, that may be a solution, but most US immigration comes from a country that shares a border, thus bringing political questions into the equation.

As patterns change, more resources will be needed particularly as we substitute increasing technology for decreasing labor. This brings Friedman to the question of energy resources. He asserts that we need a long term solution, and among other things suggests the use of space captured solar power as a possible and even likely solution: twenty-four hours a day of sunlight, matched with increased technology, some of which is either available or being developed. This brings Friedman to the conclusion that the US is in the best position to fill this need with its current position and vast resources. But we are not, Friedman cautions, the only country or company that would like to control space.

50. Are Stocks Less Volatile in the Long Run? (Spring 2010)

Robert F. Stambaugh, Miller Anderson & Sherrerd Professor of Finance, Professor of Finance and Economics, The Wharton School, University of Pennsylvania, presented “Are Stocks Really Less Volatile in the Long Run?” coauthored with Lubos Pastor, University of Chicago, NBER, and CEPR.

Stambaugh began his presentation with a restatement of the widely accepted conventional wisdom that stocks are less volatile over long investment horizons due to mean reversion induced by return predictability. His research, he said, shows something quite different: stock return variance increases over long investment horizons and that the effect of mean reversion is more than offset by the combined effects of various uncertainties faced by an investor who does not know the parameters and to whom the observable predictors imperfectly deliver the conditional expected return. It is this recognition by the investor that is critical to this analysis.

In contrast with the random walk and conventional-wisdom notions of risk over time, their research found that stocks are actually more volatile over long investment horizons and that the effect of mean reversion is more than offset by the combined effects of various uncertainties faced by an investor who does not know the parameters and to whom the observable predictors imperfectly deliver the conditional expected return. It is this recognition by the investor that is critical to this analysis.
Stambaugh first laid out the conventional wisdom showing the variance ($\sigma^2$) of return ($r$) over a large number of periods ($k$), and said this formulation is one that seems consistent with previous empirical estimates:

$$\frac{\text{Var}(r_{T,kT})}{k} < \sigma^2$$

He noted that while previous work by others ignored parameter uncertainty and assumed perfect predictions, in their research predictive variance incorporates parameter uncertainty ($\phi$) thus allowing for imperfect predictors as shown in their formulation below:

$$\text{Var}(r_{T,kT}|D_T) = E \left\{ \text{Var}(r_{T,kT}|\phi, D_T) \ | D_T \right\} + \text{Var} \left\{ E(r_{T,kT}|\phi, D_T) \ | D_T \right\}$$

Stambaugh says the true variance is relevant only to investors who know true parameters, and quoting Voltaire (1767), says “Doubt is not pleasant, but certainty is absurd.” To rectify this problem, their formulation decomposes the variance into the conditional variance, related to mean reversion, and the component due to uncertainty of expected returns. Stambaugh shows this decomposition graphically. The reformulation included five sources of variance over time and allowed the authors to specify a process for the unobservable expected returns in order to estimate the conditional expected stock return when the predictors are imperfect.

$\text{Var}(r_{T,kT}|D_T) = E \left\{ k\sigma^2 \right\} \ | D_T + E \left\{ 2k\sigma^2 \rho \rho \sigma A(k) \ | D_T \right\} + E \left\{ k\sigma^2 \beta^2 B(k) \ | D_T \right\}$

Using data from 206 years of continuously compounded real returns on the aggregate US equity market (1802–2007) and three predictors, dividend yield, term spread, and “bond yield” (first difference in high grade yield), they came to two conclusions. First, that long-run predictive variance of stock returns is greater than short-run variance and is robust to various sample and specification changes. Second, there is substantially higher predictive variance when predictors are imperfect, although it is tougher to learn about parameters when predictors are imperfect. In addition, they found that mean reversion is strong but more than offset by the other components as can be seen in the following charts:
He discussed the consequences of relying on imperfect predictors and stated that their main empirical result is that long-run predictive variance of stock returns is greater than short-run variance and is robust to various sample and specification changes. Stambaugh then summarized, saying the following:

1. Stocks are more volatile in the long run, as perceived by investors who realize:
   - Predictors are imperfect
   - Parameters are uncertain
2. Long-horizon predictive variance has five components:
   - i.i.d. uncertainty
   - Mean reversion
   - Uncertainty about future expected returns
   - Uncertainty about current expected return
   - Estimation risk

3. Mean reversion is strong but more than offset by the other components.

4. Parameter uncertainty makes target-date funds undesirable to a class of investors who would otherwise find them appealing.

51. McWages (Fall 2008)

The Monday dinner speaker, Orley Ashenfelter, Joseph Douglas Green, 1895 Professor of Economics, and Director of the Industrial Relations Section at the Woodrow Wilson School of Public and International Affairs, Princeton University, presented research on labor wage rates around the world, from studies made in 2000 and in 2007.

He used McDonalds Co. as his data source for two reasons. First, McDonalds operates in 140 countries and maintains virtually identical operations at every restaurant, and second, the employees perform identical functions. In addition, wage data were accessible. He also pointed to McDonalds University, the company’s training center, and the manual of operations that is used to maintain the operation and quality of all operations, including the restaurants. He noted that McDonald’s is rigid with regard to its operation rules.

He described the wages paid in McDonalds restaurants in various developed and developing countries and expressed these hourly wages in US dollars and in Big Macs in 2000 and 2007.

He provided information on wage gaps and price gaps from country to country. The Big Mac price gap (high to low) was 3-4 to 1. The corresponding wage gap from country to country was 27 to 1 worldwide.

While there is much room to close the wage gap, the change from 2000 to 2007 had been incredible in some countries. For example he noted that Chinese wages had risen by 92%, Indian by 67% and Russian 360%. Latin American countries did not have the same improvement, with Brazil and Venezuela having negative growth rates. The tables below provide some details.

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
<th>Minimum Wage</th>
<th>Big Mac/Hourly Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>$3.00</td>
<td>$7.00</td>
<td>2.4</td>
</tr>
<tr>
<td>China</td>
<td>$1.40</td>
<td>$0.81</td>
<td>0.6</td>
</tr>
<tr>
<td>India</td>
<td>$1.30</td>
<td>$0.46</td>
<td>0.4</td>
</tr>
<tr>
<td>Russia</td>
<td>$2.00</td>
<td>$2.30</td>
<td>1.2</td>
</tr>
<tr>
<td>Belgium</td>
<td>$4.50</td>
<td>$12.35</td>
<td>2.7</td>
</tr>
<tr>
<td>Europe</td>
<td>$4.50</td>
<td>$9-13</td>
<td>2.3</td>
</tr>
</tbody>
</table>

The last 10 years, Ashenfelter concluded, saw the greatest reduction in wage inequality in world history. Further, he said that the lower half is growing much faster than those with the top wages. He sees great future gains in China and India.

52. Sinking Globalization: What Could Go Wrong? (Fall 2006)

Niall Ferguson, Laurence A. Tisch Professor of History, Harvard University, suggested that the participants of the seminar might learn a lot from historical
events so far enough back in time that they preceded the working lives of those participants.

He began by observing that the forty-year history of the Q-Group® will approximate the years of work experience for a number of participants and he went on to discuss the importance of that work experience in shaping expectations. Some anecdotes about important historical individuals in the history of finance illustrated how important even a single event may be to the way in which such a person conducts the rest of his or her professional life. We are vulnerable then to personal experience and especially vulnerable if we limit our knowledge to that experience.

He turned to the specific topic of his presentation, which was globalization. We may think of globalization, and the opposition and threats that it has created, as a new phenomenon. But Ferguson pointed out that globalization was characteristic of a large part of the world economy from 1880 to the start of the First World War. During that period free trade was the rule, capitalism was dominant, international capital flows were significant, and there was significant migration of workers. It is true that exchange rates were largely fixed and established by a gold standard, but there was also deflation and then inflation. Short interest rates were quite volatile, although long rates were stable. The introduction of savings banks had brought short-term interest rates quite low by 1910. Then what happened in 1914?

World War I came as a huge surprise to the investment community. Liquidity disappeared in a matter of days. Stock markets around the world closed down. What went wrong?

Globalization itself had something to do with the causes of the war. Globalization generated a cultural and political backlash. There was a strong element of populism here. And Ferguson referred to a failure of the British hegemony. The beginning of the war featured strong anti-Western feelings, the rise of Bolshevism, terrorist attacks, and great power rivalry. It all has a somewhat familiar sound. He posed the question: Can we learn in time to avoid repeating the catastrophe of 1914?

53. Capital Ideas: Out of This World Or In The Thick of It? (Fall 2006)

Peter L. Bernstein, President, Peter L. Bernstein, Inc., answered his question in a presentation derived largely from a forthcoming book. He began by paying tribute to a dozen names that have revolutionized the world of finance and investing. These are Markowitz, Tobin, Sharpe, Treynor, Samuelson, Fama, Modigliani and Miller, Black-Scholes and Merton. And he linked the names in a progression of innovations by which each person on the list tended to provoke another into further innovation. In addition to tracking theoretical developments in the past years, he also discussed the practical application making these capital ideas useful. The names Wells Fargo Bank, Barr Rosenberg, Andrew Rudd, and Hayne Leyland came up as important in finding practical applications. Bernstein observed that risk management was at the heart of these significant applications. Further, risk management has always been at the heart of the theory of finance. Capitalism is a gigantic form of game theory in which none of us can arrive at a decision without considering the responses of other players. All the variation, all the volatility, all the surprises are the outcome of human
decisions. Communication is a critical element in the game. The more rapid and sophisticated the system of communication becomes, the more intense the game becomes.

Bernstein could not find any new theory today to compare in importance with those he explored over fifteen years ago. On the other hand, practical applications derived from these theories are everywhere, from sophisticated applications of mean/variance to techniques designed to separate beta risks from alpha risks – to say nothing of the bewildering complexity of new products in the derivative markets and the dominance of those markets over many aspects of investment decision making. Capital ideas are being reshaped by researchers and practitioners through an intricate combination of advanced technology and an endlessly varying institutional environment.

Why do we have the institutions we have and why do we organize as we have organized? Bob Merton’s central argument, derived from sociological analysis, is that institutions are endogenous—developed within the system in response to needs, to anomalies and to dysfunctional aberrations.

Bernstein refers to a particularly odd paradox between theoretical concepts and real world practice. Repeated empirical tests of the original Sharpe-Teynor-Lintner-Mossin CAPM dating all the back to the 1960s, have failed to demonstrate that the theoretical model works in practice. Yet startling insights gained from CAPM still have great significance. Alpha management is one of the legacies.

The important theories generally assumed investor rationality. Yet few have argued that all investors actually behave rationally. Bernstein quotes Alfred Marshall, the great Victorian economist, who opened his Principles of Economics with these words “Economics…examines that part of individual and social action which is most closely connected with the attainment and with the use of the material requisites of wellbeing. Thus it is on the one side a study of wealth; and, on the other, and more important side, a part of the study of man.” Bernstein quotes Daniel Kahneman as saying “The failure in the rational [i.e. Marshall’s] model is…in the human brain it requires. Who could design a brain that could perform in the way this model mandates? Every single one of us would have to know and understand everything, completely, and at once.”

With many vivid examples, Behavioral Finance has demonstrated that consistently correct decision-making under uncertainty is an impossible task. But Behavioral Finance has also made another significant contribution of great importance. Steve Ross sensed what Bernstein was referring to when he said “Neoclassical theory is a theory of sharks, not a theory of rational homo economicus.” The scholars of Behavioral Finance are providing a vital service for the rest of us and especially for the sharks.

Charles Darwin described how species adapt their biology as their environment shifts. Andrew Lo finds a parallel process of evolution and change at work in the capital markets. He calls this notion the Adaptive Market Hypothesis. But evolution has a quality of inevitability—species will change and develop as a result of forces beyond their control. Unlike natural phenomena, the development of human institutions is contingent on the goals or purposes that motivated their
establishment in the first place. Institutions are a result of trial and error where perfection is impossible but something less than perfect can often suffice. Institutions change as a result of purposeful decisions by the human beings who make use of them, but institutions also change in response to the forces of evolution.

With the passage of time Bernstein expects capital ideas to become increasingly involved in the capital markets and investment management, in new ways as yet unknown. The driving force for this process will come from institutional change, as Lo has hypothesized. Or, perhaps more aggressively, from Steve Ross’ sharks. Yet, the theoretical innovations at the heart of all of the developments remain the most powerful part of the story. Innovation is always exciting, but influential innovations in theory in any field are rare. Theoretical innovations in finance did not even exist before 1952. The little group of a dozen men have left us a heritage whose value we cannot even begin to calibrate.

54. Will The Phillips Curve Cause World War III? (Fall 2006)

Jack L. Treynor, President, Treynor Capital Management, Inc. made available a paper entitled “Will the Phillips Curve Cause World War III?”

At the seminar in the Fall of 2002, Treynor had presented “A Theory of Inflation”, later published in the Journal of Investment Management. At the current seminar he carried his theory forward. His paper began with a simple observation: In industry, labor and capital—workers and machines—are complements, not substitutes. Our textbooks are surely right that various proportions of land and farm labor can produce the same output. But in industry the proportions are fixed for each kind of machine.

How many workers does it take to man a rolling mill, an oil refinery, a fossil-fuel electric generating plant? Adding workers beyond the required number won’t increase the output of such plants.

When a country’s demand level fluctuates, workers and machines get more and less scarce together. The effects of the two scarcities on inflation are confounded. When, on the other hand, a country’s labor force shrinks, causing labor to become more scarce, machines become less scarce.

The first point means that it is hard for central bankers to deduce from the history of demand fluctuations which scarcity is causing inflation. The second point means that when a country’s labor force is shrinking, it’s critical for its central bankers to know whether inflation is caused by a scarcity or workers or a scarcity of machines. If the former, it should tighten; if the latter, it should ease.

The experience of the US in the 1930s shows us the result of a failure to follow Treynor’s advice. Based on the Consumer Price Index, the US inflation rate was negative from 1926 on. But judging from the rates on bankers’ acceptances, the Fed made no adjustment in velocity, hence in its nominal rate. The result was real short interest rates averaging around 5% for four consecutive years. When demand finally collapsed, the CPI fell about 25% between 1929 and 1933 (Dornbusch and Fisher). The Fed completely lost control of the real rate, which was never less than 9% in that period. Today, no central bank would knowingly steer its economy into negative inflation rates.
The experience of Japan in the 1990s is also instructive. Japan was the first major country to have a shrinking labor force. As it shrank, machines became more plentiful. As the least efficient machines were retired, the labor productivity of the marginal machine, hence the real wage, rose. With the money wage fixed by negotiation, money prices fell. Between 1990 and 2001, Japan’s CPI inflation rate fell almost 400 basis points. Its central bankers went with the Phillips curve and expected inflation. Accordingly they raised their overnight rate 400 basis points. By the time they could reverse their policy, it was too late. The result was a classic liquidity trap, with negative inflation rates. Even though the central bankers retained control of the nominal overnight rate (which reflects the scarcity of money), they lost control of the real rate. Unless central bankers learn the proper lesson from the Japanese experience, they will make the same mistake when confronted with Japan’s circumstance.

Turning to the matter of shrinking workforces in Europe, the Japanese experience suggests that when your labor force is shrinking you cannot rely on the Phillips curve. The problem today is European fertility rates, which are now far below the 2.1 rate necessary to maintain the current size of their populations. When the first of the small cohorts grow up and reach the workforce, it too will begin to shrink. Treynor showed that workforces in the major countries have already leveled off, and he raised the question will European central bankers repeat Japan’s mistake?

A workforce begins to shrink when there are fewer young people entering the workforce than old people leaving. Perhaps a reasonable age to focus on is high-school graduation – the cohort aged 15 to 19. For the major European countries we can see that the drop in fertility rates has affected the people already in the workforce only slightly. But the drop is quite noticeable in the 15 or 16 year olds, and substantial in the younger cohorts. The timing seems to be different for different countries, as Treynor demonstrated. He noted that for Canada the first year of the lower fertility rate was 1990. The babies born in 1990 won’t begin to reach the Canadian labor force until 2008.

Liquidity traps are aptly named, because they are hard to get out of. Central bankers can learn from Japan’s experience, but how fast? Speed is more important for Europe than it was for Japan. Japan extricated itself by devaluing the yen against its important trading partners. But the major European countries won’t be able to devalue against each other. And neither Japan nor the US can afford to oblige the Europeans by increasing the value of its currency – Japan because its inflation rates is already too low, and the US because its trade deficit is already too high.

Historians are in wide agreement that World War II was instrumental in restoring prosperity. At the end of the Depression decade one in seven workers remained unemployed. By war’s end, unemployment was negligible.

Treynor concluded that if labor and capital are substitutes, then a scarcity of labor will also mean a scarcity of capital. But if they are complements, then a scarcity of one results in a surplus of the other. In particular, a shrinking workforce results in a surplus of machines. Should the central banker ease or tighten? It is critical to know which scarcity is causing the inflation.
Harry Markowitz

55. The “Harry Markowitz Effect,” 50 Years Later and Still Counting
(Fall 2009)

Preceding the customary banquet on Monday night of the Seminar, Martin L. Leibowitz, Institute Fellow and Managing Director, Morgan Stanley & Co. Incorporated, called on five long-serving delegates and special guests to offer their thoughts on the “Harry Markowitz Effect” in a celebration of his life and work. Former students, friends and colleagues, Rob Arnott, Research Affiliates, Bruce Jacobs, Jacobs Levy Equity Management, Haim Levy, The Hebrew University of Jerusalem, Bill Sharpe Stanford University, and Bernie Tew, NYLIM Q.E.D. Investments, told stories of Harry’s professional accomplishments, especially in portfolio theory, and his work with students. In a more personal vein they described his help and support of their own work, and each noting a personal appreciation of his extraordinary capacity for friendship. The importance of his wife Barbara, both to them and to Harry, was not forgotten.

In a gracious response, Harry returned the compliments in a manner that showed what a true giant among his colleagues he has been in all his undertakings.

Liquidity

56. Liquidity and Corporate Bonds
(Fall 2008)

Jiang Wang, Mizuho Financial Group Professor MIT Sloan School of Management, presented “Liquidity of Corporate Bonds,” he coauthored with Jack Bao and Jun Pan of MIT.

In his introduction, Wang describes the motivation behind the study: many studies have attributed deviations from the theoretical values of corporate bond prices to the influence of illiquidity in the market. However, since quantifying liquidity is difficult, a serious examination of the asset-pricing influence of illiquidity and its implications on market efficiency is, Wang says, “compromised.”

He described a new measure of illiquidity based on the magnitude of transitory price movements. Using their measure, the authors find they can explain the cross-sectional variation in average bond yield spreads with large economic significance. Particularly interesting is the fact that they find a strong commonality in the time variation of bond illiquidity that rises sharply during market crises and reached an all-time high during the recent sub-prime mortgage crisis.

To measure illiquidity, Wang points to a salient feature of illiquidity – it gives rise to transitory components in prices, the magnitude of which reflect the degree of illiquidity in the market. These transitory price movements lead to negatively serially correlated price changes, and the negative of the auto covariance in price changes, \( \gamma \), provides, a simple, yet robust, measure of illiquidity, one that captures the impact of illiquidity on prices, beyond that of the effect of the traditional bid-ask bounce measure. Moreover, it does so without relying on specific bond pricing models.

Wang introduced the model they use for their analysis. Two properties of illiquidity are clear: it arises from market frictions, and its impact to the market is
transitory. They assume that the price of a bond depends upon its fundamental value, $F_t$, and the friction from illiquidity, $u_t$.

$$P_t = F_t + u_t$$

Their model extracts the transitory component, $\gamma$, in the observed price $P_t$, assuming that the fundamental component $F_t$ follows a random walk, $\gamma$ depends only on the transitory component $u_t$ and it increases with the magnitude of $u_t$.

$$\gamma = -\text{Cov} [\Delta P_t, \Delta P_{t+1}]$$

Wang describes some limitations: other than its transitory nature, we know little about the dynamics of $u_t$; in measuring illiquidity other aspects of $u_t$ that are not fully captured by $\gamma$ may also matter; $\gamma$ will depend on the horizon over which price changes are measured. For most of their analysis they use either trade-by-trade or end of the day prices that, they posit, capture the high frequency components in transitory price movements.

Wang and his coauthors use TRACE, transaction-level dataset, a broad cross-section of the most liquid corporate bonds in the US market, to measure the negative of the auto covariance in price changes. Their sample of 1,249 bonds contains large, investment grade bonds with an average maturity close to 7 years, from April 2003 to December 2007. The sample bonds are more frequently traded than a typical bond and, over the time studied there is a gradual reduction in maturity and an increase in age. In addition to the TRACE data, they use CRSP for stock returns, FISD for bond-level information, Bloomberg to collect the quoted bid-ask, data for the Lehman Bond indices for aggregate corporate bond market returns and bid-ask spreads. To calculate yield spreads for individual corporate bonds, data for Treasury bonds and the VIX are used.

### Table 2. Measure of Illiquidity $\gamma = -\text{Cov}(P_t - P_{t-1}, P_{t+1} - P_t)$

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>Full</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Using trade-by-trade data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean $\gamma$</td>
<td>0.6546</td>
<td>0.6714</td>
<td>0.5717</td>
<td>0.4677</td>
<td>0.4976</td>
<td>0.5814</td>
</tr>
<tr>
<td>Median $\gamma$</td>
<td>0.4520</td>
<td>0.3928</td>
<td>0.3170</td>
<td>0.2588</td>
<td>0.2830</td>
<td>0.3598</td>
</tr>
<tr>
<td>Per t-stat $\geq1.96$</td>
<td>99.74</td>
<td>97.53</td>
<td>99.31</td>
<td>98.69</td>
<td>97.45</td>
<td>100.00</td>
</tr>
<tr>
<td>Robust t-stat</td>
<td>16.87</td>
<td>16.01</td>
<td>19.10</td>
<td>20.56</td>
<td>19.51</td>
<td>22.23</td>
</tr>
<tr>
<td><strong>Using daily data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean $\gamma$</td>
<td>1.0201</td>
<td>0.9842</td>
<td>0.9047</td>
<td>0.7618</td>
<td>0.9222</td>
<td>0.9080</td>
</tr>
<tr>
<td>Median $\gamma$</td>
<td>0.6949</td>
<td>0.5328</td>
<td>0.4558</td>
<td>0.4149</td>
<td>0.5590</td>
<td>0.5533</td>
</tr>
<tr>
<td>Per t-stat $\geq1.96$</td>
<td>95.35</td>
<td>90.64</td>
<td>96.04</td>
<td>95.50</td>
<td>92.63</td>
<td>99.36</td>
</tr>
<tr>
<td>Robust t-stat</td>
<td>22.03</td>
<td>17.22</td>
<td>26.81</td>
<td>26.13</td>
<td>24.92</td>
<td>29.13</td>
</tr>
<tr>
<td><strong>Implied by quoted bid-ask spreads</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean $\gamma$</td>
<td>0.0455</td>
<td>0.0409</td>
<td>0.0499</td>
<td>0.0501</td>
<td>0.0510</td>
<td>0.0458</td>
</tr>
<tr>
<td>Median $\gamma$</td>
<td>0.0370</td>
<td>0.0299</td>
<td>0.0272</td>
<td>0.0237</td>
<td>0.0268</td>
<td>0.0302</td>
</tr>
</tbody>
</table>
The illiquidity measure is important both economically and statistically.

Wang’s results show that the lack of liquidity in the corporate bond market is substantial, significantly more severe than what can be explained by bid-ask bounce, and closely related to bond characteristics that are known to be linked to liquidity:

Bond Characteristics related to illiquidity:
- Age (+)
- Time to maturity (+)
- Issuance size (-)
- Rating (+)

Factor loadings
-Stock index
-Corporate bond index

- Residual volatility
- Firm specific
- Bond specific (+)

- Turnover (-)

- Trade size (-)

- No. of trades

- Quoted bid-ask implied $\gamma$ (+)

- CDS dummy

And vary considerably over time as shown in the following chart:
<table>
<thead>
<tr>
<th></th>
<th>Cons</th>
<th>Age</th>
<th>Maturity</th>
<th>In (Issuance)</th>
<th>Rating</th>
<th>beta (stock)</th>
<th>beta (bond)</th>
<th>sig (e)</th>
<th>sig (e_firm)</th>
<th>sig (e_firm_res)</th>
<th>Turnover</th>
<th>In (Trd Size)</th>
<th>In (#Trades)</th>
<th>Quoted BA γ</th>
<th>CDS Dummy</th>
<th>R-sq (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.8795</td>
<td>0.0726</td>
<td>0.0708</td>
<td>-0.1951</td>
<td>0.0415</td>
<td>0.4389</td>
<td>-0.0237</td>
<td>0.4730</td>
<td>-0.0357</td>
<td>0.6570</td>
<td>-0.0165</td>
<td>-0.2350</td>
<td>0.0571</td>
<td>2.0868</td>
<td>-0.0456</td>
<td>49.11</td>
</tr>
<tr>
<td></td>
<td>[21.93]</td>
<td>[4.37]</td>
<td>[11.05]</td>
<td>[-5.87]</td>
<td>[8.05]</td>
<td>[4.34]</td>
<td>[-0.90]</td>
<td>[4.37]</td>
<td>[-0.42]</td>
<td>[11.31]</td>
<td>[-2.60]</td>
<td>[-10.15]</td>
<td>[1.66]</td>
<td>[2.61]</td>
<td>[-1.90]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.8775</td>
<td>0.523</td>
<td>0.0424</td>
<td>-0.1373</td>
<td>0.0164</td>
<td>0.1536</td>
<td>0.351</td>
<td>0.4581</td>
<td>-0.0357</td>
<td>0.6570</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[23.28]</td>
<td>[6.18]</td>
<td>[19.59]</td>
<td>[-3.23]</td>
<td>[3.95]</td>
<td>[0.70]</td>
<td>[0.69]</td>
<td>[4.04]</td>
<td>[-0.42]</td>
<td>[11.31]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.8671</td>
<td>0.0517</td>
<td>0.0401</td>
<td>-0.1294</td>
<td>0.0105</td>
<td>0.24</td>
<td>0.0307</td>
<td>0.4120</td>
<td>-0.0357</td>
<td>0.6570</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[14.97]</td>
<td>[4.24]</td>
<td>[3.12]</td>
<td>[-5.31]</td>
<td>[1.58]</td>
<td>[1.13]</td>
<td>[0.59]</td>
<td>[3.82]</td>
<td>[-0.42]</td>
<td>[11.31]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.8763</td>
<td>0.0464</td>
<td>0.0461</td>
<td>-0.1368</td>
<td>0.0232</td>
<td>0.1536</td>
<td>0.351</td>
<td>0.4397</td>
<td>-0.0357</td>
<td>0.6570</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[23.03]</td>
<td>[4.97]</td>
<td>[11.04]</td>
<td>[-3.57]</td>
<td>[3.03]</td>
<td>[0.70]</td>
<td>[0.69]</td>
<td>[3.79]</td>
<td>[-0.42]</td>
<td>[11.31]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.8830</td>
<td>0.0326</td>
<td>0.0481</td>
<td>-0.0257</td>
<td>0.0314</td>
<td>0.24</td>
<td>0.0307</td>
<td></td>
<td>-0.0165</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[22.83]</td>
<td>[3.95]</td>
<td>[10.96]</td>
<td>[-1.05]</td>
<td>[3.35]</td>
<td>[1.13]</td>
<td>[0.59]</td>
<td></td>
<td>[-2.60]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.8766</td>
<td>0.0571</td>
<td>0.0450</td>
<td>-0.1551</td>
<td>0.0190</td>
<td>0.1536</td>
<td>0.351</td>
<td></td>
<td>-0.2350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[22.66]</td>
<td>[5.98]</td>
<td>[9.80]</td>
<td>[-3.81]</td>
<td>[2.40]</td>
<td>[0.70]</td>
<td>[0.69]</td>
<td></td>
<td>[-10.15]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.8948</td>
<td>0.0722</td>
<td>0.0651</td>
<td>-0.2129</td>
<td>0.0403</td>
<td>0.24</td>
<td>0.0307</td>
<td></td>
<td></td>
<td>-0.0456</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[17.42]</td>
<td>[3.44]</td>
<td>[13.45]</td>
<td>[-6.12]</td>
<td>[2.77]</td>
<td>[1.13]</td>
<td>[0.59]</td>
<td></td>
<td>[-7.87]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.9271</td>
<td>0.0719</td>
<td>0.0688</td>
<td>-0.2340</td>
<td>0.0537</td>
<td>0.24</td>
<td>0.0307</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[25.12]</td>
<td>[3.64]</td>
<td>[17.36]</td>
<td>[-7.87]</td>
<td>[6.82]</td>
<td>[1.13]</td>
<td>[0.59]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Yearly Fama-MacBeth regression with $\gamma$ as the dependent variable. T-stats are reported in square brackets using Fama-MacBeth standard errors with serial correlations corrected using Newey-West. *Issuance* is the bond’s amount outstanding in millions of dollars. *Rating* is a numerical translation of Moody’s rating: 1=Aaa, and 21=C. *Maturity* is the bond’s time to maturity in years. *Turnover* is the bond’s monthly trading volume as a percentage of its issuance. *Trd Size* is the average trade size of the bond in thousands of dollars of face value. *#Trades* is the bond’s total number of trades in a month. *beta(stock)* and *beta(bond)* are obtained by regressing weekly bond returns on weekly returns on the CRSP value-weighted index and the Lehman US bond index, and *sig(e)* is the standard deviation of the residual. For firms with more than 10 bonds, *sig(e)* is further decomposed into a firm-level *sig(e_firm)* and the residual *sig(e_firm_res)*. *Quoted BA $\gamma$* is the $\gamma$ implied by the quoted bid-ask spreads. *CDS Dummy* is 1 if the bond has credit default swaps traded on its issuer.
In assessing the chart, Wang notes that $\gamma$ increased drastically during the two periods of credit market turmoil, indicating that bond market illiquidity varies over time and with changing conditions of the market. He links changes to specific market events, such as April/May 2005 when $\gamma$ rose coincident with the downgrade of Ford and GM debt to junk status.

Wang and his coauthors use their data to examine a number of other questions and find they can conclude that:

- Their illiquidity measure is both statistically and economically significant for a broad cross-section of corporate bonds.

- The magnitude of the reversals is beyond what can be explained by bid-ask bounce reversals and shows significant asymmetry: price reversals are on average stronger after a price reduction than after a price increase.

- Simple contrarian strategies can yield substantial profits acting on price reversals, and that price changes accompanied by small trades exhibit stronger reversals than those accompanied by large trades.

- A bond’s illiquidity is related to several bond characteristics:
  - It increases with a bond’s age and maturity and is positively related to its idiosyncratic return volatility.
  - It decreases with its rating and issue size.
  - It has little relationship to its market risk exposures as measured by beta.

- Illiquidity of individual bonds fluctuates substantially over time:
  - Average illiquidity of all bonds increases sharply during the periods of market turmoil.
  - Illiquidity is positively related to changes in VIX while negatively related to lagged returns of the aggregate stock market.
  - There are four principal components that explain over 80% of the variation in the liquidity of bond portfolios sorted on their characteristics.

To conclude, Wang proposes three questions for future research:

1. What are the underlying factors giving rise to the high level of illiquidity?
2. What causes the fluctuations in the overall level of illiquidity in the market? Are these due to fundamental risks or a reflection of new sources of risk such as illiquidity?
3. Does the high level of illiquidity for corporate bonds indicate any inefficiencies in the market? If so, what would be the policy remedies?

57. The Divergence of Liquidity Commonality (Spring 2008)

Ronnie Sadka University of Washington distributed and presented “The Divergence of Liquidity Commonality in the Cross-Section of Stocks,” co-authored with Avraham Kamara, University of Washington and Xiaoxia Lou, University of Delaware.
This paper demonstrates that the cross-sectional variation of illiquidity commonality has increased over the period 1963-2005. The divergence of systematic illiquidity can be explained by patterns in institutional ownership over the sample period. The authors conclude that their findings are associated with similar patterns in systematic risk. The evidence suggests that the fragility of the US equity market to unanticipated events has increased over the past few decades. Their analysis also indicates that the ability to diversify systematic risk and aggregate liquidity shocks by holding large-cap stocks has declined.

Sadka began with a brief review of the impact of illiquidity on prices:

- Transaction costs and profitability.
- Return premium for holding illiquid securities.
- Aggregate liquidity as a risk factor.

In their research, the authors address the following questions regarding the commonality in illiquidity:

- Why is it there?
- Does commonality change overtime? Do we expect a time trend?
- Would it differ across firms?
- What are the implications for asset pricing and asset management?

Sadka noted that illiquidity is not a simple concept that can be directly observable, yet it is generally associated with the price impact induced by trades. The authors choose to use a daily illiquidity measure, adjusted for non stationarity (based on the ratio of the absolute value of daily return over the dollar volume), that corresponds to the notion of price impact. They make this choice because, unlike such things as bid-ask spread, it can be computed using daily data and allows for the study a much longer time period. They do note that there is a high degree of correlation, driven by a common systematic component.

Using the data for NYSE/AMEX stocks for 1963-2005 with a $2 minimum price and 100 valid observations per year, they run a market model time-series regression of illiquidity to examine the commonality of illiquidity and to investigate the evolution of the systematic illiquidity of the firms in the smallest (Quintile 1) and largest (Quintile 5) size quintiles. This following graph shows the cross-sectional average illiquidity beta for every year of their study.
By segmenting the companies into sizes, they find that large firms have more illiquidity commonality than do smaller ones, with the spread between the two increasing over time.

Sadka then reported on the relation between sensitivity to aggregate illiquidity shocks (liquidity beta) and institutional ownership both in the cross-section of firms and over time: illiquidity commonality increases with institutional ownership. He also noted that since institutional ownership data start in 1981, they could not examine the substantial growth in institutional ownership before 1981.

The authors use several different approaches to answer their questions and conclude that:
• Commonality has increased significantly for large firms, but declined significantly for small firms.

• Increases in institutional ownership are associated with increases in the stock's sensitivity to systematic illiquidity.

• Differences between the percentages of institutional ownership of large and small stocks can explain the differences in their illiquidity betas.

• Market volatility, market return, and market illiquidity affect both firm systematic liquidity and systematic return.

• Time variations in systematic risk are significantly (positively) related to time variations in systematic illiquidity, even after accounting for the time trends in systematic risk.

• Even though idiosyncratic risk has increased over the sample period for the typical firm, there is a monotonic negative size effect.

• Patterns of systematic risk in the cross-section of stocks are highly related to systematic illiquidity.

• Ability to diversify systematic risk and aggregate illiquidity shocks by holding relatively liquid, large, stocks has declined over the sample period of 1963-2005, both in absolute terms and relative to the diversification benefits of small stocks.

• Illiquidity sensitivity to extreme market illiquidity events across large and small firms has also diverged over time

Continuing with the concerns expressed in most of the papers thus far in the seminar, Sadka and his co-authors conclude that the “evidence therefore suggests that the vulnerability of US equity markets to unanticipated events has increased over 1963-2005.”

58. Stale or Sticky Stock Prices
(Spring 2008)


The authors update previous research on the nature of institutional stock ownership to the end of 2006, 10 years further than previous research. Previous research had found that from 1980 to 1996 institutions increased their demand for large stocks and decreased their demand for small stocks, with the exception of small cap funds.

They use data from on holdings by institutional (Thomson/CDA via WRDS), mutual funds (Thomson/CDA via WRDS), and Trade and Quote (TAQ), CRSP Monthly and Daily Returns Files, but excluding ETFs, closed end funds, and ADRs. They partition stocks into equal-capitalization deciles at the end of each year, compute institutional (13f) and mutual fund (S12) holdings within each of the deciles at each year end and produce annual distributions of holdings, comparing the value of institutional holdings to total market value of each decile, and compute under- or over-weighting of institutional holdings.

The results of this analysis, Keim reported, was that for the 10 years studied institutional investors rapidly increased their percentage holdings of US equities to
70% by 2006. At the same time, institutional holdings of larger stocks decreased relative to market weights and smaller stocks were overweighted. He used the following chart to emphasize the dramatic nature of the change.

![Graph showing institutional ownership of common stock from 1900 to 2006.](image)

Keim and his co-author looked at the implications of the change in ownership of large and small stocks, examining the impact on market liquidity, stock prices, and institutional investment returns. The data, they say, suggests that as institutions increase their:

- Overall ownership of stocks, overall equity market liquidity should increase, holding constant other influences.
- As relative holdings of smaller stocks increase the relative liquidity of smaller stocks should also increase.

They use three measures of liquidity — bid-ask spreads, turnover rates, and stale prices — and find that the trend of increasing liquidity in the stock market generally, and in smaller cap stocks in particular, over the past two decades mirrors the increase in institutional ownership of common stocks.

Given the increase in trade volume and institutional presence in the market, and the accompanying increase in turnover rates and decrease in stale prices, particularly for smaller stocks, they find:

- Return predictability appeared to be confined to the smallest stocks, which continued to display some stale prices at the end of the sample period.
- Significant variation in predictability over the sample period is unrelated to the observed trend of increasing market liquidity.
- There are fewer stale prices.
- Using performance attribution analysis, any excess returns of institutional investors in the past two decades are primarily due to security selection within market cap deciles, not to allocation across deciles. Keim showed this in the following chart.
Attrition Analysis
Comparison of Institutional Returns to Benchmark Returns

The table reports means and t-values (in italics) of the quarterly total excess returns (in basis points) for institutional investors in our sample, and the decomposition into security selection and asset allocation, for several time periods.

<table>
<thead>
<tr>
<th></th>
<th>Security Selection</th>
<th>Asset Allocation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981-1998</td>
<td>10.09</td>
<td>0.33</td>
<td>10.41</td>
</tr>
<tr>
<td></td>
<td>2.37</td>
<td>0.12</td>
<td>2.29</td>
</tr>
<tr>
<td>1999-2000</td>
<td>68.99</td>
<td>4.07</td>
<td>73.06</td>
</tr>
<tr>
<td></td>
<td>4.56</td>
<td>0.45</td>
<td>4.71</td>
</tr>
<tr>
<td>2001-2006</td>
<td>-11.85</td>
<td>5.14</td>
<td>-6.71</td>
</tr>
<tr>
<td></td>
<td>-3.30</td>
<td>1.95</td>
<td>-1.56</td>
</tr>
<tr>
<td>1981-2006</td>
<td>7.50</td>
<td>3.07</td>
<td>10.57</td>
</tr>
<tr>
<td></td>
<td>1.64</td>
<td>1.26</td>
<td>2.17</td>
</tr>
<tr>
<td></td>
<td>1.14</td>
<td>0.59</td>
<td>1.44</td>
</tr>
</tbody>
</table>

- Over the decade they studied, the mean bid-ask spread decreased, the turnover rates increased, and the percentage of trades in the last 5 minutes of the day increased.

Keim discussed these conclusions:

- Over time, institutions and mutual funds increased their holdings of smaller stocks and decreased their holdings of larger stocks so that they now underweight the largest stocks and overweight the smaller stocks relative to market weights.

- The increasing liquidity in the stock market over the past two decades generally, and in smaller cap stocks in particular, mirrors the increase in institutional ownership of common stocks. Today there are virtually no stale prices, except for very smallest stocks.

- Daily return predictability is time varying.

- Any excess returns of institutional investors in the past 25 years are primarily due to security selection within market cap deciles, not to allocation across deciles, and is not significant.

59. Implied Liquidity From Redundant Futures Markets (Fall 2007)

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.

60a. Larry Harris, Discussant
(Fall 2007)

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® 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.

60. **Liquidity Risk in the Corporate Bond Markets (Spring 2006)**

George Chacko, Associate Professor of Finance, Harvard Business School, made available a paper entitled: “Liquidity Risk in the Corporate Bond Markets.”

Chacko started with the proposition that any investor holding a security or a portfolio of securities or considering purchasing a security is exposed to liquidity risks. (As Chacko points out, it is illiquidity that presents the risk.) The difficulty in testing the effects of illiquidity is that trading volume is very low for most bonds, and virtually non-existent for truly illiquid bonds. To deal with this problem the author constructed a new liquidity measure that assesses the accessibility of a bond rather than its trading volume. If a bond is readily accessible, meaning that a dealer can call up one of a number of buy-side clients and obtain the bond easily, the bond can be thought of as liquid even though it may not actually trade much. The procedure was to construct a statistic known as latent liquidity, which measures the accessibility of a bond to dealers based on the aggregate trading characteristics of investors holding the bonds.

The source of data was one of the world’s largest custodians. The custodian knows not only the transactions level information but also portfolio holdings. For any bond issue, Chacko was able to aggregate all of the funds holding that issue to calculate the weighted average turnover value for that issue. That value then became the latent liquidity measure for that bond.

Next was answering the question whether liquidity risk is priced or not. The procedure was to sort the universe of bonds into categories by duration risk, credit risk, and liquidity risk. From loadings on these factors it was possible to form long-short portfolios to construct a time series of the duration, credit and liquidity factors. With these factors it was then possible to conduct some simple regressions to determine whether the liquidity factor is priced.

To construct the liquidity factor, the universe of corporate bonds over the last 10-years (approximately 25,000 bonds) was sorted into twenty-seven buckets on a monthly basis. For each month, the sort is done first by placing each bond issue existing at that point in time into a high, medium or low duration bucket. The sort is done so that each bucket contains the same number of bond issues. Therefore the duration cutoff to go from one bucket to another varies through time.

Similarly three credit buckets and three liquidity buckets were created. Each duration bucket was sorted into one of three equal-weight credit buckets to give a total of nine equal weight buckets. Finally, each of these nine buckets was sorted into one of three equal-weight liquidity buckets so the process yielded a total of twenty-seven buckets each with unique duration, credit and liquidity risk characteristics.
From the twenty-seven buckets three factor portfolios were formed – a duration, a credit, and a liquidity factor portfolio. To form the duration factor portfolio, we take a long position in the high duration portfolio and a short position in the low duration portfolio. Similarly, to form the credit factor portfolio we take a long position in the low credit and a short position in the high credit portfolio. Finally, to form the liquidity factor portfolio we take a long position in the low latent liquidity portfolio and a short position in the high latent liquidity portfolio.

The time series of each of these portfolio returns represents the returns from the duration, credit and liquidity risk factors.

Factor regressions were conducted with each security regressed against the three factors to obtain duration, credit and liquidity betas for the security. The bonds are then sorted by their respective betas. Next, five equal-weight liquidity portfolios are formed, corresponding to five levels of beta, from high to low. Each of the five liquidity portfolios is split into three credit portfolios, high credit, medium credit and low credit. Next, each of the fifteen buckets was split into three more portfolios based on duration. A regression was run of each of the forty-five portfolios against the factors. It was clear that as the liquidity level of the portfolio decreases, the liquidity factor coefficient increases along with its t-statistic. The liquidity factor is important in the pricing of corporate bonds.

The next question was whether the risk being priced was diversifiable. The beta-sorted portfolios were run through several asset pricing models against common measures of systematic risk factors. A table of alphas from running each of the five liquidity portfolios against the bond market indicated that liquidity risk is indeed priced. Nor does the alpha disappear when each of the liquidity portfolios is regressed against the duration and credit factors.

Finally, the liquidity risk factor was tested against the returns of US Treasury bonds. Empirical work in US Treasuries has indicated that there are three important factors, level, slope and curvature factors in the yield curve. Adding the liquidity factor and constructing a four-factor term structure model showed that the contribution of liquidity (or perhaps more properly illiquidity) made a significant contribution to Treasury bond yields.

Chacko went on the show that a practical implication can be found in convertible arbitrage, that is going long a convertible bond and shorting the equity of the firm issuing the bond. Regressing convertible arbitrage returns against various explanatory variables, it turned out that the liquidity factor appeared to be very important in explaining the performance of the arbitrage. In fact the apparent outperformance of convertible arbitrage may simply be due to leaving out an important risk factor in performance evaluation. The returns are fair compensation for the risk being taken.

In conclusion Chacko said that in addition to finding very strong evidence that the liquidity risk factor is an important determinant of bond returns and is priced, the out-of-sample test on US Treasury bonds showed that the factor can be important in explaining returns in a number of asset classes, and can therefore be thought of as a universal risk factor.
Market Models and Simulation

61. Market Equilibrium in a Non-CAPM World (Fall 2006)


The CAPM is an elegant theory. With the aid of some simplifying assumptions, it reaches dramatic conclusions about practical matters. In a CAPM world the market as a whole is the single best investment, and forecasting expected returns requires only forecasts of betas. The model rests, however, on some simplifying assumptions of which one is clearly unrealistic. In his presentation, Markowitz accepted three of the assumptions as reasonable approximations of reality. These are:

- Transaction costs and other illiquidity can be ignored,
- All investors hold mean-variance efficient portfolios,
- All investors hold the same (correct) beliefs about means, variances, and covariances of securities.

A fourth assumption, however, is unrealistic for almost all investors. This is that every investor can lend all she or he has or can borrow all she or he wants at the risk-free rate. A somewhat weaker, but also unrealistic assumption is that investors can sell short without limit and use the proceeds of the sale to buy long positions. In the absence of these two more or less equivalent assumptions, the market portfolio is not a mean-variance efficient portfolio, and in equilibrium the expected return for each security does not depend only on its beta. The purpose of Markowitz’s presentation was to discuss the consequences of abandoning the fourth assumption.

He used as an example a market consisting of three securities, and demonstrated graphically that the mean-variance efficient straight line plotted for various combinations of the assets turned into two straight lines, with the market portfolio falling on neither of these lines.

He next raised the question whether if just one investor could sell short, would this investor arbitrage away the inefficiency in the market portfolio. Again, he showed graphically that not only would the market portfolio remain inefficient, but shorting the market would be a mistake. He considered the consequences of limited borrowing to show that once again the market portfolio is not mean-variance efficient.

Next, we generalize to a world that contains many securities. We begin with the portfolio that is 100% invested in the security with the highest expected return. We then trace out the set of efficient portfolios in a series of iterations, each iteration computing one piece (one linear segment) of the piecewise linear efficient set. Each successive segment has either one more or one less security than the preceding segment. If the universe consists of say 10,000 securities, and if all securities are to be demanded by someone, then the universal efficient frontier must contain at least 10,000 segments. If investors have
sufficiently diverse risk tolerances, they will choose portfolios on different segments. The market portfolio is a weighted average of individual portfolios and typically it is not on any efficient segment.

Turning from the negative consequences of a non-CAPM world, Markowitz suggested some positives. He described the JLMSim simulation model. This asynchronous simulator was developed to help think through the dynamic consequences of models more complex than the CAPM.

- All investors in current JLMSim seek mean-variance efficiency. For a particular simulation run, the JLMSim user specifies a series of parameters, including: how many securities, how many “investor templates”, for each template how frequently to reoptimize, how to set bid and ask prices, how to modify bids and offers, or cancel orders, what $k$ used in maximizing $E-kv$, how many statisticians, and what rules they use to estimate means, variances and covariances. (The statistician estimates expected return by increasing estimates for securities under target weights and decreasing them for securities over target weights.)
- The system converges fairly rapidly, as Markowitz showed graphically.

In concluding, he said:

**If**

Investors cannot borrow all they want at the risk free rate or short without limit and use the proceeds to buy long positions,

**Then**

The market portfolio is not necessarily efficient,

Expected returns are not a linear function of betas,

There is no representative investor.

**But**

One can calculate equilibrium expected returns.

---

### 62. Equilibrium Simulation (Fall 2006)

William F. Sharpe, Nobel Laureate, Fellow of the Institute, STANCO 25 Professor of Finance, Emeritus, Stanford University, Chairman, Financial Engines, Inc. presented a second simulation approach. In answer to the question: Why analyze equilibrium? Sharpe proposed:

- An investor needs to have a view of the ways in which asset prices are determined.
- Risk and return forecasts should reflect these views.
- Asset prices are set by investors operating in markets.
- Equilibrium prices are those at which no investors are willing to make further trades.
- Asset prices will tend towards equilibrium until conditions change.
- Good asset pricing theory is a key ingredient for good investment practice.

He commented briefly on two asset pricing theories: Mean/Variance and State Preference. His focus was on State Preference analysis. Which goes something like this:
• There are alternative future states of the world.
• One and only one will occur.
• For each state there is a probability.
• It is possible to buy and sell state claims
• A claim for state $s$ pays $1$ if and only if state $s$ occurs
• (similar to an insurance policy).
• The markets are complete
• (every state claim can be traded).
• When equilibrium is established, there will be a set of state prices, one for each state of the world.

Sharpe introduced the Price Per Chance.

$$\text{PPC} = \frac{\text{State Price}}{\text{Probability of State}}$$

We can think of buying a state as equivalent to buying insurance. With any insurance policy, one should compare the price with the likelihood of cashing in on a claim. The higher the PPC, the less attractive is an investment. The incentive then is to allocate current wealth to obtain more future wealth in states with lower PPCs. The market wealth in a state is the sum of the individuals’ levels of wealth in that state. If each individual wants more wealth in state A than in state B, the total desired market wealth in state A will be greater than that in state B.

He turned next to conditions for equilibrium. Given the amount of production, the amount of market wealth in each state is given. So prices must adjust until the individuals’ collective demand for wealth in a state equals that wealth available. This implies that states with the same wealth will have the same PPC, and states with more wealth will have lower PPCs. For each PPC there is a level of individual wealth. Lower PPCs lead to higher levels of individual wealth. Thus each individual should arrange to have wealth that is related directly to market wealth.

Moving to a description of equilibrium simulation, he noted that the key question to be addressed is to what extent do the implications of the CAPM and/or State Preference Asset Pricing Theory hold when markets are incomplete and investors (1) Do not have mean/variance preferences, (2) Make different predictions and (3) Act in accordance with findings of behavioral research.

The vehicle to be used is APSIM, that is Asset Price and Portfolio Choice Simulator. (The APSIM simulator, with cases and manual, is available free of charge on Sharpe’s website WWW.wsharpe.com.) The simulator produces discrete outcomes over discrete time. It simulates trading to reach market equilibrium and analyzes the characteristics of the resulting equilibrium. For an investor we need to know his or her initial position, that is holdings. Next we need to know the investor’s preferences generally in terms of above what price will the investor sell and below what price will the investor buy. We need the investor’s predictions as well. Given these initial conditions, a market operates until no further trades are possible. Trades take place on the basis of the initial conditions, including preferences, and the trader’s ability to take care of those preferences.
Sharpe went through a simple case involving two traders in a single commodity. He showed the inputs, the trading, and the equilibrium portfolios and prices that were reached.

A further case admitted outside positions. For example, the investors may have salary income beyond the income from their portfolios. He moved on to an example with a kinked marginal utility function. In this case the utility of avoiding losses was greater than the utility of achieving gains, a not unusual situation.

In concluding, his general observations were:

- The MRRT version of the Market Risk/Reward Theorem holds relatively well in most cases.
  - Equivalently, asset prices are consistent with a pricing kernel that is a decreasing function of market return.
- The Market Risk/Reward Corollary fails in many cases.
  - Investors do hold portfolios with non-market risk and in at least some cases they should do so.

Finally, he set out his requirements for good investment practice.

- A well thought-out view of the ways in which asset prices are determined:
  - An equilibrium model and/or simulation.
- A procedure for making forecasts of possible future returns that take into account the current market values of assets.
  - Such values reflect the opinions of investors worldwide concerning assets’ future prospects.

- Without both ingredients it will be difficult or impossible even to know whether you are betting against the market and if so, in what manner.

63. Putting Economics (Back) Into Quantitative Models (Spring 2006)

Vineer Bhansali, Head of Analytics, PIMCO had made available a paper entitled: “Putting Economics (Back) into Quantitative Models.”

His thesis was that as we quants became more mathematically sophisticated and obtained faster processing power, the approximation and computational muscle that was a short-cut took on a life of its own, largely at the expense of the economic common sense that lies behind the purpose of investing – making superior excess risk adjusted returns. Models are too assumed to operate in a theoretically ideal environment.

He pointed out that extra expected return in fixed income typically involves the sale of explicit or implicit options. For example, duration extension yield gain implies giving an option to rebalance at forwards. Taking advantage of mortgage spreads implies giving a prepayment option. Taking advantage of a TIPS spread implies giving an inflation/deflation option. The effects of these options depend very much on economic developments. His argument was that incorporating economic principles such as demand and supply, investor behavior, preferences etc. from microeconomics and monetary policy, macro aggregates, deficits, trade balances etc. from macroeconomics can make our models more flexible and hence more robust.
He provided a number of examples to demonstrate the importance of factors that are frequently omitted in investment decision making. For example, in comparing tax exempt yields with Treasury yields, a taxable investor may conclude that the tax exempt is obviously superior, ignoring the risk that tax rates may change and there is no way to hedge that risk.

To properly put economics back into models, he proposed one, although not the only possible, framework. We begin by translating economic priors into possible economic scenarios and the realization of the factors. For example, typically but not always, low inflation and low GDP is associated with low interest rate levels and relatively flat yield curves. When pricing a credit security, the arbitrage-free price can be compared or supplemented with pricing obtained by the risk premia of these factors on the security. If under shocks of the factors a so-called arbitrage free package yields non-zero excess returns, it has to hold true that the risk-neutral price is wrong, or there are hidden factors, or there are risk-free profit opportunities. He continued: We can start by defining risk exposures in terms of specific factors. For each of these factor exposures we obtain factor risk premia. For packages that allow factor risk-premia to be hedged out, we can price using the arbitrage free approach.

Depending on our outlook of the world and the expected variation in risk premia, certain sources of risk are better than others at different times. Whenever we expect to be able to earn high risk premia in a sector, we overweight that sector.

The Taylor rule connects the short rate to the deviation of inflation and output from targets. Since the Fed appears to follow the Taylor Rule in setting the short nominal rate, this input is crucial if we want to extract the economic content embedded in the yield curve. The Taylor Rule is expressed as an economically motivated term structure model:

\[ i_t = (r^* - \theta_1 \pi^* + \theta_2 (u^* - u_t) + \pi_t) \]

\( r^* = \) Real funds rate
\( \pi^* = \) Target inflation rate – PCE deflator
\( u^* = \) Target unemployment rate – proxy for output gap

The Taylor Rule is the building block for the yield curve. The short rate is set by the Fed and transmitted across the yield curve by the no-arb condition. Yields are expectations of an exponential in short rates.

Given the economic variables in this model we can test to see the impact of changes in those variables, and Bhansali showed the effects in past years of changes in parameters included in the rule. We know from experience that Treasury yield curve fluctuations can be described by at most three factors and in most circumstances by two factors. We also know that risk-free fixed income securities are predominantly determined by inflation and inflation expectations, Fed behavior and risk premium. So a simple economically well-specified model is better suited to fit the market than a very general model that has little to do with the real world. The model is efficient enough to stress test with. At PIMCO he reported an extension where credit risk, prepayment risk and tax risk are introduced into the model explicitly from the start with stochastic intensities correlated to macro factors.

He closed his presentation with a quotation from Myron Scholes:
“We make models to abstract reality. But there is a meta-model beyond the model that assures us that the model will eventually fail. Models fail because they fail to incorporate the inter-relationship that exists in the real-world.”

Myron Scholes, NY, Fall 2005.

Performance Evaluation and Benchmarks

64. Pension Funds: Performance, Costs and Benchmarks (Fall 2009)

Rob Bauer, Maastricht University, presented “Pension Funds: Performance, Benchmarks and Costs,” a work he coauthored with Martijn Cremers and Rik Frehen, also from Maastricht University.

Bauer began by enumerating the problems in the pension fund performance literature. Many of these problems are the result of poor quality or incomplete data being used in many studies. Bauer’s concern, and impetus to this study, was that most data are focused on the managed accounts level rather than the plan level. The data are likely to be biased since there is no reporting obligation, no cost data or information on the fund benchmarks.

Bauer and his coauthors set out to rectify some of the data problems by measuring the domestic equity performance of US pension funds at the total plan level for a variety of fund types, benchmarks and cost levels. The main results of their analysis were:

1. Pension fund domestic equity performance at total plan level is zero after costs in most cases or slightly positive in some.

2. Size of collective vehicle (pension fund) creates economies of scale in costs that are transferred directly to end-consumers (beneficiaries).

The study data came from the Cost Effective Management Benchmarking (CEM) database that has self reported information on approximately 40 percent (market value) of the pension fund universe in the US from 1990 to 2006 that includes information on fund type, sponsor, and mandate type. CEM Benchmarking collects yearly questionnaires and provides annual fund-specific returns, benchmarks and cost data. The data are available at low aggregation level (portfolio) and can be aggregated to a total plan level. There is information on 463 Defined Benefit (DB) funds (1990-2006) and 248 Defined Contribution (DC) funds (1997-2006). Bauer reported that since they were concerned about possible data bias they performed a number of tests. However, they found no evidence of performance related bias.

Costs are another important issue. Bauer presented the following table regarding costs and size of equity holdings.
Costs and Size of Equity Holdings

<table>
<thead>
<tr>
<th></th>
<th>Costs</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DB</td>
<td>DC</td>
</tr>
<tr>
<td>Total</td>
<td>28.75</td>
<td>51.09</td>
</tr>
<tr>
<td>Largest 30%</td>
<td>16.09</td>
<td>42.47</td>
</tr>
<tr>
<td>Smallest 30%</td>
<td>39.92</td>
<td>61.30</td>
</tr>
<tr>
<td>Corporate</td>
<td>32.63</td>
<td>48.45</td>
</tr>
<tr>
<td>Largest 30%</td>
<td>24.42</td>
<td>39.16</td>
</tr>
<tr>
<td>Smallest 30%</td>
<td>40.22</td>
<td>56.90</td>
</tr>
<tr>
<td>Public</td>
<td>21.33</td>
<td>58.68</td>
</tr>
<tr>
<td>Largest 30%</td>
<td>9.32</td>
<td>55.26</td>
</tr>
<tr>
<td>Smallest 30%</td>
<td>34.05</td>
<td>73.15</td>
</tr>
<tr>
<td>Other</td>
<td>29.46</td>
<td>-</td>
</tr>
<tr>
<td>Largest 30%</td>
<td>14.75</td>
<td>-</td>
</tr>
<tr>
<td>Smallest 30%</td>
<td>42.75</td>
<td>-</td>
</tr>
</tbody>
</table>

From these data Bauer reported:

- Cost difference between plan type, defined benefit (DB) and defined contribution (DC), is approximately 20 basis points.
- Within DB and DC larger funds have lower cost levels, and, in general, pension fund cost levels are lower than those in the mutual fund universe.
- Size matters and differs between fund types and fund characteristics.
- Passively and internally managed funds are less costly than those that are actively or externally managed.

In their analysis of equity holdings they found that allocation within equities does not vary a lot between different funds (Corporate, Public and other); public funds invest more internally (size related); large funds have fewer small cap portfolios, less active portfolios and more internally managed portfolios (size related); DC Funds are less heterogeneous.

Very interesting was the benchmark evolution Bauer presented. For large cap funds, Bauer pointed out, the S&P 500, Russell 3000 and Russell 1000 were competing for benchmark dominance. For the small cap portfolios, the Russell 2000 small cap benchmark stood out, its use rising from 20% to 60% of funds over the same period.

As for returns, Bauer first described their risk-adjustment procedure and presented risk adjusted net returns. These returns were zero after costs, thus showing that pension funds outperformed mutual funds. There was one aberrant return; the return for the small cap segment was about 3 percent, even after adjustment and verification.

Bauer noted the critical role that the pension fund boards may play in reducing costs by demanding separate accounts with client-specific investment guidelines, better monitoring of external managers, and tougher cost control, without added agency costs. All this can result in the added
benefits being transferred to plan participants. The larger the fund, the more bargaining power.

65. Should Benchmark Indices Have Alpha? Revisiting Performance Evaluation (Spring 2009)

K.J. Martijn Cremers, Associate Professor of Finance, Yale School of Management, presented “Should Benchmark Indices Have Alpha? Revisiting Performance Evaluation,” written with Antti Petajisto, Yale School of Management, and Eric Zitzewitz, Dartmouth College. This work was supported by the Q-Group®. Money managers are typically evaluated by comparing their returns to benchmark indices. Two of the most popular, the S&P 500 and the Russell 2000, cover 85% of the US market for stocks. In contrast, the academic literature has adopted the Fama-French three-factor model and the Carhart four-factor model as the standard benchmarks for performance evaluation. Cremers and his colleagues provide evidence that the practitioner and academic approaches can yield very different results: the academic factor models assign large nonzero alphas even to these passive benchmark indices.

Cremers and his coauthors take on the question of whether and why standard Fama-French and Carhart models produce economically and statistically significant nonzero alphas even for passive benchmark indices. They find that the alphas arise primarily from the disproportionate weight the Fama-French factors place on small value stocks that have performed well, and from the CRSP value-weighted market index which is a downward-biased benchmark for U.S. stocks.

Cremers shows a conundrum: how can indices have alpha when evaluated by factor models, as shown in the following chart? The portfolios are the indexes, fully replicated.

<table>
<thead>
<tr>
<th>Portfolio (Index Fund)</th>
<th>Alpha/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P 500</td>
<td>a = 0.82% (t = 2.95)</td>
</tr>
<tr>
<td>Russell 2000</td>
<td>a = -2.41% (t = -3.35)</td>
</tr>
<tr>
<td>S&amp;P 500 – Russell 2000</td>
<td>a = 5.24% (t = 3.97)</td>
</tr>
</tbody>
</table>

To demonstrate that the alpha problem is not time specific he provides the historic alphas on the indices from 1980 to 2005.
Cremers notes that given the t-statistics in both of these charts, the problem is not noise. Further, the alpha from these indices is readily available since each is easily replicated by cheap index funds. This leads Cremers to ask the following: does this cause significant biases for performance evaluation? His answer is yes: from 1980 to 2005, the long side underperformed the short side by 1.66% annually; the Carhart four-factor model had a positive annual alpha of 3.90%; the Fama-French three-factor model alpha was 4.33%. Thus, he says, it is clear from the data that mechanical application of the Fama-French and Carhart models may lead to incorrect inferences about performance.

On the basis of these data, Cremers asks the following:

1. How large a problem are these index alphas?
2. Are they in effect for all common indices?
3. Why do we get non-zero index alphas?
4. Is it a problem in factor construction?
5. What would be a better factor model?
6. What if we modify factors and index-based factors?

The authors explore ways to construct the factors and propose alternative models constructed from common and easily tradable benchmark indices. As alternatives to the Carhart and Fama-French models they consider two different approaches: modifying the construction of the factors; using the common indices themselves as replacement factors. They use the most widely followed index in each size category, including the S&P 500, Russell Midcap, and Russell 2000, as well as their value and growth components. One of the charts showing the overlap in common indices is shown below.

### Index Alphas 1980-2005

<table>
<thead>
<tr>
<th>Main index</th>
<th>Style component</th>
<th>Value</th>
<th>All</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russell 3000</td>
<td></td>
<td>-0.55</td>
<td>0.18</td>
<td>1.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-1.01)</td>
<td>(0.96)</td>
<td>(2.05)</td>
</tr>
<tr>
<td>Russell 1000</td>
<td></td>
<td>-0.45</td>
<td>0.47</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-0.83)</td>
<td>(2.58)</td>
<td>(2.73)</td>
</tr>
<tr>
<td>Russell Midcap</td>
<td></td>
<td>-0.52</td>
<td>0.17</td>
<td>1.61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-0.54)</td>
<td>(0.24)</td>
<td>(1.34)</td>
</tr>
<tr>
<td>Russell 2000</td>
<td></td>
<td>-1.25</td>
<td>-2.41</td>
<td>-3.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-1.31)</td>
<td>(-3.35)</td>
<td>(-3.87)</td>
</tr>
<tr>
<td>S&amp;P 500</td>
<td></td>
<td>-0.35</td>
<td>0.82</td>
<td>1.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-0.59)</td>
<td>(2.95)</td>
<td>(2.76)</td>
</tr>
<tr>
<td>S&amp;P Midcap 400</td>
<td></td>
<td>0.84</td>
<td>1.44</td>
<td>2.64</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.51)</td>
<td>(1.33)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>S&amp;P Smallcap 600</td>
<td></td>
<td>-1.49</td>
<td>-2.59</td>
<td>-3.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-0.89)</td>
<td>(-2.20)</td>
<td>(-1.39)</td>
</tr>
<tr>
<td>Wilshire 5000</td>
<td></td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.43)</td>
<td></td>
</tr>
<tr>
<td>Wilshire 4500</td>
<td></td>
<td>-0.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(-0.79)</td>
<td></td>
</tr>
</tbody>
</table>
Cremers said that their primary index-based alternative models are a four-factor model analogous to Carhart with the addition of the S&P 500, Russell 2000, and an index-based value factor added to the usual momentum factor; as well as a seven-factor model which adds the Russell Midcap and introduces separate index-based value factors for small, midcap, and large stocks. He noted that all of the alternative models eliminate or significantly reduce the alphas of Fama French and Carhart indices.

In recasting the models the authors explicitly examine four choices: the universe of assets included in the market factor; the weighting of component portfolios when constructing factors; the imposition of a common value factor for small and large stocks; the boundaries between size and book-to-market categories. In each case, they propose alternative choices that are more consistent with the construction of the benchmark indices and real-world portfolios, finding that these alternative choices lead to factor models that more closely approximate the mix of stocks held by the index, and individually and collectively reduce index alphas and their variance.

The authors analyze tracking error volatility across a broad cross-section of mutual funds to see which of their models best explains the common variation in returns and thus most closely tracks the time-series of fund returns. The index-based models produce the lowest out-of-sample tracking error, outperforming the traditional Fama-French and Carhart models. When applied to the cross-section of average mutual fund returns, the index-based models explain average returns well, producing alphas close to zero for all fund groups. They conclude that such index-based models outperform the Fama-French and Carhart factor models both in terms of asset pricing tests and performance evaluation of mutual fund managers.

66. Non-Cap Weighted Indexes (Spring 2007)

Robert D. Arnott, Chairman, Research Affiliates, LLC and Clifford S. Asness, Managing Principal, AQR Capital Management, LLC, engaged in what some might call a discussion and others a debate over the use of fundamental indexes as a substitute for market weighted indexes.
Arnott began the session with a comparison of the performances of capitalization weighted averages (the S&P 500 being an obvious example) with returns on the same sets of stocks weighted by fundamentals. The fundamental index funds offered by Research Affiliates make use of measures including sales, book value, cash flow, and dividends in place of capitalization for weighting. Arnott showed the substantial superiority in annual rates of return and annual alphas for various factor weightings. In general, it seemed fair to say that he relied primarily on value characteristics for weighting. His time periods included various decades, bull markets and bear markets, and he made use of the S&P 500 and Russell indexes, as well as foreign and international indexes.

Asness responded that he had no quarrel with the superior performances of indexes tilted toward value. His dispute with Arnott rested on the manner in which Arnott characterized the use of fundamental indexes. In short, Arnott appeared to him to be claiming that his fundamental indexes were something of a new invention, when, Asness argued, value tilts and their superiority had been known and demonstrated for a long time. Arnott’s position is that he has gone well beyond a simple value tilt in devising his fundamental indexes. Little was said at the seminar about the ease with which Arnott’s fundamental indexes can be traded as ETFs. This makes them especially attractive to those who like the weighting scheme.

Questions were raised about turnover and while Arnott agreed that there is more turnover with the fundamental index than with the cap-weighting index, he said the difference is not great enough to affect seriously the superiority of returns. It was not entirely clear how the maximum size of trades might differ between the fundamental and cap-weighted indexes. In any case, Arnott took the position that the fundamental index would be a useful benchmark against which to judge manager performance.

No vote was taken as to who might have prevailed in the debate.

67. Attribution: A Unified, Portfolio Based Approach (Fall 2006)

Richard Grinold, Barclays Global Investors, followed Kahn with a discussion of attribution. Grinold’s approach was to put the analysis of ex-ante alpha, ex-ante risk and ex-post returns in the same framework. Ex-ante we start with a vector of alphas, \( \alpha \). An ideal implementation, call it \( Q \), is selected so that the covariance of every asset with portfolio \( Q \) is proportional to its alpha. The information ratio of portfolio \( Q \) is the ratio of its alpha to its risk, \( IR_Q = \frac{\alpha_Q}{\sigma_Q} \), and can be considered as an ex-ante estimate of our ability to add value. The portfolio we actually hold is \( P \) which, due to costs or constraints, is not equal to \( Q \). A key equation is:

\[
a_P = IR_Q \cdot \rho_{Q,P} \cdot w_P
\]

where \( a_P \) is the alpha of our portfolio \( P \), \( IR_Q \) is the information ratio, \( \rho_{Q,P} \) is the correlation between \( P \) and \( Q \), also known as the transfer coefficient and \( w_P \) is the risk of portfolio \( P \). In other words, the alpha of the portfolio \( P \) depends upon our potential as captured by the information ratio, how close the portfolio comes to exploiting those opportunities captured by the transfer coefficient and the aggressiveness of the portfolio.

The ex-post analysis of returns flows in an analogous manner. Given returns \( q \) we can ask what portfolio would have been
the most efficient to hold if we had been fortunate enough to use \( q \) as our alpha forecast. This portfolio, call it \( Z \), is selected so that the covariance of every asset with portfolio \( Z \) is proportional to the return on that asset. We call the ratio of the return on portfolio \( Z \) divided by the risk of portfolio \( Z \) the opportunity set; \( OS_Z = q Z / w Z \). Portfolio \( Z \) plays an ex-post role that is analogous to the ex-ante role played by portfolio \( Q \). This allows us to write the return on our portfolio \( P \) as:

\[
q_P = OS_Z \cdot \rho_{Z,P} \cdot w_P
\]

where \( \rho_{Z,P} \) is the correlation of portfolio \( Z \) with our portfolio \( P \), we call this the realized information coefficient, and as before, \( w_P \) is the risk of the portfolio. These results are summarized as

\[
a_P = IR_Q \cdot \rho_{Q,P} \cdot w_P
\]

\[
q_P = OS_Z \cdot \rho_{Z,P} \cdot w_P
\]

In the first equation we consider what we expect to happen and in the second what actually took place.

Next we calculate exposures (this step is equivalent to a linear regression) of our portfolio \( P \) to the sources by solving the equations

\[
\rho_{P,i} = \sum_{Sources \ j} \rho_{i,j} \cdot y_{j,p}
\]

for the exposures, \( y_{j,p} \). This calculation also yields a residual exposure equal to \( \sqrt{1 - R^2} \) where \( R^2 \) is the r-squared of the regression. These exposures allow us to attribute the correlations \( \rho_{Q,P} \) and \( \rho_{Z,P} \) to the sources and the residual. In addition, we can use the same setup to attribute the correlation of our portfolio \( P \) with itself, \( \rho_{P,P} = 1 \), to get an attribution of risk to the sources.

This results in three equations:

\[
\rho_{Q,P} = \sum_{Sources \ Residual} \rho_{Q,j} \cdot y_{j,p}
\]

\[
\rho_{Z,P} = \sum_{Sources \ Residual} \rho_{Z,j} \cdot y_{j,p}
\]

\[
\rho_{P,P} = \sum_{Sources \ Residual} \rho_{P,j} \cdot y_{j,p}
\]

The first of these attributes the transfer coefficient to the sources. The second attributes the realized information coefficient to the sources and the third attributes the portfolio risk to the sources.

In summarizing, Grinold said: model the elements of your investment management operation, alpha and returns, as portfolios and similarly capture your sources of information as portfolios. The relations among these portfolios are then in terms of covariance and correlation. This structure allows you to attribute correlations to sources and explain the transfer coefficient and portfolio return by how much each source is contributing.
Political and Taxation Impacts on Investment Performance

68. Reflections on the Actions of the New Administration (Spring 2009)

William G. Gale, Vice President and Director, Economic Studies, The Brookings Institution, gave the dinner presentation entitled “The Economic Crisis and the Policy Response.”

He began with a description of the state of the economy and provided the following observations:

- The belief that housing prices would rise forever led to risky behavior, fueled by securitization, low interest rates, and a savings glut.
- The collapse in the real estate sector brought down the financial sector, and the two sectors together led the economy down.
- The budget, already in bad shape, was hurt by the downturn and the stimulus, and faces medium- and long-term problems.
- Housing, finance and the budget are in self-reinforcing vicious cycles.
- Proposals to address the economy, housing, finance, and the budget are intertwined, aggressive, and may not work.

Getting out of the recession won’t be enough – medium-term and long-term, Gale says that the goals of the current plans are to convert the “vicious circle” to a “virtuous cycle,” instill confidence, boost aggregate demand, stabilize or raise prices, and must take into account the global dimensions of the crisis. Because, he says, we don't really know what will work or how much is needed, we have to be wary of solutions from models that failed to predict the problem and understand that mistakes will be made. He goes on to quote Larry Summers who said, “The risks associated with under-responding are much bigger than the risks associated with over-responding.”

He then turned to the current stimulus packages noting the success of each:

1. Stimulus. Gale concludes that a big, diversified, somewhat sustained stimulus was the right response. However, an additional stimulus or stimulus for a longer time may be needed.

2. Housing. Housing prices rose inexorably for decades. Now 14 million homeowners are under water, owing more than the value of their houses. Gale concludes that we knew what to do about stimulus and did it, we knew what to do about housing, but could not do it since we cannot follow mortgages to the originators.

3. Financial Sector. Increased confidence and regulatory changes led to very high leverage and increased dependence on short-term financing. This system works when asset prices are rising and is lethal when they fall. However, without government intervention many major firms would have gone under.

He went on to warn of the enormous risks of politicization of bank activities by the Federal Reserve.

As to long-term financial market reforms Gale lays out some criteria for long-term financial market return:

- Determine the right size and structure of the financial sector.
- Enhance regulation of systemically important institutions.
• Encourage formation of clearinghouses and regulation for derivatives contracts.
• Encourage counter-cyclical capital standards.
• Reorganize financial regulatory agencies.

Gale concluded by pointing out the short-, medium- and long-term uncertainties.

• Short term:
  – The four packages (stimulus, housing, finance, and budget) will likely succeed or fail together.
  – Coordinated stimulus could help.
  – A European financial crisis or Chinese collapse could hurt tremendously.

• Medium Term:
  – What is the exit strategy?
  – We got into this problem by spending too much and borrowing too much, we are trying to get out of it by spending and borrowing even more. This may raise GDP and reduce unemployment but it will leave us with higher and more unsustainable levels of spending and debt.
  – After recovery, we need to transition rapidly to a higher-saving society to pay down international debt, pay for entitlements, finance investments.

This will require:
- Contradictory fiscal policy (lower spending, higher taxes)
- Reduced private consumption
- New investment, public and private
- Trade surpluses
- Structuring fiscal policy to maintain full employment and meet these needs will be a difficult balancing act.

• Long Term. Even if the short-run strategy and medium-term transitions work, the country faces massive long-run fiscal shortfalls, primarily but not exclusively because of health care. This presents another set of challenges, and opportunities.

69. Investment Taxation and Portfolio Performance (Fall 2008)

Jeffery Pontiff, Professor of Finance, Boston College Carroll School of Management, presented his paper “Investment Taxation and Portfolio Performance, coauthored with Daniel Bergstresser of the Harvard Business School.

Pontiff notes that most financial research mistakenly assumes that growth/value and market capitalization portfolios command similar tax burdens. However, the ability to defer capital gains creates more heterogeneity in after-tax returns than previously recognized. By using explicit tax code and income level information, Pontiff and Bergstresser document the after-tax returns to different strategies coming not only from differences in the patterns of pre-tax returns, but from differences in the pattern of capital gains realizations induced by the need to maintain particular portfolio strategies.

Traditionally, the optimal tax-trading strategy, is to sell stocks that have fallen below their tax basis and hold stocks that have risen above. Because of this, portfolio strategies differing in the degree to which gains and losses are deferred and harvested, will have specific style and composition related tax burdens. For example, portfolio
strategies that create a high capital gains tax burden for taxable investors are those that maintain equal position weights, hold small market capitalization stocks or value stocks, induce capital gain realizations in positions that have done well, and defer realization in stocks that have done poorly.

Conversely, those that correspond more closely to the optimal tax-trading strategy are those that have value position weighting, and contain large market capitalization stocks and portfolios of growth stocks.

Pontiff reported the three sets of data for the period 1927 to 2002 used for this research.

- Stock prices: The stock prices, splits, distributions, mergers, and delistings come from the CRSP database. For distributions and delistings, they apply the appropriate tax rates for the given hypothetical investor.

- Tax rates: The tax rates take into account the differences in capital gains rates for different holding periods. The authors omit state taxes due to variations in the state tax codes. They expect this omission will cause an underestimation of the tax impact difference.

- Income distributions: Because they are interested in constructing the portfolio returns enjoyed by investors at different income levels, they collect data on both the structure of taxes and on income distribution.

In themselves, the data on tax regimes and income distributions are enlightening. As an example, their table for direct and indirect tax rates by income levels are shown in the following table:

<table>
<thead>
<tr>
<th>Level of Family AGI</th>
<th>Share of families above threshold</th>
<th>Share of direct taxable equity above threshold</th>
<th>Share of direct + indirect taxable equity above threshold</th>
<th>Share of dividends above threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>88.1%</td>
<td>99.9%</td>
<td>99.6%</td>
<td>98.6%</td>
</tr>
<tr>
<td>25,000</td>
<td>59.7</td>
<td>97.3</td>
<td>96.3</td>
<td>93.3</td>
</tr>
<tr>
<td>50,000</td>
<td>31.9</td>
<td>90.3</td>
<td>87.4</td>
<td>82.4</td>
</tr>
<tr>
<td>75,000</td>
<td>17.3</td>
<td>80.9</td>
<td>77.4</td>
<td>70.5</td>
</tr>
<tr>
<td>100,000</td>
<td>9.7</td>
<td>74.5</td>
<td>69.8</td>
<td>61.8</td>
</tr>
<tr>
<td>125,000</td>
<td>6.7</td>
<td>69.5</td>
<td>63.9</td>
<td>55.9</td>
</tr>
<tr>
<td>150,000</td>
<td>4.9</td>
<td>65.8</td>
<td>59.1</td>
<td>51.6</td>
</tr>
<tr>
<td>175,000</td>
<td>3.7</td>
<td>62.6</td>
<td>55.3</td>
<td>45.6</td>
</tr>
<tr>
<td>200,000</td>
<td>3.0</td>
<td>60.0</td>
<td>52.5</td>
<td>42.2</td>
</tr>
<tr>
<td>225,000</td>
<td>2.6</td>
<td>55.7</td>
<td>48.8</td>
<td>38.1</td>
</tr>
<tr>
<td>250,000</td>
<td>2.2</td>
<td>52.7</td>
<td>45.6</td>
<td>36.6</td>
</tr>
<tr>
<td>275,000</td>
<td>2.0</td>
<td>51.4</td>
<td>44.5</td>
<td>35.8</td>
</tr>
<tr>
<td>300,000</td>
<td>1.7</td>
<td>44.6</td>
<td>38.8</td>
<td>34.9</td>
</tr>
<tr>
<td>325,000</td>
<td>1.6</td>
<td>42.6</td>
<td>36.8</td>
<td>33.7</td>
</tr>
<tr>
<td>350,000</td>
<td>1.4</td>
<td>40.4</td>
<td>35.0</td>
<td>32.8</td>
</tr>
<tr>
<td>375,000</td>
<td>1.3</td>
<td>40.0</td>
<td>34.5</td>
<td>31.6</td>
</tr>
<tr>
<td>400,000</td>
<td>1.1</td>
<td>38.2</td>
<td>33.0</td>
<td>30.6</td>
</tr>
</tbody>
</table>

Note. From the 200? Tax code, income below 26,250 taxed at 15%, income below 63,550 taxed at 28%, income below 132,600 taxed at 31%, income below 288,350 taxed at 36%, income above that taxed at 39.6%.
Portfolios are constructed on the basis of market equity, book-to-market ratio, and firms’ dividend policies. For book/market they divide NYSE firms into groups based on market equity capitalization at the end of the most recently completed month of June. Dividend-based portfolios follow firms’ dividend policies. All long portfolios are totally self-financing: all distributions are reinvested in the portfolio and all taxes are paid through partial liquidation of positions. They also consider strategies that involve both a long and a short portfolio. To limit drastic portfolio changes when NASDAQ data enter the CRSP dataset, they include only stocks listed on the NYSE as of June 1927.

They use a simulation to examine the returns to different strategies, taking taxes into account. They note that the simulation routine is also capable of considering portfolios with short components.

A thorny problem was how to deal with the after-tax value of the capital gains that accrue but remain unrealized in the portfolio. The authors chose to calculate a value of the portfolio assuming that the effective tax rate on accrued but unrealized capital gains is lower than statutory rates but higher than zero, due to the investor’s option to defer the realization of gains. Their solution lies between one that would be taken by an investor who planned to pass the assets to heirs through an estate with step-up in basis and one taken by a short-horizon investor who would calculate accrued capital gains on the liquidated portfolio each month.

Pontiff showed that an optimal tax strategy has a material impact on investment returns both by selling strategy and by investment style. For example when investors in the 99 percent income level used optimal selection with a value weighted strategy, they outperformed those using the suboptimal selection assumption by 3.15 percent. Using an equal-weighted portfolio strategy returned a 12.71 percent advantage. The long portfolio benefiting least from the tax-optimized strategy is the high dividend yield portfolio. Optimal selection is particularly important for the equally weighted portfolio strategy, less important for strategies that focus on large or small firms or have high turnover, and has remarkable impact on long-short portfolios returns.

Pontiff’s results clearly demonstrated his conclusions that capital gains tax-timing options induce variation in tax burdens that are related to portfolio style: equal weighted portfolios, small stock portfolios, and value portfolios tend to have higher exposure to capital gains taxation, whereas value weighted portfolios, large stock portfolios, and growth portfolios tend to have lower exposure. For a 99.5 % AGI investor, an equal weighted portfolio over the past 80 years would have had 14% of the performance of a tax-exempt investor.

70. Investment Implications of the 2008 Elections (Spring 2008)

Robert Butman, President, CONTEXT/TQA ADVISORS, introduced the after dinner speaker on March 31st. Gregory P. Valliere, Consultant, Stanford Washington Research Group, is an extremely able political analyst, with 30-years experience behind him. Prompted in part by a variety of questions, he commented on the investment implications of the 2008 elections, covering a wide variety of topics.

He began with the unpopular topic of higher taxes. He believes these are
inevitable following the coming elections, regardless of whether the new President is a Democrat or a Republican. The most important tax increase he anticipates is a move in the capital gains and dividend rate from 15% to at least 20% and perhaps more, possibly in 2009 and certainly by 2010. Such an increase will have profound implications, threatening a stock market decline as investors rush to take advantage of the 15% rate.

He regards General Petraeus as by far the most competent military commander we have had in Iraq, and believes that by the end of 2008 there will be some significant withdrawal of forces from Iraq.

A question was raised about inflation, and his response was that Bernanke is more concerned about strengthening the economy than controlling inflation, but he will take inflation threats very seriously, perhaps this fall. It is likely that the Fed will be taking-back some of the rate cuts. Some Fed members think that these have already gone too far. It has taken Bernanke some time to understand the fragility of the US economy. Valliere commented that past Federal Reserve Chairmen would take a strong personal stand on the economy and that policy would be followed. Bernanke, on the other hand, would ask for suggestions and would get a confusing assortment from his Board members, leading to weakness in direct action. Valliere has been told that Volker told Bernanke he had to take charge, and Bernanke has since adopted the approach of his predecessors.

Valliere referred to Barney Frank as an important member of Congress who also was slow to realize what was happening to the economy. He too, has learned, and by late this year we will begin to see some economic growth.

The Fed has changed dramatically its attitude towards its freedom and obligation to expand its lending activities. Frank, among others, will probably get the government into a bailout of homeowners as well as financial institutions.

There will be an increase in regulation. This will show up at the Fed, at the CFTC, and product safety.

Deficits pose an interesting problem. These are headed sharply higher. Even McCain, the strongest of the presidential candidates in terms of reducing deficits, will have a hard time, if elected, doing anything about them.

Turning to election predictions, Valliere commented that a few months ago he was fairly sure that Hillary Clinton would win. Now he thinks Obama is the likely winner, but recognizes that this is not certain. He believes that 2008 will clearly be a good year for Democrats. In the House, the Democrats will pick up a dozen seats as close to 30 Republicans retire. Significant Republican retirements in the Senate will likewise help to establish a major Democratic win.

McCain does have a chance of being President. His fundraising is going very successfully but he does face a problem in distinguishing himself clearly from George W. Bush.

Returning to the matter of taxation, Valliere sees the expiration of the Bush tax cuts in 2010 as very significant. Should McCain become President, the Democrats in Congress will have a powerful weapon in the form of a threat not to renew those tax cuts.

Finally, a question was raised about whether protectionism could become a
powerful force. Valliere believes this to be very unlikely. The stakes are simply too high, especially because of the effect on our trading partners. However, he does think the chances of new trade bills are slim.

71. Corporate Political Contributions and Stock Returns (Fall 2007)

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 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.

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 \( i = 1, 2, \ldots, N \)) 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.

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>FF candidates weighted</th>
<th>FF strength weighted</th>
<th>FF ability weighted</th>
<th>FF power weighted</th>
</tr>
</thead>
<tbody>
<tr>
<td>All candidates portfolio</td>
<td>0.0021</td>
<td>0.0017</td>
<td>0.0022</td>
<td>0.0021</td>
</tr>
<tr>
<td></td>
<td>(2.82)</td>
<td>(2.32)</td>
<td>(3.18)</td>
<td>(2.86)</td>
</tr>
<tr>
<td>Democratic portfolio</td>
<td>0.0021</td>
<td>0.0018</td>
<td>0.0024</td>
<td>0.0022</td>
</tr>
<tr>
<td></td>
<td>(2.97)</td>
<td>(2.55)</td>
<td>(3.41)</td>
<td>(3.01)</td>
</tr>
<tr>
<td>Republican portfolio</td>
<td>0.0020</td>
<td>0.0017</td>
<td>0.0021</td>
<td>0.0021</td>
</tr>
<tr>
<td></td>
<td>(2.67)</td>
<td>(2.16)</td>
<td>(2.94)</td>
<td>(2.76)</td>
</tr>
<tr>
<td>House portfolio</td>
<td>0.0021</td>
<td>0.0018</td>
<td>0.0022</td>
<td>0.0021</td>
</tr>
<tr>
<td></td>
<td>(2.84)</td>
<td>(2.39)</td>
<td>(3.16)</td>
<td>(2.86)</td>
</tr>
<tr>
<td>Senate portfolio</td>
<td>0.0020</td>
<td>0.0016</td>
<td>0.0023</td>
<td>0.0021</td>
</tr>
<tr>
<td></td>
<td>(2.71)</td>
<td>(2.08)</td>
<td>(3.09)</td>
<td>(2.84)</td>
</tr>
</tbody>
</table>

And

**Party Influence in Congress and the Economy (Fall, 2007)**

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.

73. National Politics Today – As I See It (Spring 2007)

Mary Cahill introduced the after dinner speaker, Cynthia Tucker, Editorial Page Editor, The Atlanta Journal-Constitution. Her topic was “National politics today – As I see it”. After a few general comments on presidential candidates, she turned to two public policy issues that we are not likely to hear about during the presidential campaign.

The first issue concerned which men and women we Americans will depend on to defend us. Will we continue to draw on working Americans while the rest of us contribute very little? How will we maintain our military strength? We simply do not dare to deal with these questions. We do not dare to question the sufficiency of our military, and we do not dare mention a draft. A draft would mean a widely shared sacrifice to defend our county.

Enlisted men and women are largely drawn from families earning about $32,000
a year. They are not the poorest of the poor. But we are now accepting poorly educated candidates, and indeed many with criminal records. If those entering the military came from a broad middle-income class we would never have invaded Iraq. If we were truly serious about our country we would have a much greater military. If we had gone into Afghanistan the right way, we could not have gone into Iraq. And we don’t have the resources to deal with Korea.

These issues and questions say a lot about the character and morality of the United States. We are complacent at sending young men and women off to fight and die, while the rest of us are called on for no sacrifices. We are influenced by an economist’s observation that we send off to fight for us “low cost” bodies. We are not likely to hear about this during the coming campaign.

The second major issue concerns the growing income (prosperity) gap in the U.S. As the campaign progresses, we will hear about loss of jobs to overseas. But we are reluctant to face the bottom end of the economic scale in the U.S. Many Americans are doing well, and some claim that working class Americans are better off today than they have been in the past. There has however been a systematic loss. Wages and salaries have decreased as a share of GDP, while corporations are doing better. Working people are simply not sharing in the prosperity. They are losing health care and retirement benefits. The long-lasting factory jobs that provided significant benefits are decreasing. This loss is more important than the TV sets and cell phones working people are purchasing.

Tucker said she supports free trade, but we need to consider the consequences to the middle class who are employed in industry. Following World War II a shared prosperity fostered the “American Dream.” This dream was essential to the civil rights movement. We need to preserve that dream and the shared prosperity. But again, this is not a topic that is likely to be discussed in the campaign.

She turned next to the campaign itself. The acceleration of primaries, particularly in California, New York and Florida will give us presidential candidates by next March. She doubts that Obama has the experience to become President or Vice-President this time around. Clinton carries some baggage. In addition, the first woman to be President must be seen as tough, perhaps like Margaret Thatcher.

A year ago Tucker would have said that McCain would win. He may indeed get the backing of the Bush machine, but he is actually running behind Giuliani these days. The conservatives are not happy with him, and Giuliani may well get the nomination. Does Gore have a chance? Possibly, if Clinton fades.

Quantitative Tools for Portfolio Management

74. Rebalancing and Asset Allocation (Fall 2008)


Page and his coauthors address a nagging problem in portfolio management. Institutional investors using mean-variance analysis to determine optimal portfolio
weights, find almost immediately upon implementation, that the portfolio’s weights become sub-optimal: changes in asset prices cause the portfolio to drift away from the optimal targets. In a world without transaction costs, the manager would rebalance continuously. However, in practice, managers generally use informal rules, heuristics, to deal with this problem. The authors compare these rules to solutions from dynamic programming.

To begin, they describe how dynamic programming can be used to identify an optimal rebalancing schedule, which significantly reduces rebalancing and sub-optimality costs compared to naïve heuristics. Unfortunately, the curse of dimensionality prevents applying dynamic programming to more than a few assets. The problem is shown in the chart that follows.

<table>
<thead>
<tr>
<th>Number of Assets</th>
<th>Number of Portfolios</th>
<th>Number of Calculations to Perform</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>101</td>
<td>5,620,751</td>
</tr>
<tr>
<td>3</td>
<td>5,151</td>
<td>14,619,573,351</td>
</tr>
<tr>
<td>4</td>
<td>176,851</td>
<td>17,233,228,186,751</td>
</tr>
<tr>
<td>5</td>
<td>4,598,126</td>
<td>11,649,662,254,243,700</td>
</tr>
<tr>
<td>6</td>
<td>96,560,646</td>
<td>5,137,501,054,121,460,000</td>
</tr>
<tr>
<td>7</td>
<td>1,705,904,746</td>
<td>1,603,471,162,336,350,000,000</td>
</tr>
<tr>
<td>8</td>
<td>26,075,972,546</td>
<td>374,655,945,665,079,000,000,000</td>
</tr>
<tr>
<td>9</td>
<td>352,025,629,371</td>
<td>68,281,046,097,460,800,000,000,000</td>
</tr>
<tr>
<td>10</td>
<td>4,263,421,511,271</td>
<td>10,015,396,403,505,300,000,000,000</td>
</tr>
</tbody>
</table>

Notes. This table shows the number of portfolios as a function of the number of assets, assuming 1% granularity. It also shows the number of calculations one would need to perform in order to solve the dynamic programming problem for a one-year horizon with 12 time steps.

As an alternative they examine the efficacy of a more sophisticated heuristic called the MvD heuristic, that proposed by Markowitz and van Dijk in 2004. It is a quadratic heuristic for rebalancing a portfolio to capture shifting views about the mean returns of portfolio assets. This heuristic scales up to several hundred assets.

The authors tested the relative efficacy of dynamic programming and the MvD heuristic with data on domestic equities, domestic fixed income, non-US equities, non-US fixed income, and emerging market equities. For these portfolios the expected portfolio return is:

\[ E_p = \sum_{i=1}^{n} X_i \mu_i = X \mu' \]

and the expected portfolio variance is:

\[ V_p = \sum_{i=1}^{n} \sum_{j=1}^{n} X_i X_j \sigma_{ij} = XCX' \]

Where \( X = [X_1, \ldots, X_n] \) is the set of asset weights, \( \mu = [\mu_1, \ldots, \mu_n] \) is the set of expected returns on the \( n \) assets, \( \sigma_{ij} \) is the covariance between assets \( i \) and \( j \), and \( C \) is the covariance matrix (\( \sigma_{ij} \)).

Their tests show that the MvD heuristic performs almost as well as dynamic programming for up to four assets and better than dynamic programming for five assets.

In theory, of course, dynamic programming always yields the best result, but they do not observe these results beyond
a few assets. Therefore, there is no way of determining how the MvD heuristic would compare to the unobservable “correct” dynamic programming solution for many assets. However, they believe that the MvD heuristic is the best alternative by far for rebalancing portfolios with more than just a few assets.

The scalability of the MvD heuristic opens the door to several new applications of portfolio rebalancing. Passive managers could use the MvD heuristic to optimize the tradeoff between tracking error and transaction costs. Quantitative asset managers could use it to minimize alpha decay between rebalancing dates. Plan sponsors in particular could benefit from the MvD heuristic, as they are continually confronted with asset mix rebalancing decisions. Moreover, plan sponsors could customize the optimal rebalancing process to existing tolerance bands, tracking tracking error targets, cash inflows, and benefit payments.

<table>
<thead>
<tr>
<th>Rebalancing Strategy</th>
<th>2 Assets</th>
<th>3 Assets</th>
<th>4 Assets</th>
<th>5 Assets</th>
<th>10 Assets</th>
<th>25 Assets</th>
<th>50 Assets</th>
<th>100 Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic Programming</td>
<td>6.31</td>
<td>6.66</td>
<td>7.33</td>
<td>8.76</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>MvD Heuristic</td>
<td>6.90</td>
<td>7.03</td>
<td>7.58</td>
<td>8.61</td>
<td>25.57</td>
<td>20.38</td>
<td>17.92</td>
<td>12.46</td>
</tr>
<tr>
<td>0.25% Bands</td>
<td>15.19</td>
<td>17.01</td>
<td>19.81</td>
<td>21.37</td>
<td>41.93</td>
<td>42.96</td>
<td>41.53</td>
<td>26.88</td>
</tr>
<tr>
<td>0.50% Bands</td>
<td>14.11</td>
<td>15.75</td>
<td>17.81</td>
<td>18.92</td>
<td>41.73</td>
<td>38.42</td>
<td>31.15</td>
<td>21.82</td>
</tr>
<tr>
<td>0.75% Bands</td>
<td>12.80</td>
<td>14.09</td>
<td>15.32</td>
<td>16.27</td>
<td>40.05</td>
<td>32.95</td>
<td>31.46</td>
<td>25.02</td>
</tr>
<tr>
<td>1% Bands</td>
<td>11.54</td>
<td>12.52</td>
<td>13.15</td>
<td>14.13</td>
<td>37.71</td>
<td>31.95</td>
<td>36.74</td>
<td>29.47</td>
</tr>
<tr>
<td>2% Bands</td>
<td>8.73</td>
<td>9.20</td>
<td>9.79</td>
<td>10.73</td>
<td>41.94</td>
<td>48.59</td>
<td>66.96</td>
<td>39.33</td>
</tr>
<tr>
<td>3% Bands</td>
<td>8.51</td>
<td>8.66</td>
<td>10.14</td>
<td>11.43</td>
<td>61.29</td>
<td>73.78</td>
<td>89.03</td>
<td>41.54</td>
</tr>
<tr>
<td>4% Bands</td>
<td>9.46</td>
<td>9.52</td>
<td>12.08</td>
<td>13.78</td>
<td>88.49</td>
<td>93.23</td>
<td>98.55</td>
<td>41.96</td>
</tr>
<tr>
<td>5% Bands</td>
<td>11.20</td>
<td>11.21</td>
<td>14.80</td>
<td>16.77</td>
<td>120.19</td>
<td>106.38</td>
<td>102.38</td>
<td>42.03</td>
</tr>
<tr>
<td>Monthly</td>
<td>15.65</td>
<td>17.25</td>
<td>20.07</td>
<td>21.85</td>
<td>41.92</td>
<td>42.92</td>
<td>43.34</td>
<td>39.75</td>
</tr>
<tr>
<td>Quarterly</td>
<td>11.05</td>
<td>11.86</td>
<td>13.51</td>
<td>14.76</td>
<td>45.17</td>
<td>34.32</td>
<td>33.12</td>
<td>26.54</td>
</tr>
<tr>
<td>Semi-annually</td>
<td>11.13</td>
<td>11.53</td>
<td>12.67</td>
<td>13.95</td>
<td>69.97</td>
<td>40.75</td>
<td>37.33</td>
<td>24.41</td>
</tr>
</tbody>
</table>

Notes. This table shows results for 5,000 Monte Carlo simulations. For the 10 through 100 asset cases, which employ equally weighted portfolios of stocks drawn from the S&P 500, a dynamic programming solution is unachievable.

Retirement Investing

75. Lifetime Consumption and Investment for Retirement (Fall 2010)

Philip H. Dybvig, Boatman Bancshares Professor of Banking and Finance, Olin School of Business, Washington University, Saint Louis, presented “Lifetime Consumption and Investment for Retirement” coauthored with Hong Liu, Washington University in Saint Louis. Dybvig had previously presented a paper at the Q-Group® seminar in the Spring of 2002.

Dybvig says life-cycle investing is extremely important but neglected in the academic literature, primitive in practice,
and quantitatively challenging. His objective in the research is to build quantitative models of the individual choice problem. Though, he acknowledges, while these models may not be rich enough to apply directly in practice, they provide important economic insights into lifetime consumption and help in answering questions about retirement, pensions, and insurance.

Dybvig’s model includes a choice of voluntary or mandatory retirement date, a nonnegative wealth constraint on borrowing, an idealized hedge using life insurance, a potential bequest motive, and it can handle wages and mortality that vary randomly over time. The main results of his work show flexibility in retirement.

- Working longer when the economy is bad
- Human capital (the present value of the rest of working life wages) has a negative beta
- Young people would like to hedge negative beta with a long stock position
- Borrowing constraint limits hedging opportunities and tempers the portfolio choice
- Risky human capital reduces or reverses all of these effects
- Discontinuity of portfolio choice at retirement
- Closed form solution

The model used for this research is more limited and has:

1. Constant wages (over time and states of nature), somewhat like, Dybvig says, a tenured academic’s salary.
2. Constant mortality rate.
3. Retirement that is either mandatory (fixed) or voluntary.
4. Insurance that is fairly priced and continuously available.
5. No bequest.

Dybvig clearly lays out the model and all of its notations and assumptions. First for voluntary and then mandatory retirement he demonstrates in some detail how the portfolio choices are made and the resulting magnitude of financial wealth that should be in the equity portion of the portfolio. To demonstrate the outcomes he provides a series of graphs showing the equity proportion under different levels of wealth and borrowing constraints, as shown in the following example. On the y axis is equity relative to wealth plus human capital, and on the x axis is financial wealth. NBC is the model with no borrowing constraints, BC, with borrowing constrained. He notes the following, in the BC version with low wealth, there is no use hedging. As the wealth increases, so does the equity proportion of the portfolio, until the two versions converge.

Equity per total wealth against financial wealth

\[
\frac{\theta}{W+H}
\]

Where

\[W = \text{financial wealth, and} \]
\[H = \text{human capital.}\]

This is only one of several graphs that
examine the implications of the model results. With a nod to the current economy, Dybvig says that human capital pays off more when the market is down and less when it is up.

In conclusion, Dybvig says this model is able to accommodate:

- Voluntary or mandatory retirement date.
- Nonnegative wealth constraint on borrowing.
- Idealized hedging using life insurance.
- Bequest motive or not.
- Wage and mortality varying through life and stochastic wages over time.

76. Retirement Investing: Analyzing the “Roth” Conversion and Re-characterization Options (Spring 2010)


Spatt and his colleagues shed light an array of fundamental issues raised by the 2010 opportunity to convert a traditional IRA into a Roth IRA by paying ordinary income taxes on the market value of the assets being converted at the time of conversion. This research examines the costs and benefits of converting to a Roth IRA from a traditional tax-deferred account and analyzes the optimal conversion decisions under various circumstances absent the re-characterization option, an option that allows those who convert from a traditional IRA to reverse that conversion at the individual account level up to the final income tax filing deadline for that year. As a result of their research, they find that the optimal conversion implications are much more subtle than commonly perceived and volatility is valuable for positions that can be re-characterized. In fact, they contend the potential for re-characterization leads to substantial optionality for investments in certain tax-deferred accounts, thus raising the following questions about financial planning and the impact on potential government revenues:

1. Under what circumstances is conversion a beneficial strategy for investors?
2. How should converted funds be invested?
3. When is re-characterization optimal?
4. What are the implications for the use of traditional and Roth tax-deferred investments over time?
5. How does the removal of the income cap for conversion influence the temporal structure of income tax revenues?
6. How does the re-characterization option influence the stochastic structure of tax revenues?

Since the decision to convert a traditional into a Roth IRA ultimately depends upon whether the conversion leads to higher after-tax wealth for the individual at retirement, Spatt first derives the after-tax wealth at retirement for a traditional IRA and then for a Roth conversion.
**Strategy 1: Retain the Traditional IRA**

After-Tax Value of Traditional =

\[ V_0 (1+r)^N (1-T_{p,N}) \]

Where

- \( V_0 \) = Current market value of the IRA
- \( r \) = Realized (geometric) average annual pre-tax rate of return on IRA assets
- \( T \) = Individual’s ordinary tax rate during retirement.
- \( N \) = Number of years to retirement

**Strategy 2: Convert to a Roth IRA and pay ordinary income tax on the market value of the IRA assets paying the tax and any penalty with:**

- IRA assets with an immediate reduction in the value of the assets.
- Non IRA or borrowed assets, leaving the value of the IRA assets unchanged.

While much of the Spatt analysis assumes the conversion decision is now or never, some individuals may be better delaying the conversion: those under age 59½ using IRA assets and subject to the 10 percent penalty for early withdrawal; those older than 59½ who expect their ordinary tax rate to decline further prior to retirement. For those financing the Roth conversion tax from non-IRA assets it makes sense to convert only if the ratio of the future to current ordinary tax rate is above some critical level that varies with the embedded capital gains in the IRA. Spatt provides the following chart showing the critical tax ratios for different retirement horizons and different asset returns.

A Roth conversion has some additional important benefits. One such benefit is the potential reduction of estate taxes, using the “income in respect to a decedent deduction.” This allows the IRA beneficiary of a traditional pre-tax IRA account to deduct the estate taxes paid on IRA assets against future taxable
withdrawals from the IRA account. While this deduction is designed to reduce the burden of double taxation (income and estate taxes) on IRA assets, it can also reduce the value of a Roth conversion.

Spatt then turns to the re-characterization option, and makes several very important points:

- Since a conversion can be made any time during a year, the earlier in the year the conversion takes place the higher the value of the option to re-characterize.

- Re-characterization can be particularly valuable when asset values decline following the original conversion. Thus, it is useful to locate volatile assets in a tax-deferred account, indeed in many tax deferred accounts, until the re-characterization option expires (or otherwise has little value). This conclusion, Spatt says, is quite different from traditional asset location advice.

- An investor who does not re-characterize foregoes a series of future conversion and re-characterization options and their value.

- Since volatility in accounts is valued in the IRA, diversification should be across accounts rather within each account.

To the extent that conversion and especially re-characterization provide useful choices to investors, those options come at the expense of the government’s revenue. The revenue effect may be especially strong in the first two years because the tax liabilities from initial year conversions are spread over two years. Spatt notes that it is important to recognize that the time profile of the revenue effects is stochastic because the decisions about whether to exercise a re-characterization option depend upon the price movements.

In conclusion, Spatt says that anyone considering converting to a Roth IRA should understand that it is not just a trade between the immediate tax cost and future tax benefits. Indeed, the simple heuristic that Roth conversions are beneficial when the ordinary tax rate in retirement is expected to be more than the current rate may not be true and must be analyzed considering what assets are used to pay the taxes, the impact on estate taxes and the option for re-characterization if the situation changes.

In some situations a Roth conversion, he says, can be beneficial even if the ordinary tax rate in retirement is expected to be less than the current ordinary tax rate. The reason is that the payment of the tax on the Roth conversion using non-IRA assets is equivalent to allowing the individual to scale up his/her IRA savings, which has the advantage of earning pre-tax returns.

77. Portfolio Choice in Retirement: Health Risk and the Demand For Annuities, Housing and Risky Assets (Fall 2009)

Labor income risk has been adequately dealt with in life-cycle theory during the working phase of life. However, there has been little corresponding work on health risk in the retirement phase. Yogo began by saying that the lack of work in this area is particularly troublesome for public policy makers and those grappling with potential reform of health care and Social Security. This is not just a policy issue: those who create financial products that ensure the financial security of retirees should consider health risk in life-cycle product design and the design of other products including such things as annuities (including deferred and variable), reverse mortgages, long-term care insurance, and life insurance.

In his presentation Yogo undertook to do three things:

1. Explain the entire investment portfolio composition (bonds, stocks, annuities, and housing) using a positive rather than normative analysis.
2. Create a realistic model of health risk where health expenditures are an endogenous response to health shocks, and retirees who can adjust health expenditures in response to changes in health and wealth and may be able to change the distribution of future health outcomes through investment in health.
3. Address the “annuity puzzle:” why so few people purchase fixed, immediate, lifetime annuities for their retirement portfolios.

To understand investment portfolios held by individuals, he provided the following chart.

<table>
<thead>
<tr>
<th>Age</th>
<th>Stocks</th>
<th>Investment Funds</th>
<th>Retirement Accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 35</td>
<td>$ 3.0</td>
<td>(13.7 %)</td>
<td>$ 18.0 (5.3 %)</td>
</tr>
<tr>
<td>35-44</td>
<td>$15.0</td>
<td>(17.0 %)</td>
<td>$ 22.5 (11.6 %)</td>
</tr>
<tr>
<td>45-54</td>
<td>$18.5</td>
<td>(18.6 %)</td>
<td>$ 50.0 (12.6 %)</td>
</tr>
<tr>
<td>55-64</td>
<td>$24.0</td>
<td>(21.3 %)</td>
<td>$112.0 (14.3 %)</td>
</tr>
<tr>
<td>65-74</td>
<td>$38.0</td>
<td>(19.1 %)</td>
<td>$ 86.0 (14.6 %)</td>
</tr>
<tr>
<td>≥ 75</td>
<td>$40.0</td>
<td>(20.2 %)</td>
<td>$ 75.0 (13.2 %)</td>
</tr>
</tbody>
</table>

Source: 2007 Survey of Consumer Finances, thousands of dollars

The size of the investments for older individuals was surprising to those in attendance at the seminar. Yogo pointed out that housing was retirees’ most important asset, and described health care choices as depending on both wealth and state of health. The retirees’ problem is to maximize health relative to wealth. In his model he maximized expected discounted utility over retirement until death, assuming that:

1. The individual owns and lives in a home that is subject to realistic housing price risk, and can sell, upgrade or borrow up to 20 percent of the value of the home.
2. Health is an accumulation process where exogenous shock in each period has a distribution that depends on previous health.
3. The individual is able to improve health at the margin through technology.
4. Cost depends upon health insurance (primarily Medicare).

Key choice variables included consumption, health expenditure, and wealth including bonds, stocks, annuities, and housing.

Endogeneity was important to Yogo’s work for several reasons. First, it reduced background risk arising from health. Second, it reduced overstatement of market incompleteness that comes with exogenous health expense models that overstate the importance of liquid assets relative to illiquid assets (annuities and housing). Third, it created more useful models for policy and welfare analysis. Fourth, it provided an alternative market structure (e.g., new financial products or Social Security reform) that can change the endogenous accumulation of wealth.

Yogo’s data came from a study of retired single females born from 1891 to 1940 and aged 65 or older who were interviewed every 2 years about health, health expenditures, health insurance and health status. He provided provocative charts showing the health transition probabilities in the absence of health investment for self reported health, two of which are shown below. The first chart shows the transition over time for those who self reported poor health, the second for those reporting that their health was excellent.

Yogo used an ordered probit model to estimate transition probabilities between health status, while controlling for observables and health investment. He compared his results to study data from HRS, and found that his benchmark model results were consistent with the RAND HRS Data File (National Institute for Aging and the Social Security Administration) data. A variety of model calibrations were used. The chart below shows the model calibrated for initial endowment. The color highlights the data and model results for the oldest age group.
From his analysis Yogo concluded that:

1. The life cycle model with health risk explains the cross-sectional distribution and the joint dynamics of health expenditure, health, and asset allocation in retirement.

2. A realistic calibration with health risk and a bequest motive reduces the size of the “annuity puzzle”: why so few people purchase fixed, immediate, lifetime annuities for their retirement portfolios.

3. There is a link between annuities and health care: the same frictions that prevent private annuitization increase the demand for healthcare.

78. **Optimal Portfolio Choice over the Life Cycle with Social Security** (Spring 2009)

Kent Smetters, Associate Professor of Insurance and Risk Management, The Wharton School, University of Pennsylvania, presented “Optimal Portfolio Choice over the Life Cycle with Social Security,” a paper he had written with Ying Chen, a doctoral candidate at The Wharton School. Smetters had previously presented a paper at the Fall 2005 seminar of the Q-Group®.

Smetters provided the following motivation for his presentation on optimal portfolio choice:

- Over the lifecycle optimal portfolio choice has a large impact on expected utility; hence, it has been highly studied.

- Optimal portfolio choice is central to financial planning, especially for non institutional accounts (households).

- The wrong guidance about optimal portfolio choice can have a substantial impact on lifetime utility, much like a large tax.

- The growth of Target Date Funds assumes we know the answer, although Smetters takes a contrarian view.

Smetters is particularly concerned given the increase in solution funds, target date funds, as shown below:

In this presentation Smetters looks at an enduring question: how households should optimally allocate their portfolio choices over their lifetime. The investment choice of savings is among the most important decisions over the investor’s lifecycle. Not surprisingly, a considerable literature has examined how households should optimally allocate their savings.
between stocks and bonds over their lifecycle. Typical lifecycle models have the allocation toward stocks starting high early in life and declining over a person’s life as human capital depreciates. Moreover, these models suggest that the share of savings devoted to stocks should be roughly independent of full lifetime income. However, Smetters says the empirical evidence indicates more of a “hump” shaped allocation: the share of savings devoted toward stocks starts low early in life, peaks in midlife, and declines toward retirement as shown below for one of his three education differentiated groups. The stock allocation data is derived from the U. S. Survey of Consumer Finances from 2004.

Smetters reconsiders the portfolio choice allocation in a computationally challenging lifecycle model he developed in which households face uninsurable wage shocks and an uncertain lifetime. Most important to the analysis, Smetters includes a progressive social security system that is wage indexed before retirement, as in many pay-as-you-go systems including that of the United States. Social security benefits, therefore, are correlated with stock returns at the low frequency that is relevant for lifecycle retirement planning. The model attempts to closely replicate these key facts of portfolio choice.

1. The share of a household portfolio invested in equities is much less than 100% for most households.
2. The lifetime poor invest in fewer equities than richer households.
3. The share of portfolios invested in risky assets tend to be “hump shaped” (or “inverse U”) in age.

Smetters finds that the wealth-income ratios increase with age and education and the shape of the accumulation profiles suggest a significant bequest motive that increases for those with more education.
Smetters developed a model that better matches the actual behavior of investors over time than do the traditional models that underlying most target date funds. His model’s simulated wealth-income ratios appear to match the actual data fairly closely for the education-based calibrations. From this, Smetters concludes that his adjusted life cycle model is able to more closely replicate the key facts of portfolio choice relative to alternative specifications.

This paper considers the wage indexation that has not been considered in the previous literature due to the additional computational complexity it brings. The authors conclude the following:

- A wage-indexed social security system provides a retirement asset that is highly correlated with stock returns, thereby reducing the demand for stocks by most households.
- This effect is especially strong for lower-income households who derive most of their retirement income from social security due to its progressive benefit structure. For poor households (many of whom don’t have access to employer-based defined-contribution retirement plans), we also investigate how a realistic minimum investment account requirement in stocks reinforces the pattern observed in our model.
- The correlation between social security and equity returns is larger at younger ages, reducing the demand for equity. As benefits begin to accrue at higher ages and the horizon toward retirement becomes shorter, social security benefits begin to become more substitutable with bonds, thereby increasing the demand for equities. Closer to retirement, human capital has depreciated, making stocks less attractive again.
Smetters is aware that some may object to their positive findings by arguing that few people actually understand the complexities of how their social security benefits are calculated. To which he agrees. He concludes, however, the average household might already be holding something close to the optimal portfolio. As a result, very little change is needed in their behavior to make it optimal.

79. Financial Liquidity and Savings: Evidence From 401(k) Loans (Fall 2008)

Brigitte Madrian, Aetna Professor of Public Policy and Corporate Management, John F. Kennedy School of Government, Harvard University and NBER, discussed her paper “Financial Liquidity and Saving: Evidence from 401(k) Loans,” coauthored with John Beshears, Harvard University, James J. Choi, Yale University and NBER, and David Laibson, Harvard University and NBER.

The authors examine the impact on savings outcomes of the liquidity provided to 401(k) savings plan participants through 401(k) loans. Borrowing from defined contribution savings plans, including 401(k) plans, has long been permissible, and such loans are prevalent: the Investment Company Institute reported that 18 percent of 401(k) participants had a 401(k) loan in 2006. The recent economic slowdown seems to have caused the fraction to rise. This increase, coupled with the introduction of the 401(k) debit card, has resulted in concern that easy access to one’s retirement nest egg will lead to excessive consumption in the present at the expense of future financial security. Some in the Congress have proposed limiting the number of outstanding 401(k) loans to three per participant and banning 401(k) debit cards outright.

To begin, Madrian set out the nature of a 401(k) loan: terms are set by individual savings plans, within certain regulatory bounds. Qualified retirement savings plans may provide plan participants with the option of obtaining one or more loans against their plan balances.

Madrian reports that their research suggests that 401(k) loans may be a reasonable source of credit in many circumstances, and that the net impact of 401(k) loans on asset accumulation is likely to be small for a reasonable range of assumptions. Their empirical analysis also suggests that it may be possible to structure the provision of 401(k) loans in ways that reduce their potentially negative impact on retirement wealth accumulation. Intuitively pleasing, they find that loan utilization is higher in plans that have lower minimum loan amounts and in plans that allow employees to take out multiple loans, and 401(k) loan utilization is lower in plans that have higher loan interest rates.

Madrian and her coauthors use data on 401(k) plans and loans against them from a variety of sources. Different sources provided data on 401(k) loans at the participant, administrative, firm, and household levels. They provide details for each data source.

Due to the difficulties with the data, Madrian reports that “The only thing that seems clear… is that 401(k) loan availability has grown over time. What is less clear is exactly how many participants had a loan option available at any particular point in time.” However, drawing on their various data sources, they begin with a veritable primer on 401(k) loan characteristics.
Following the basic descriptive data obtained from the sources, Madrian then turned to some basic questions important when considering the impact of 401(k) loans:

1. When does a 401(k) loan reduce borrowing costs compared to other sources of liquidity?
2. How do 401(k) loans affect overall retirement wealth accumulation?
3. How do 401(k) loans affect individual utility?

Madrian describes the process for evaluating the welfare consequences of using different sources of credit. A model compares after-tax dollars available for consumption in Period 2 assuming the consumer takes out a loan in Period 1 and repays it Period 2, liquidating all 401(k) balances for consumption. They posit that the net advantage of the 401(k) loan relative to an alternative source of credit depends on the interest rate on the alternative source of credit, the rate of return on assets in the 401(k) plan, the interest rate on the 401(k) loan, and the tax rate. They find that the 401(k) loan:

- Is more attractive as the interest rate on the alternative source of credit increases.
- Is less attractive as the
  - Rate of return on assets within the 401(k) plan increases because the opportunity cost of using 401(k) balances to fund the 401(k) loan increases.
  - Interest rate on the 401(k) loan increases because the interest payments on the 401(k) loan are taxed twice: payments are made with after-tax dollars, and they are taxed again when distributed. The actual interest,
of course, goes to the 401(k) borrower’s account from which the loan was made.

- Varies depending on the magnitude of the 401(k) loan interest rate relative to the rate of return on assets in the plan: a higher tax rate increases the cost of the double taxation of 401(k) loan interest payments, but it also reduces the opportunity cost of giving up the rate of return on plan assets by taking out a loan.

They provide various tables to show the relative importance of each factor.

Madrian says that much of the recent criticism of 401(k) loans has been made on the grounds that 401(k) loans are easy credit. As such, loan provisions induce individuals to consume more today than they otherwise would have consumed, implicitly reducing saving. They find that the negative “savings effect” is actually ambiguous. The existence of a loan option produces a number of consequences for wealth formation with offsetting effects. However, four are potentially large:

1. Enrollment effect (+): The existence of a loan option may increase 401(k) participation, since a loan option increases the flexibility (and hence the value) of 401(k) savings.

2. Contribution rate effect (+): The existence of a loan option may increase average 401(k) contribution rates since a loan option increases the effective liquidity of 401(k) savings.

3. Credit availability effect (-): The existence of a loan option may increase the likelihood of borrowing, since a loan option makes 401(k) savings liquid.

4. Repayment crowd-out effect (-): The repayment of a loan may crowd out existing savings flows.

Madrian concluded with questions for future research:

- How does having a loan option affect 401(k) participation?
- How does having a loan option affect contribution rates? Does having a 401(k) loan option encourage consumption that otherwise would not have taken place? Or do 401(k) loans largely represent efficient financing of consumption that would have occurred even in the absence of a 401(k) loan option?
- What fraction of loans is repaid and what fraction experience default? How does this compare to the default rates on alternative sources of financing?

80. Life Cycle Funds (Spring 2008)


Viceira began his presentation with the historic context that forms a basis for life-cycle (also called age-based) investing: the shift from defined-benefit plans, where the sponsor defines the benefits and makes the investment decisions for the funding pool, to defined-contribution plans where the beneficiary largely or totally assumes the risk of making the investment decisions. He provided the chart below to demonstrate the changes in the use of the two types of funds since 1983.
He reported that while the self-directed defined contribution system rests on employees being able to make sound investment decisions, the evidence of their skill “reads like a catalog of personal investing maladies.” He provided some statistics to support that conclusion:

- Low savings and low contribution rates.
- In 2004 the median balance of 401(k) accounts was $35k for accounts with non zero balances, and $73k for households headed by adults age 55-59.
- Money was left on the table by participants.
- Inertia (i.e., too infrequent rebalancing; choosing default option in plan).
- Excessive holdings of own company stock.
- Naïve diversification (equal weighting of choices in plans) and performance chasing.
- Lack of financial sophistication (e.g. considering that the employer’s stock is safer than a diversified bond).

The challenge Viceira stated is whether it is possible to merge the good characteristics of the defined benefit plan and professional money management quality into a self-directed defined contribution plan, while still maintaining portability and cost efficiency.

A solution to the problem he said, is life-cycle investing: investing in professionally managed funds where asset allocation is a function of retirement horizon and is independent of risk tolerance. These life cycle funds typically increase bond allocations as the investor moves toward retirement age as shown below:
Life-Cycle Funds: Age-Based Investing

Asset allocation is a function of retirement horizon, and independent of risk tolerance.

The authors, based on their analysis of life-cycle funds, conclude that changes are needed to the design of life-cycle funds and life-style funds. One such change is to incorporate the participant’s bond-like labor earnings into the asset mix analysis of their fund’s investments. These are left out of current funds that are available. Most prior work on life-cycle investing Viceira reported treated labor earnings as exogenous. The authors assert this should not be, and in addition, there should be different allocation strategies based on the labor earnings certainty. They go on to point out other important omissions in the current offerings, such things as lifespan, risk aversion, and individual tax rates.

Viceira described a model that incorporates an uncertain lifespan, the leisure/consumption choice, and individual’s relative risk aversion with respect to consumption, the investment choices of riskless bonds and stock, and the investor’s tax rate. The model treats housing and other durables consumption expenditures as exogenous, “off-the-top” spending, by subtracting it from disposable income. Two other things are treated as exogenous: retirement age; the level of social security benefits. In their model they assume that the investor is 21, will retire at 65, and will die for sure by age 100. The authors use the mortality tables of the National Center for Health Statistics to parameterize the conditional survival probabilities from 65 until death, and average labor supply over the life cycle that matches the average annual male working hours reported in the Consumer Expenditure Survey, and other data for housing expenditures.

They recalibrate the optimal portfolio allocation to stocks over the life cycle generated by their model and conclude that
investors receiving pension income should increase their allocation to stocks as they age and spend down their assets with no diminution of social security income. They do note, however, that their model does not account for potentially large financial liabilities generated by healthcare costs in retirement. This, they conclude, would likely reduce the investor’s willingness to invest in stocks in retirement. The charts below show the difference in their model including riskless and risky human capital.

In analyzing the robustness of the model and its execution, Viceira reported implications for the model for inflation, different investment styles, international diversification, mean reversion of equity returns, and investors’ risk preferences.

From these implications they conclude that life cycle funds should be customized. They recommend the following:

- The target date for the fund should not be retirement but length of the investor’s life.
Since inflation can have a major impact on wealth over time, TIPS are the riskless asset for long-term investors and should be at the very core of conservative portfolios.

Life-cycle funds should be customized into industry or employer-specific funds to account for disparity in the correlation of human capital with stock returns.

Since equity market risk is time dependent, in the long-term investors should allocate more to equities, on average, adjusting allocations as market conditions change.

Uncertainty around mean reversion calls for the introduction of moderate, low frequency, “strategic” tilts to equity allocations.

Life-cycle funds and life-style funds should include a healthy allocation to currency hedged international equities.

Life-cycle funds should allow for heterogeneity in risk tolerance and in human capital characteristics.

81. The Theory of Life-Cycle Saving and Investing (Spring 2008)

Paul Willen, Federal Reserve Bank of Boston distributed and presented “The Theory of Optimal Life-Cycle Saving and Investing” he coauthored with Zvi Bodie and Jonathan Treussard of Boston University. This paper takes a quite different approach to the examination of life-cycle investing from the one Viceira introduced in the previous session.

In this paper the authors argue that economic theory offers important insights and guidelines to policymakers, financial service firms that produce life-cycle financial products, advisors who make client recommendations, those helping the public make informed choices, and consumers. The authors led off with the following questions for consumers:

- How much of their income should they save for the future?
- What risks should they insure against?
- How should they invest what they save?
- Should they buy or rent a house?
- Should they choose a fixed-rate mortgage or an adjustable-rate mortgage?

They address these issues in the paper and highlight them through examples. They:

- Discuss the life-cycle model of consumption choice and portfolio selection, emphasizing the central role of consumption in life-cycle planning, suggesting that such funds:
  - Focus not on the financial plan itself but rather on the consumption profile that it implies.
  - View financial assets as vehicles for moving consumption from one time in the life cycle to another.
  - Recognize that a dollar is more valuable to an investor in situations where consumption is low than in situations where consumption is high.

- Highlight the use of financial assets as a means to transfer consumption from times in an individual’s life cycle when consumption is of relatively low value to times when consumption is relatively more valuable (from higher earning periods to lower ones).
Willen discussed examples of how each of the concepts would work when applied to decision making for investors at different stages in their lives. The authors expanded these examples considerably in the paper.

Before discussing a real world life-cycle planning decision, the authors point out the role of intermediaries in the life cycle investing process. They must, they say:

- Create and price contingent claims,
- Design products
- Construct the securities they have designed and marketed, assuming that firms can produce financial assets more efficiently.

The authors conclude that the purpose of their life-cycle theory is not to provide clear-cut answers but rather to provide a framework for individuals and planners to figure out those answers. In fact, they view the failure to provide simple answers as a virtue of the model: it allows planners to adjust their advice to the enormous variations across households in income, future prospects, health, and even tastes.

The theory, Willen said and described in this paper, only scratches the surface of academic research on the topic, which addresses many real-world problems that they have had to ignore. In particular, they made no mention of the many institutional issues that limit the portfolios available to households. Investors face limits on short sales and on how much of their assets they can use as collateral for loans; trading costs make frequent adjustment of portfolio shares prohibitively expensive. Willen showed, using the life cycle model why home buyers face limits on how much they can borrow as a function of both the value of the house they want to buy and their current income.
At this point Willen turned to the current housing and subprime mortgage markets crisis. He used mortgages and housing price data from Massachusetts that he, and a team of analysts at the Federal Reserve Bank of Boston, used to understand the current crisis. He used the data first to show that while initial assessments showed a debt crisis, what we are experiencing is not a capital market crisis but the result of the deflation of a housing price bubble, stating that even this conclusion may not be supported by later data. He also used their insights together with the life-cycle model, shown below, to illustrate how the model can be used to understand the decisions investors make when foreclosure is looming.

He framed the decision making as a tradeoff between period 1 and 2. The individual can sell or leave the foreclosed home and rent, spending current income. Or, the decision could be to borrow to pay the debt arrears now, and, depending upon the economic future, be better off, and retain their home. This was an illustration of consumption transfer from one period to another, not risk within a period.

82. **The Major Provisions of the Pension Protection Act of 2006: Implications for Pension and Investment Management (Spring 2007)**


He began with some quotations from the Wall Street Journal and other sources highly critical of the new PPA. But as the title of his paper suggests, he believes the criticism to be unjustified. Among his conclusions he said the PPA should improve overall private defined benefit (DB) system and make the defined contribution (DC) somewhat more like the DB. The PPA makes automatic enrollment simpler, and provides a safe harbor from a number of tests, including a non-discrimination test. In November 2006 Watson Wyatt surveyed employers on the matters of automatic enrollment, default investments, and Department of Labor (DOL) proposed regulations. From 95 responses, a number of interesting statistics and observations were derived. The median number of funds offered in a primary DC plan is 15, with an average of 23. About one-third of the plans currently have automatic enrollment. The rest have been dissuaded, mainly by the cost and the
potential legal liability, but about one-half of these are now considering the possibility.

Nearly all (94%) have a default investment in their plan. Most use it for circumstances when the participant has not made a selection. Other uses are for automatic enrollment, rollovers, or changes in investment options or service provider. The most common current default investment is the life cycle fund (38%), followed by stable value (27%), money market (18%) and balanced (8%) funds. Equity-based funds are more common now for use in auto enrollment (70%) than for other purposes, e.g. employee non-selections (47%). If regulation is put in place as published, 48% will have to change their default fund; 53% are considering doing so. The life cycle fund is first choice of the vast majority (94%) of respondents. Nonetheless, some (34% and 18%) said they were still interested in stable value and money market funds, respectively, if allowed by the DOL. The preference for stable value and money market funds is positively related to the respondent-assessed significance of outflows from plans.

Warshawsky described a simulated investment performance comparing Balanced and Life Cycle funds. The simulation assumes:

- Steady contributions of 6% of earnings over a 40-year career, with earnings starting at $40,000 at age 25, growing 4% annually thereafter through age 50 and flat thereafter – best case scenario of no plan leakages and continual work profile.
- Stochastic asset real return based on 1960 – 2004 experience; investment expenses are not included.
- Equity/bond/cash mixes of average Balanced and Life Cycle funds in the marketplace.
- The table shows distribution of account balance outcomes (inflation-indexed) at the end of career. The overall mean is $529K for Balanced fund vs. $515K for Life Cycle; Life Cycle outcome is higher in first two deciles. Balance fund outperforms life Cycle 57.3 percent of the time. But standard deviation for Balanced fund, particularly in the age 55 to 65 period, is much higher than for Life Cycle fund.

Regarding these results, Warshawsky offered the following:

- Other simulations have been done and more are possible. Interpretations are – Life Cycle funds makes more sense for an individual account investor with shortening horizon, but for a longer investment horizon of DB plan sponsor Balanced fund) gives a higher expected return.

With respect to DC plans, despite DB-like features – automatic enrollment and life cycle default investment, higher allowable contributions for older workers, annuities, and diversification of employer securities – even the best-designed and managed “auto” 401 (k) plans still place risks (of investment, point-in-time annuity purchase price, opt-out, cash-out, etc) on plan participants. DC is not a substitute for a DB plan.

Turning to the implications of the PPA for DB plans, Warshawshy said the average funded status of corporate DB plans
in 2005 was 95%, on an ABO basis, according to financial accounting. “Our estimate for 2006 indicates average is above 100% on a PBO basis”. Plan sponsors with an ongoing plan or interested in avoiding complexity probably would want to improve status to around 100% quickly and maintain status going forward to avoid possible benefit restrictions/maximize future funding flexibility/further reduce volatility. Generally, Warshawshy found there is still hesitancy to significantly overfund plans, however, unless the reversion tax is changed.

The environment should stabilize or improve for DB plans – less scope for future systemic abuses (moral hazard) and more sponsor flexibility and less volatility. The Image of plan participants should improve. The legal and regulatory regime is likely to be stable. PBGC financial situation and prospects improved in 2006.

With respect to the fundamental determinants of optimal investment approach for DB plans, investment policy should include:

- Horizon of plan sponsor, its tolerance for risk and structure of liability.
- For well funded active DB plans sponsored by growing companies, equities have an important role to play.
- The example above and other analysis show that required contributions are less volatile under new law than under old law.
- For older or frozen DB plans, more attention to liability is appropriate; this is consistent with signals sent by the PPA.

Moving now to implications for DC plans, Warshawshy raised the question of whether automatic enrollment would become a significant factor in the DC system. For some plan sponsors, auto enrollment plans are probably more costly and administratively burdensome than other safe harbor plans. We do not yet have enough robust information to judge whether auto enrollment will accomplish the public policy goal of increased saving for retirement among lower-income workers, given possible opt-outs, and increase in outflows – loans, in-service “hardship” distributions and cash-outs – over time.

Watson Wyatt predicts that with DOL proposed default investments, more plan participants will tune out on investment information/advice, and trade less frequently. Therefore plan sponsor’s initial choice of default investment in 2007 will be critical.

DOL says that its proposed regulation will result in slightly higher equity allocation. There is, however, an already high share of DC investment in equities – 62 percent at the end of 2005 – little in money market, and Life Cycle and Balanced funds allocate a significant share to bonds.

83. Demographics and Finances of the Baby Boomers (Spring 2007)

The baby boomers form an unusually large cohort of individuals born between 1946 and 1966. The book provides a detailed and thoughtful assessment of how the 77 million baby boomers will fare in retirement. Actually, there are three cohorts of interest today. Those born between 1936–1941, for which we have a study, a second consisting of those born between 1942–1947 (the war babies) for which we have another study, and the early boomers born between 1943–1953, for which we have a study performed in 2004.

It seems that the early members of the boomer generation are better educated, more ethnically diverse and less likely to be married than previous cohorts. They also have significantly higher earnings, housing values and net worth than their earlier counterparts and they are expected to continue working longer. On the other hand, although boomers are better off than their forebears in terms of wealth levels, this wealth will not be enough to guarantee retirement security. There are important pockets of vulnerability and these appear to be growing.

Health prospects for the boomers are mixed. Boomers are smoking less than their predecessors but obesity is an increasing problem, together with diabetes and self-reported pain. But the fraction of boomers reporting a work disability fell by 11% compared to earlier respondents. A study by two of the three editors of the volume concludes that boomers are in poorer health than their counterparts a dozen years ago. In particular women tend to report worse health (even if they live much longer). The indication is that boomers have poorer self-perceived health than earlier groups, and the fraction of boomers lacking health insurance is reported as slightly higher than for prior generations.

Turning to retirement financing, the discussion coalesces around pensions and private housing equity. There has been a long-term shift from defined benefit (DB) to defined contribution (DC) plans over the past two decades. This means a shift of capital market and longevity risk to workers.

There are substantial differences in stock market investment among workers, depending on their pension characteristics. Employees covered for a long time in a DB plan hold riskier investments outside the pension. But workers with DC plans invest more in the stock market overall. What seems quite significant is that many workers have little or no idea what they can expect in pension benefits during retirement. One study shows that as many as 1/3 of boomers have not given any thought to retirement prospects even if they are only a few years away. Planning for retirement is positively associated with having more retirement wealth, and this is true across cohorts. Non-planners are concentrated disproportionately among the less educated, those with low income, and households which seem to have been largely unaffected by financial education programs instituted during the 1990s.

The role of home equity in retirement saving is a critical one. Many older persons own their homes and the homes represent a substantial asset. Boomers have more housing wealth than their predecessors but they have borrowed more against their homes. One judgment is that boomers have not acquired enough net worth to keep constant the replacement ratio of net worth to pre-retirement household income. Given boomers longer life expectancies, the result may be that the cohort is worse off in old age. There is evidence that retirees are tapping into their home equity and either spending it or putting it into financial assets.
Turning from reported research to their own judgment, the editors conclude that boomers’ expectations about working into retirement may be realistic. They also find that boomers’ health capital is about as good as it was for earlier cohorts. However, they see a complex picture. While most boomers are relatively well off, there is much dispersion in the data. In addition, many people are still not planning adequately for retirement, and as a result they are failing to save effectively. Many boomers may be vulnerable to old age shocks and have few resources to cope. Boomers have not shown that they can adjust their spending patterns to align these with changing circumstances. They have enjoyed lifetime economic prosperity so many have never had to scrimp and save as did their parents and grandparents. Indeed for many, the whole idea of retirement risk management is unfamiliar. Some in the boomer generation have shown a tendency to spend now and worry about tomorrow later, whereas retirees who experienced the great depression are reluctant to part with their savings.

Mitchell turned to discuss some specific issues she felt to be important. Boomers may not understand or appreciate the value of life annuities. Housing assets might be better used for retirement. Many boomers feel housing is something to be sold only in time of crisis, when it might be sold and turned into a life annuity. Especially among those toward the lower end of the wealth scale, education about retirement planning seems urgently needed.

84. **Participant Reaction and the Performance of Funds Offered by 401(k) Plans (Spring 2006)**

Edwin Elton and Martin J. Gruber, Nomura Professors of Finance, Leonard N. Stern School of Business, New York University have appeared at eleven Q-Group® seminars, the most recent being that in the Spring of 2000. They made available a paper by themselves and Christopher R. Blake, entitled: Participant Reaction and the Performance of Funds Offered by 401(k) Plans.

There are many interesting topics related to private and public pensions. The authors had chosen two: Do companies offer participants adequate choices and do companies offer participants the “right” choices? Their presentation also dealt with the responses of individuals to those choices. There has been a large amount of research on participant behavior, but almost none on the choices given to the participants.

The data selected came from Moody’s survey of pension plans, for 401(k) plans that offer only mutual funds with or without money market accounts, GICs, stable value funds and company stock. 417 of these funds used mutual funds with at least 5 years of data.

The major source of data was the 11-K filings for 401(k) plans with the Securities and Exchange Commission. These filings are required every year for all 401(k) plans that offer company stock as an investment choice. From the plans filed in 1994 through 1999, the authors excluded those where the participant flows could not be identified, plans that offered non-public stock or bond funds, and plans that had less than 4 years of contiguous data or where the plan was a duplicate of another plan offered by the same company. The final sample included 43 plans. From the 11-K filings it was possible to determine the investment choices that were offered by each plan in the sample, the amount invested by
participants in each choice as of each 11-K reporting date, the allocation of new money each year, and the reallocations across existing accounts.

The first question addressed was how well the funds selected by plan administrators perform compared to funds they could have selected. The actions of plan administrators are vitally important to plan participants, since for over 60% of the plan participants the 401(k) plan represents their sole financial asset outside of a bank account. And for many plan participants that have other investments, the 401(k) represents the majority of their financial wealth. Over the 289 plan years examined, there were 215 additions and 45 deletions of funds held. It turns out that on average plan administrators select funds that underperform passive portfolios with the same risk but outperform randomly selected funds from the same category. Much of the outperformance is due to lower expense ratios. The performance measure was a differential alpha. This is the alpha for a mutual fund minus the average alpha for funds of the same general size from the same category.

Administrators add funds that have performed well in the past and drop funds that have performed poorly, and they add categories that have performed well in the past. However after the plans make a change the preponderance of evidence is that deleted funds did better than added funds, although the differences are not statistically significant. There seem to be differences in skill in selecting funds by plan administrators, but the principal predictive power is with the poorer performing plans. Bad performance predicts bad performance.

Turning to participant behavior, an interesting question was the importance of contributions and transfers in determining changes in investment weights. The authors compared the differential alphas for four weighting strategies. These were the actual participant weights, the 1/N method (equal investment in each investment choice), 1/N using the top half of past performance, and 1/N in each category. Participant weights were outperformed by each of the other strategies. But with one exception, the differences in the alphas were not significant. Theory would suggest the benefits of using contributions and transfers to restore the weights that had been altered by investment performance. It turned out, however, that the changes in weights from contributions and transfers were generally in the same direction as the change brought about by investment returns. Furthermore, contributions and transfers were equally important with investment returns in changing investment weights.

Finally, the importance of company contributions in the form of company stock was examined. In all plans, participants in the aggregate had a median investment in company stock larger than they did in other accounts. If the company’s contribution was in the form of company stock, the participants held in company stock a median of 2.75 times the average amount invested in all funds, and participants still added additional money to the stock account.

Overall, there is no significant evidence to indicate participant allocations are superior or inferior to equal investment allocations. So the principal factor affecting the performance of participant 401(k) portfolios is the set of investment choices offered.
Risk Measures and Management

85. Financial Intermediary Leverage and Value-at-Risk (Fall 2008)


When the financial system as a whole holds long-term, illiquid, assets financed by short-term liabilities, a synchronized contraction of balance sheets will cause stresses in the system. Even if some institutions can adjust down their balance sheets, not everyone can since the system has a maturity mismatch. Stressed institutions, what Adrian calls pinch points, suffer a liquidity crisis. Fluctuations in leverage are central, he contends, to understanding financial market distress. He notes that Bear Stearns was precisely such a pinch point in the de-leveraging in March 2008.

Financial intermediaries borrow in order to lend. Hence, they are both debtors and creditors. This bilateral contracting model can then be embedded in a system context to examine liquidity crises. In the typical analysis it is convenient to take the assets of the firm as given in order to focus on the financing decision alone. However, the evidence on the capital structure of financial intermediaries points to a reversal of the usual order. Instead of assets being the driving variable, it is equity. All adjustments in assets take place in shifts in leverage and the resulting fluctuations in assets can be substantial. Adrian cites the contraction of US investment banks balance sheets by 15% between the third and fourth quarters of 1998 (during the LTCM crisis).

Repos are a major funding source to the market-based financial system, and haircuts constrain maximum leverage. The difference between the current market price of the repo and the price at which it is sold is called the “haircut” and fluctuates together with funding conditions in the market. The fluctuations in the haircut largely determine the degree of funding available to a leveraged institution. Dislocations in repo markets can lead to the spreading of crisis.

Adrian describes a theory that ties leverage constraints imposed by haircuts to moral hazard.

- Higher risk increases option value to equity holders, so debt holders respond by increasing haircuts. Empirical evidence links risk to leverage.
- The model gives rise to procyclical leverage in the data for broker-dealers, but not for non-financial corporations.

To look at the impact, they base their model on a principal/agent relationship where both are risk neutral. The agent is a financial intermediary (bank) that finances its operations through collateralized borrowing. By modeling the bank as the agent in the principal agent relationship, they focus on the dual nature of the bank, both as a lender but also as a borrower, but the key is the borrower role.

Given that the minimum stake held by the agent is the “haircut” in a purchase agreement, they solve for both the face value of debt (the promised repurchase price) and the market value of debt (the amount that can be raised by pledging assets). The key determinant of the haircut is the severity of the moral hazard induced by the underlying risks in the environment.
When risks are heightened, moral hazard has a larger consequence. Haircuts must rise so as to restore incentives. Their theory of leverage is a function of the shifts in the risks inherent in the underlying environment.

To leave the probability of default constant, they use the Value-at-Risk rule in which exposures are adjusted continuously to be matched with available capital. Using balance sheet data on Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch and Morgan Stanley they investigate total assets, collateralized borrowing (via repos and other secured borrowing transactions), and leverage defined by the ratio of total assets to equity. Value-at-Risk is their main comparative statistic, and is especially useful since it is widely used by both by private sector financial institutions and by regulators of the Basel Committee.

Adrian provides an elegant exposition of both the theory and model and reports that measures of Value-at-Risk that are computed from the time series of daily equity returns explain shifts in total assets, leverage, and key components of the liabilities side of the balance sheet, such as the stock of repos.

Adrian concludes with the following:

- Leverage is pro cyclical: high when the balance sheet is large.
- Leverage and balance sheet size are both determined by the riskiness of the intermediary’s assets.
- A fall in the permitted leverage of the financial intermediaries as a group can lead to a funding crisis for a constituent that cannot reduce the size of its balance sheet. Thus as funding is withdrawn it can lead to a run on a particular institution that has a mismatch.

86. Alpha/Beta Separation (Spring 2007)

James L. Haskel, Director-Portfolio Strategy, Bridgewater Associates, Inc. proposed that the single greatest improvement to a traditional portfolio is to convert a “bad” risk budget (with risk essentially concentrated in a single asset class) to a “good” risk budget, where risk is highly diversified among asset classes. He pointed out that the risks of traditional portfolios are unnecessarily concentrated in equities and thus highly vulnerable to the fate of the equity market. In other words, beta risk dominates. This is probably not surprising for largely passive portfolios. But it also turns out that active management is unnecessarily tied to underlying asset allocations and is also concentrated in equities and hence beta risk. Separating market risk from active management risk, and reducing each by diversification can result in hundreds of basis points of additional return at the same overall risk.

It may come as particularly surprising that assets that are invested to produce alpha are likely to involve highly significant beta risk and comparably minor alpha risk.

The task then is separating beta and alpha risk. We begin with beta risk. A typical graph of expected total return against expected risk shows cash as the low return, low risk asset, with debt and equity classes, emerging equities, and finally private equity displaying higher expected returns and risks. The classes offering high expected returns appear to demand substantial equity risk. However, Haskell pointed out that the leverage-adjusted expected excess returns for a number of asset classes are comparable to those for equities. Some simulations offered by Haskel showed that we could equal the total
return on a typical portfolio (with significant beta risk) with a diversified beta portfolio with far lower beta risk. The Sharpe ratio for the typical portfolio with a return of 10.8% was 0.40. The Sharpe ratio for a diversified beta portfolio with a total return of 10.9% was 0.70. We could also have constructed a diversified beta portfolio to match the risk of the typical portfolio and increase the total return to 13.9% while holding the Sharpe ratio at 0.70.

Over the past six years there has been a substantial shift toward the diversified beta portfolio in assets under management from essentially zero to ten billion dollars. Bridgewater Associates is not the only organization to make the shift.

Haskel turned next to building a better alpha portfolio. Alpha is a zero sum game in which weaker players lose to stronger players. Our objective is to exploit the ability of alpha managers, while keeping the alpha risk low through diversification. This means making heavy use of both long and short positions. It is important to understand that a degree of leveraging can reduce risk. Once again over recent years, in this case from 1991 to 2007, the diversified alpha approach has replaced and overtaken the traditional approach as a percent of total assets under management.

In response to a question, Haskel suggested that the allocations among the alpha assets depended on confidence in those making the investment decisions. In connection with beta diversification, he said he does not depend upon correlations among asset classes, because these are highly volatile over time. What is more important is the correlation of asset returns to the economic environment.

87. Extreme Bound Analysis (Spring 2007)

Benson Durham, Chief, Monetary and Financial Market Analysis Section Federal Reserve Board, worked from slides entitled “Stock Market Anomalies and Model Uncertainty.” Extreme Bound Analysis (EBA) he proposed as a way to deal with model uncertainty. In explaining the motivation for EBA, he turned to the logic of scientific discovery. Model uncertainty is real. We generally want to build into a model what has already been explained in preceding versions, plus something new. EBA is designed to increase the information set as much as possible in a model, so that when we are given a set of possible factors, \( \chi \), we run \( M \) models following

\[
Y = \alpha_j + \beta_j z + \beta_f f + \beta_x x + \epsilon
\]

Where

- \( Y \) is the dependent variable.
- \( z \) is a “doubtful” variable of interest in \( \chi \).
- \( f \) is the set of “free” variables.
- \( x \) is an \( n \)-factor subset of \( \chi \).

Now we must decide whether to keep or reject the doubtful variable \( z \). A traditional rule is the following:

A. Given \( M \) estimates of \( \beta_{zj} \) and \( \sigma_{zj} \), the “traditional” rule (Leamer, 1983) is:

1. Upper Bound: \( \beta_{zj} + 2\sigma_{zj} \)
2. Lower Bound: \( \beta_{zj} - 2\sigma_{zj} \)
3. The upper and lower bounds must have the same sign.
Another decision rule is:

B. The “R2” Decision Rule
(Granger and Uhlig, 1990):

1. Create a subset, MR2, of the M regressions that satisfy

\[ R_{2j}^2 > a R_{MAXIMUM}^2 \]

where \( 0 < a < 1 \)

2. The extreme bounds among the MR2 regressions must have the same sign.

And a third is:

C. The “CDF” Decision Rule
(Sala-i-Martin, 1997):

1. Weight each \( \beta_{2j} \) and \( \sigma_{2j} \) by overall fit \( (R_{2j}^2) \), as in

\[ \hat{\beta}_z = \sum_{j=1}^{M} \frac{R_{2j}^2}{\sum_{i=1}^{M} R_{2i}^2} \beta_{2j} \]

Still another approach is to avoid decision rules and cite the confidence interval.

\[ \hat{\sigma}_z^2 = \sum_{j=1}^{M} \frac{R_{2j}^2}{\sum_{i=1}^{M} R_{2i}^2} \sigma_{2j}^2 \]

His first example made use of 16 Emerging Market indexes, 14 factors, and the time period March 1988 - January 1995. None of the 14 factors was robust to traditional criteria. Two, plus another one when lagged, passed the CDF decision rule. When he went to a model of developed market anomalies, with 16 indexes, 15 factors, and the time period May 1984 – March 1999, and applied the EBA, all of the factors were rejected. Two were robust to the traditional criteria, and 3 passed the CDF decision rule.

Next, working with 32 indexes, and 15 factors, for December 1986 – December 1998, one factor, the total return on the world (MSCI) equity index, survived the EBA test. Five factors were robust to the traditional criteria, and one passed the CDF decision rule.

Finally, he showed the results of applying EBA to the cross-section of the NYSE, the AMEX, and NASDAQ with 23 factors, from July 1963 – December 2000. No factors passed the EBA test. Three variables passed the traditional criteria and 3 passed the CDF decision rule.

He continued with a discussion of strengths and weaknesses in the EBA approach. First he explained that EBA is not “data mining” and that it does not “waste information.” At the same time the EBA says nothing about “economic significance,” does not deal with statistical significance and transaction costs, and cannot bridge economic theory and empirics.

He suggested some improvements to EBA:

- Identify problematic specifications: Under what conditioning assumptions are results fragile?
- Incorporate indicators of multicollinearity
- Modify the set of “free” variables, $f$

He suggested that it would be useful to determine which particular factors in $\chi$ produce the extreme hounds of $z$. And he suggested looking at the subsets of the estimates that include each element of $\chi$. Looking at results over sub periods may also be helpful since the importance of factors may well be changing over a long period.

Multicollinearity can clearly be a problem, and he discussed the significance of collinearity and ways to deal with it. He pointed that if a “doubtful” variable turns out to be robust to even the most stringent EBA criterion, problems remain. Other sensitivity analyses are critical, for parameter stability, alternative proxies, and simple economic logic. He turned specifically to a variable representing the anticipated stance of monetary policy. Earlier sub samples produced robust results, but more recent data and cross-sectional evidence suggest fragility. Economic logic tells us that unanticipated policy changes should be important. So an unexpected interest rate change may be important, while an anticipated change or level may not be. Clearly his work is an ongoing process.

88. On the Implications of Modern Risk Management for Equity and Credit Analysis (Fall 2006)

Robert C. Merton, Nobel Laureate, Fellow of the Institute and Professor, Harvard Business School described his talk as exploring the implications of modern enterprise risk management for external equity and credit analysts in evaluating the intrinsic values and risk profiles of firms. Inadequate analytical tools and over-reliance on accounting and actuarial conventions has caused systematic distortions of estimates of economic risk and value for firms.

He began with a discussion of pension funding surplus/deficits pre-FAS 87. Before 1987, the actuarial discount rate used to determine the PV of pension liabilities was a matter of judgment and was generally “backward-looking” and sluggish in changes through time. The liability measure would therefore deviate substantially from market rates.

In a rising and high interest rate environment, as in the 1970s – 1981, the discount rate would be lower than the market rate and the PV of liabilities would be overstated. But in a declining interest rate environment, as 1981 – 1986, the discount rate would be higher and the PV of liabilities understated. He referred to a discussion of this serious distortion in a paper by Martin Leibowitz.

He turned next to the effects of ignoring the cost of employee stock options prior to FAS 123 in 2004. Corporate profits and perhaps more important, operating efficiencies, in certain sectors were greatly overstated and innovation in incentive and retention compensation designs were inhibited.

Moving to a current problem, he discussed the failure to recognize the value and risk of corporate pension plans in distorting measures of systematic risk and cost of capital estimates for the entire firm. First, pension assets and pension liabilities should be included in statements of total firm assets and liabilities. And their effect on the beta and the cost of capital of the
firm should be taken into account. He offered an example showing the difference between the calculation of a beta and a weighted average cost of capital for operating assets that ignored retirement fund assets and liabilities with one that included them. The latter produced a beta of 0.49 and WACC of 7.52% while the former had indicated a beta of 1.05 and a WACC of 12.35%. The differences were rather dramatic.

He went on to discuss the tradeoff between pension asset allocation and the capital structure of the firm. As the fraction of pension assets invested in equities is increased, in order to maintain a fixed equity beta for the firm the equity capital must be increased and the debt to equity ratio decreased. In his example, with a fixed firm beta of 2.00, raising the fraction of pension assets in equities from 0 to 100 percent called for changing the firm’s debt to equity ratio from 4.48 to 0.33.

Merton observed that large transformations in the risk of the firm can be implemented by the use of derivative securities without an impact on the earnings statement or the balance sheet. Examples were interest rate swaps, useful to banks to deal with the risk of borrowing short and lending long; equity swaps, used for reducing risks in pension funds assets; and credit default swaps, used for reducing risk in extensions of credit to customers.

He concluded by pointing out that the use of credit default swaps is part of a convergence of credit and equity analysis. The benefit to the credit of the firm is obvious, and the benefit to the equity investor is reduction or elimination of tail risk.

89. A Speculator’s Look at Risk Management (Fall 2006)

Myron S. Scholes, Nobel Laureate, Fellow of the Institute and Managing Partner, Oak Hill Platinum Partners, focused his presentation essentially on the provision of two kinds of financial services: liquidity and risk transfer. And he characterized the providers of those services as speculators. Much of his talk was concerned with the role of hedge funds as the speculators, and he made many references to his own hedge fund.

Keynes was the first to discuss the relationship between speculators and hedges. His theory was that those seeking to avoid or reduce risk turn to hedging, and that speculators profit from providing hedges with insurance. Scholes pointed that there are two ways to deal with risk: either establish enough equity or hedge. There are costs associated with each, and the question then is which is more efficient. Markets have developed to improve the superiority of hedging over equity, and the stock market has become less important for cushioning equity risks. Hedging essentially transfers risks to those best able to carry them. The problem then shifts to how the speculators handle risk. Banks, for example, have ways of dealing with risk of borrower nonpayment. They demand collateral, they use VAR to identify risks, but realize that VAR is incomplete. Most important, it does not deal with tail events. Dealing with tail risk is difficult.

Speculators must deal with the volatility of the prices of risk transfer and liquidity services. Events can change the demand for the services quite dramatically. As conditions change, the speculator has to be able to adapt, and the most successful are those that can adapt quickly. The two
resources the speculator depends upon are human capital and financial capital. Scholes referred to the recent problems at AMARANTH as an example of the need for very fast action.

He discussed the definition of the price of liquidity. The classic definition is the price of immediacy. He offered a definition as the cost of a put option to protect a position. This is a form of dynamic protection.

The standard models for dealing with financial risk do not cope with rapid price changes in the provision of liquidity and risk transfer services. So the speculator needs new models, and the ability to make quick changes in them. Protection is needed when interest rate curves steepen, when spreads widen whether or not credit spreads do so, when volatility increases and when asset values fall.

The separation of human capital from capital holders has become important. Scholes observed that in the past those with capital, like banks, have tended to hire the human capital to deal with the provision of risk reducing services, while more recently teams of risk analysts have turned to hiring the capital. And this might be a description of a hedge fund.

With more uncertainty, the value of human capital increases. The risk reducing team becomes more valuable as the environment becomes more chaotic. It is difficult to build and maintain those teams. There are some “natural” providers of risk services, among them are hedge funds.

Scholes described the “free boundary problem.” A hedge fund can make an investment with a time period in mind, but that time period may shorten or lengthen with very little notice. It is important to be able to anticipate these changes and respond quickly. His fund has a model for each position it takes. The model has to anticipate how to decide when to get in and out of the position. But the model is only a guide, and more judgment is needed to deviate from it.

He went into more detail on risk control. Three major elements are a capital allocation model, an optimization model with a level of risk, and a plan for dealing with crisis. The optimizer makes use of the fund’s own utility function, and the crisis planning makes use of scenario analysis. It is important to keep in mind that liquidity and risk transfer services is a time series business, dealing with period-to-period changes, something quite different from traditional financial analysis. A correlation structure is constantly changing, and an important part of the business is dealing with shocks.

90. **Downside Risk and Its Implications for Financial Management**  
(Spring 2006)

Robert Engle, Professor of Finance, Leonard W. Stern School of Business, New York University, who Jim Farrell observed in introducing him, is also a Nobel Laureate. He had made a presentation at the Q-Group® seminar in the Fall of 1990, and now made available a paper entitled: “The Underlying Dynamics of Credit Correlations,” by himself Arthur Berd, and Artem Voronov.

Engle began with the proposition that the trade-off between risk and return is the central paradigm of finance. The risk of a portfolio is that its value will decline, hence downside risk is a natural measure of risk.
Many theories and models assume symmetry and volatility based risk, and he listed some of these. But a number of measures have been proposed specifically aimed at the measurement of downside risk, measures that do not assume symmetry. Engle went a step beyond this to consider multivariate downside risk. What is the likelihood that a collection of assets will all decline? This depends partly on correlations, and for extreme moves other measures are important too. It also appears that correlations and volatilities tend to move together.

As we move to measuring joint downside risk, we ask what is the probability that one asset has an extreme down move when another has an extreme down move? We can define an indicator for default in the case of a fixed income security, and measure the correlation between the indicators for a number of such instruments. For extremes, the default correlation will be the same as the lower tail dependence.

Turning specifically to credit derivatives, Engle commented that it is well documented that the multivariate normal density under-prices joint extreme events such as defaults. Tail dependence is essential to pricing multivariate credit products like CDO tranches:

- Collateralized debt obligations are portfolios of corporate bonds.
- For a fee, an investor can be paid for the first K % of default losses in the portfolio over a period.
- The value of this derivative depends on default correlations.

Engle next described modeling the one-period return and calculating the multi-period distribution of returns into the future. From this distribution a measure of downside risk can be computed. He proposed the GARCH model. The TARCH is like a GARCH, but gives negative returns an extra boost, reflecting empirical observations.

Moving to the sources of asymmetric volatility, a small effect is due to increased leverage. As equity prices fall, the leverage of a firm increases, so that the next shock has a greater effect on stock prices. But the more important effect has to do with risk aversion. News of a future volatility event will lead to stock sales and price declines. Subsequently, the volatility event occurs. Since events are clustered, any news event will predict higher volatility in the future. This effect is especially relevant for broad market indices, since these have systematic risk.

Evidence of skewness can be found in the high price of out-of-the-money equity put options. The implication is skewness in the risk neutral distribution, and much of this is probably due to skewness in the empirical distribution of returns. The option skew appears only post 1987.

With respect to stocks, under the standard assumptions the skewness of return is related to the skewness of the market through the correlation between stock and market. All stocks will then have skewness, but it will be less than for the market.

The probability that two stocks will both underperform some threshold can be calculated conditional on the market return. When the market return is a fat-tailed distribution then tail dependence rises. In summary, asymmetric volatility in the market factor implies:

- Skewness in multi-period market returns.
• Skewness in multi-period equity returns.

• Lower tail dependence in equity returns.

Engle set out a number of implications of the preceding for risk management, derivative hedging, and portfolio selection. Multi-period risks may be substantially different from one period risks. The multi-period risk changes over time and can be forecast. Big market declines are more likely when volatility is high.

As each new period return is observed, derivatives can be repriced and the hedge updated. Low frequency mean variance portfolio optimization will miss the asymmetries in stock returns. High frequency rebalancing will give early warning of downside risk.

All of this implies coordination of risk management and alpha estimation.

In conclusion, Engle said:

• Asymmetric volatility and correlation models are powerful tools for analyzing downside risk.

• One period models have big implications about the long horizon returns.

• The updating of volatility and risk measures has a natural application to derivative hedging, pricing, and possibly high frequency portfolio rebalancing.

91. Buy Side Risk Management
(Spring 2006)


He began with a brief discussion of the difference in perception of risk and type of risk between sell side and buy side firms. To begin with, sell side firms put firm capital at risk to facilitate the completion of transactions and/or to make a direct profit. On the buy side, firms are hired to put client capital at risk in order to obtain a financial goal or reward for the client. A brief statement of the distinction is that the buy side’s business model is to profit from successfully taking risk, while the sell side’s business model is to profit from avoiding risk. Buy side risk management analyzes outcomes and probabilities and takes actions to profit from anticipated outcomes, and to limit the cost of unanticipated outcomes.

He turned next to some models for predicting volatility in the S&P 500 index. He displayed the results of applying five different forecasting methodologies to conclude that the most successful simply used the previous quarter’s sample volatility to predict the next. For prediction of the MSCI EAFE volatilities from quarters of daily data the GARCH(1,1) model worked a little better than simply using the previous quarter volatility.

Absolute levels of market risk are hard to predict, but dividing predictions into an absolute level and a relative-to-markets multiplier can be helpful.
\[ \text{Variance (Portfolio - Benchmark)} = \]

\[ \text{Variance (Benchmark)} \left( \frac{\text{Variance (Portfolio)}}{\text{Variance (Market)}} + (1 - 2\beta) \right) \]

If a statistic (e.g. variance, standard deviation, VaR) is \( k \)-homogeneous, we can write

\[ f(x) = \sum_i \left( \frac{1}{k} \left( \frac{\partial f(x)}{\partial x_i} \right) x_i = g'x \]

where \( g \) is the gradient. For example, combining this with the previous absolute/relative breakdown, we can write tracking variance as

\[ \text{TrkVariance}(x) = \text{Variance(Benchmark)} \left( 1 + (h - 2\beta)'x \right) \]

where \( h \) is the gradient divided by benchmark variance. The dot product of \((h-2\beta)'\) provides a component-by-component breakdown of relative risk. We shall see that the gradient can be very useful as a practical tool.

Winston showed a table of factors to which a portfolio might be exposed. A column tabulated the sensitivities of the return of the portfolio to each factor. A second column tabulated a factor volatility, a third tabulated the contribution of the factor to tracking error, and the final column showed the marginal contribution to tracking error. This last item is the gradient for the factor. From the table one could compute the contribution to rate of return by changing exposure to the factor, and at the same time the contribution to tracking error. The result is that the manager can trade-off return against tracking error in making factor exposure decisions.

Kurtosis had been described in an earlier presentation as an important element in downside risk. Winston has found that with longer investment horizons, kurtosis comes down.

Scenario analysis involves modeling but removes the task of assigning a probability to a particular outcome. For complex portfolios of complex instruments it may not be obvious whether the portfolio will react as desired and scenario analysis may be particularly helpful. In addition, the manager or the client may wish to shield the portfolio from adverse reaction to replays of historical disasters like October 1987.

He turned next to the subject of risk in long-short portfolios. In this case, even if the long side and the short side are lognormal, the difference is not, and is not a tractable distribution. And the difference can go negative, something that could not happen in a long-only portfolio. He
presented a number of graphs, showing the terminal probability of bankruptcy, and the even more important issue the probability of reaching a stopping barrier at which point the client will simply have to liquidate its position in order to avoid bankruptcy. Important parameters were the degree of leverage, the volatilities of the short position and the long, and the estimated skill on the long and short sides. The graphs offered some useful warning signals depending on the combination of parameters. In concluding with respect to long-short portfolios, he said:

- Unmanaged long/short portfolios have large chances of unacceptable drawdowns.
- Skill can be ineffective when leverage, volatility, and correlation are not properly managed.
- Higher levels of leverage, volatility, and drawdown constraints force more frequent risk management.

**Securities Lending**

92.  The Effects of Stock Lending on Security Prices: An Experiment (Fall 2010)

Steven N. Kaplan, Neubauer Family Professor of Entrepreneurship and Finance, Booth School of Business, University of Chicago and NBER, presented “The Effects of Stock Lending on Security Prices: An Experiment,” coauthored with Tobias J. Moskowitz, University of Chicago and NBER and Ohio State University, and Berk Sensoy, Ohio State University. Kaplan had previously presented a paper at the Q-Group© seminar in the Fall of 1989.

Kaplan began with questions about short selling:

1. Does shorting make prices more efficient by reducing overpricing?

2. Does shorting make prices less informative and destabilize markets?

Kaplan said that the effects of short selling are empirical and the work thus far has had mixed results. It is hard to separate supply and demand.

To begin, he provided a thoughtful review of how short selling works and then turned to this research. The question the authors seek to address is what is the magnitude of net benefits and costs to lending stocks to short sellers, taking into account fees, adverse effects and costs?

Motivating this study was the decision of the Board of Directors of a $15 billion mutual fund that invests in mid- and small-cap equities, inside and outside the US, to lend shares to short sellers. No previous lending had been done by the portfolio manager out of concern that doing so would lower the stocks’ prices and/or increase their volatility. The Board, however, wanted the manager to consider lending to earn additional returns for the fund shareholders.

Kaplan described the experiment they created for lending the fund’s shares and determining whether they could demonstrate the value of security lending to the portfolio manager and assuage his fears. The fund randomly made available for lending 2/3 of the Manager’s stocks and withheld a characteristic-matched 1/3. They focused on high loan fee stocks (loan fee > 25bps, with mean > 4%).

For this experiment the portfolio’s stocks were divided into two groups:
1. High expected loan demand stocks projected to have a loan fee of at least 10 basis points, resulting in 138 “Revenue” stocks.

2. The remaining group of 385 stocks they labeled low demand or "Nonrevenue" stocks.

3. Within each group the stocks were randomly selected to lend out 2/3 and withhold 1/3, with one exception: three stocks were lent in the revenue stock group with the highest expected revenue, to reduce opportunity cost.

4. The loan sizes were restricted to the lesser of three times the trailing 30 day average daily trading volume or 5% of outstanding shares of issuer.

The result was 32 available and 20 withheld stocks.

Kaplan said that while they cannot rule out a change in participation of other institutions, it seems likely their experiment was the only major supply shock.

There were two separate experiments. The first began on September 5, 2008. On September 17 over $700 million of securities were on loan. The next day the manager called back the loans because of turbulent market conditions, and all shares were returned by October 3, 2008. The second phase began June 5, 2009 and ended September 30, 2009.

Kaplan reported that exogenous changes in loan supply have significant effects on loan fees, but no adverse effects on security prices or spreads for either of the two time periods. The supply shocks were sizeable and significantly reduced lending fees, but returns, volatility, skewness, and bid-ask spreads remained unaffected. Results are consistent across both phases of the experiment and indicate no adverse effects from securities lending on stock prices.

In conclusion, Kaplan said, yes the experiment actually happened with real money. It is clear from their research that fund managers can earn revenue from lending shares to short sellers without adversely affecting share prices, as the portfolio manager of the fund continues to do. As for policy, they suggest that restricting or altering the supply of shares is neither effective nor useful.

Sources of Returns in Investing

93. Forecasting Returns – The Sum of the Parts Approach (Fall 2010)

Miguel Ferreira – Universidade Nova de Lisboa Pedro Santa-Clara – Universidade Nova de Lisboa and NBER, presented “Forecasting Stock Market Returns: The Sum of the Parts is More than the Whole.”

Ferreira starts with the premise behind his research:

- There is strong evidence that expected returns vary considerably over time with price multiples, macroeconomic variables, corporate actions and measures of risk.

- This variation has important implications for investments and corporate finance.

- Practical gains using this information have remained elusive since there has
been no single approach to forecast returns that works robustly out of sample.

It is the last point he seeks to remedy with this work. Ferreira reviews others’ efforts in creating forecasts and proposes a sum-of-the-parts approach to estimate expected growth with three variations: no multiple growth; multiple growth regression (with shrinkage); multiple reversion (with shrinkage).

He forecasts each component of returns separately: 1) expected dividend price estimated by the current dividend-price ratio assuming a random walk; 2) expected earnings growth estimated with a 20-year past moving average; and 3) earnings growth, nearly impossible to forecast, but Ferreira does have a simplistic method. Ferreira reports he has tried analyst consensus forecasts with worse results.

Using monthly and yearly data from December 1927 to December 2007, S&P 500 continuously compounded returns including dividends, and a set of macroeconomic predictors, he does the following for monthly and annual data:

1. Regresses returns on lagged predictors with data up to time \( s \).
2. Forecasts return at time \( s+1 \) with estimated coefficients and predictive variable at time \( s \).
3. Rolls forward until the end of the sample using a sequence of expanding windows.
4. Evaluates performance with out-of-sample \( R^2 \) relative to historical mean.

The following shows the results of his work with the annual data:

<table>
<thead>
<tr>
<th>Predictor</th>
<th>In-sample R-squared</th>
<th>Predictive regression</th>
<th>Predictive regression (shrinkage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVAR</td>
<td>0.34</td>
<td>-0.15</td>
<td>0.00</td>
</tr>
<tr>
<td>DFR</td>
<td>1.95</td>
<td>1.64</td>
<td>0.99</td>
</tr>
<tr>
<td>LTY</td>
<td>0.71</td>
<td>-8.31</td>
<td>-0.85</td>
</tr>
<tr>
<td>LTR</td>
<td>2.29</td>
<td>-2.94</td>
<td>2.65</td>
</tr>
<tr>
<td>INFL</td>
<td>1.39</td>
<td>-1.04</td>
<td>0.53</td>
</tr>
<tr>
<td>TMS</td>
<td>0.80</td>
<td>-7.23</td>
<td>-1.20</td>
</tr>
<tr>
<td>TBL</td>
<td>0.13</td>
<td>-11.69</td>
<td>-2.09</td>
</tr>
<tr>
<td>DFY</td>
<td>0.03</td>
<td>-1.13</td>
<td>-0.31</td>
</tr>
<tr>
<td>NTIS</td>
<td>12.29</td>
<td>1.06</td>
<td>2.30</td>
</tr>
<tr>
<td>ROE</td>
<td>0.02</td>
<td>-10.79</td>
<td>-2.40</td>
</tr>
<tr>
<td>DE</td>
<td>1.58</td>
<td>-0.17</td>
<td>0.47</td>
</tr>
<tr>
<td>EP</td>
<td>5.69</td>
<td>7.54</td>
<td>4.56</td>
</tr>
<tr>
<td>SEP</td>
<td>8.27</td>
<td>-17.57</td>
<td>2.47</td>
</tr>
<tr>
<td>DP</td>
<td>2.31</td>
<td>-17.21</td>
<td>1.45</td>
</tr>
<tr>
<td>BM</td>
<td>5.76</td>
<td>-8.80</td>
<td>0.82</td>
</tr>
</tbody>
</table>

He decomposes returns into capital gains, dividend yield and total returns, and the log of each of the factors and then creates a sum of the parts approach.
### SUM-OF-THE-PARTS APPROACH – ANNUAL

<table>
<thead>
<tr>
<th>Variable</th>
<th>Predictor</th>
<th>Out-of-Sample R-square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SOP No multiple</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.32</td>
</tr>
<tr>
<td>SVAR</td>
<td>Stock variance</td>
<td></td>
</tr>
<tr>
<td>DFR</td>
<td>Default return spread</td>
<td>1.27</td>
</tr>
<tr>
<td>LTY</td>
<td>Long term bond yield</td>
<td>1.22</td>
</tr>
<tr>
<td>LTR</td>
<td>Long term bond return</td>
<td>1.24</td>
</tr>
<tr>
<td>INFL</td>
<td>Inflation</td>
<td>1.37</td>
</tr>
<tr>
<td>TMS</td>
<td>Term spread</td>
<td>1.50</td>
</tr>
<tr>
<td>TBL</td>
<td>T-bill rate</td>
<td>1.31</td>
</tr>
<tr>
<td>DFY</td>
<td>Default yield spread</td>
<td>1.32</td>
</tr>
<tr>
<td>NTIS</td>
<td>Net equity expansion</td>
<td>1.55</td>
</tr>
<tr>
<td>ROE</td>
<td>Return on equity</td>
<td>1.20</td>
</tr>
<tr>
<td>DE</td>
<td>Dividend payout</td>
<td>1.20</td>
</tr>
<tr>
<td>EP</td>
<td>Earning price</td>
<td>1.35</td>
</tr>
<tr>
<td>SEP</td>
<td>Smooth earnings price</td>
<td>0.94</td>
</tr>
<tr>
<td>DP</td>
<td>Dividend price</td>
<td>0.89</td>
</tr>
<tr>
<td>DY</td>
<td>Dividend yield</td>
<td>0.76</td>
</tr>
<tr>
<td>BM</td>
<td>Book-to-market</td>
<td>0.68</td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ferriera concludes with the differences that result from calculating the
cost of capital with sum of the parts, CAPM, and Fama French. Out of sample he shows that only the sum of the parts method works well and is the only method that should be used.

94. Returns to Buying Earnings and Book Value: Accounting for Growth and Risk (Fall 2010)

Stephen H. Penman, George O. May Professor of Accounting and Morgan Stanley Research Scholar, Graduate School of Business, Columbia University, presented “Returns to Buying Earnings and Book Value: Accounting for Growth,” coauthored with Francesco Reggiani, Bocconi University. Penman had previously presented a paper at the Q-Group® seminar in the Spring of 2003.

The book to price ratio and the earnings to price ratio are widely used in choosing attractive stocks. Penman shows results that are typical from a Fama French type study using the two ratios measures to predict returns.

<table>
<thead>
<tr>
<th>E/P Portfolio</th>
<th>1 (Low)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 (High)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B/P</td>
<td>4.3%</td>
<td>10.9%</td>
<td>14.2%</td>
<td>17.1%</td>
<td>19.7%</td>
</tr>
<tr>
<td>Portfolio</td>
<td>8.8%</td>
<td>9.1%</td>
<td>13.0%</td>
<td>16.0%</td>
<td>22.1%</td>
</tr>
<tr>
<td></td>
<td>14.4%</td>
<td>8.5%</td>
<td>12.1%</td>
<td>17.0%</td>
<td>21.6%</td>
</tr>
<tr>
<td></td>
<td>15.5%</td>
<td>13.4%</td>
<td>14.7%</td>
<td>18.0%</td>
<td>24.3%</td>
</tr>
<tr>
<td></td>
<td>26.4%</td>
<td>20.1%</td>
<td>20.2%</td>
<td>22.6%</td>
<td>30.0%</td>
</tr>
</tbody>
</table>

In this table we see the typical results; a high E/P ratio appears to be a good predictor of returns. But, Penman asks, “Am I loading up on risk?”

Earnings and book value are accounting numbers and the ratios are, in part, the results of accounting phenomena. This leads Penman to ask the following questions about the ratios:

- Is there a predictable return reward for risk?
- Does the accounting for earnings and book value explain why P/E and P/B indicate risk and return?

The answer is yes: a high E/P, even without growth in earnings, means accepting more risk in the future earnings in anticipation of a higher return.

Penman turns to the role of the Fama French Book/Price as a guide to higher returns and says its value is a mystery. He says that B/P depends on how accounting is done, and a low ratio indicates a deferral of earnings to the future, increasing risk. In response to the question of whether accounting can explain why B/P indicates risk and return, he says that accountants defer earnings in the face of uncertainty. Four features of accounting are at the root of this:

1. P/B is expected earnings not yet added to book value.
2. Accounting defers earnings under uncertainty, and deferred earnings create earnings growth.
3. To defer earnings to the future (create growth), the accounting must depress earnings (and E/P).
4. If price is unaffected, the deferral means a higher B/P: the growth is not priced.
The earnings yield portfolios shown below, and their annual returns, lead Penman to three explanations for the results:

**Earning Yields and Returns**

**Annual Returns 1963-2006**

<table>
<thead>
<tr>
<th>E/P Portfolio</th>
<th>E/P</th>
<th>Annual Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 (high)</td>
<td>14.1%</td>
<td>23.5%</td>
</tr>
<tr>
<td>4</td>
<td>9.3%</td>
<td>18.2%</td>
</tr>
<tr>
<td>3</td>
<td>6.7%</td>
<td>14.9%</td>
</tr>
<tr>
<td>2</td>
<td>3.2%</td>
<td>12.4%</td>
</tr>
<tr>
<td>1 (low)</td>
<td>-18.4%</td>
<td>13.9%</td>
</tr>
</tbody>
</table>

Penman says expected returns depend upon growth and risk: E/P is increasing with the expected return because future earnings are at risk, even with no growth. E/P may not indicate expected return because of growth, but growth may be risky. So, how does one infer the expected return from E/P if growth is risky?

Each stock price is composed of three things: the book value, the value of the short term earnings, and the value of the growth in earnings. Penman provides the following chart showing his decomposition of Cisco’s $21 stock price in 2004:

Penman concluded with the following disclaimers:

- We do not claim to provide a comprehensive explanation for the B/P effect in stock returns.
- Observed returns might be due to market inefficiency rather than rational pricing of risk.
- However, we do observe returns to B/P that are consistent with both the rational pricing of risk and the accounting for book value.

**95. Value and Momentum Everywhere**

(Spring 2010)

In this research Asness takes on two of the most studied capital market phenomena, value and momentum effects. Value assets are those with a high book-to-market value ratio that outperform those with a low ratio, and momentum assets are the recent relative winners in the market. Asness says that in the past these effects typically have been studied separately, in certain asset classes, and one asset class at a time. In this research, the authors extend the analysis of value and momentum to more asset classes and asset class combinations, and to more markets, what they call “everywhere.”

Asness first discussed the wide variety of data they used, the sources of the data, and how the authors used it. Using data on stocks, bonds, currency, and commodities they created asset class by asset class and also country by country portfolios sorted on value and momentum into three equal groups (high, middle, low) within each asset class. The portfolios are an equally weighted combination of value and momentum assets, and, as a robustness test they combine asset classes using equal-weighting and equal-volatility weighting. They determine the correlation between strategies and the resulting Sharpe ratios for each strategy. They find that value and momentum strategies are negatively correlated, but both have positive Sharpe ratios. The magnitude of the effect varies from country to country, as can be seen in the chart below. Perhaps more interesting, and clearly seen in the chart, is the fact that equally-weighted momentum-value portfolios have even higher Sharpe ratios and better t-statistics than the single strategy portfolios. Finally, the same chart shows the relationships are similar in all asset classes and over the various countries. Asness described their findings in the form of a rhyme:

Value here correlates with value there
Momentum here correlates with momentum there
Value and momentum negatively correlated everywhere

<table>
<thead>
<tr>
<th>Table I: Performance of Value and Momentum Sorted Portfolios Across Markets and Asset Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Value</strong></td>
</tr>
<tr>
<td>H-L</td>
</tr>
<tr>
<td>4.3%</td>
</tr>
<tr>
<td><strong>Return</strong></td>
</tr>
<tr>
<td>Rate</td>
</tr>
<tr>
<td><strong>% Contribution</strong></td>
</tr>
<tr>
<td>59.1%</td>
</tr>
<tr>
<td><strong>U.S.</strong></td>
</tr>
<tr>
<td>2.7%</td>
</tr>
<tr>
<td><strong>(1.00)</strong></td>
</tr>
<tr>
<td><strong>(0.22)</strong></td>
</tr>
<tr>
<td><strong>(0.20)</strong></td>
</tr>
<tr>
<td><strong>Correlated Europe</strong></td>
</tr>
<tr>
<td>4.8%</td>
</tr>
<tr>
<td><strong>(1.00)</strong></td>
</tr>
<tr>
<td><strong>(0.31)</strong></td>
</tr>
<tr>
<td><strong>(0.10)</strong></td>
</tr>
<tr>
<td><strong>Japan</strong></td>
</tr>
<tr>
<td>15.3%</td>
</tr>
<tr>
<td><strong>(3.53)</strong></td>
</tr>
<tr>
<td><strong>(0.89)</strong></td>
</tr>
<tr>
<td><strong>(0.10)</strong></td>
</tr>
<tr>
<td><strong>All Stock Selection</strong></td>
</tr>
<tr>
<td>6.8%</td>
</tr>
<tr>
<td><strong>(2.00)</strong></td>
</tr>
<tr>
<td><strong>(0.43)</strong></td>
</tr>
<tr>
<td><strong>(0.10)</strong></td>
</tr>
</tbody>
</table>
In addition to the ubiquity of value and momentum strategies, in their research they found that over time both value and momentum have become less profitable, and more correlated across markets, asset classes, and with each other. Liquidity plays a significant role in explaining value, particularly since the Long Term Capital Management event: Value loads positively and momentum negatively on their measure of liquidity risk. In addition, liquidity partly explains global co-movement patterns and the negative correlation between value and momentum. Using a variety of liquidity measures, Asness shows the power of liquidity on value and momentum in the chart below:

Asness looks at the potential for a strong seasonal effect in the correlation structure, leading him to conclude that not everything works everywhere. His results are shown below:

---

**Seasonal patterns to correlation structure?**

Are seasonal effects in value and momentum driving the strong correlation structure?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly return correlations in January</td>
<td>Monthly return correlations Feb-Dec</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stock selection, value</td>
<td>0.38</td>
<td>0.45</td>
<td>-0.67</td>
<td>-0.53</td>
<td>0.44</td>
<td>0.03</td>
<td>-0.60</td>
</tr>
<tr>
<td>Non-stock selection, value</td>
<td>0.13</td>
<td>-0.34</td>
<td>-0.50</td>
<td>0.19</td>
<td>-0.12</td>
<td>-0.48</td>
<td></td>
</tr>
<tr>
<td>Stock selection, momentum</td>
<td>0.28</td>
<td>0.58</td>
<td>0.44</td>
<td>0.32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-stock selection, momentum</td>
<td>0.19</td>
<td>0.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In summary, Asness said that value and momentum appear in all the asset classes, everywhere, and that:

1. Value and momentum are negatively correlated everywhere.

2. Combining the two effects in one portfolio create higher risk-adjusted returns.

3. Liquidity risk is important and its importance increases significantly over time, rising sharply after the summer of 1998.

4. Value and momentum both become less profitable over time, more correlated across markets and asset classes, and more correlated with each other.

5. Liquidity risk appears important and may point to the importance of trading costs and limited arbitrage in explaining these phenomena.

6. The risks and patterns are statistically present regardless of asset class or market, though not easy to detect in any single strategy or asset class.

Finally, he concluded, there is much left to be explained. This work is just a start and he offers his data to others to use in their research, and plans to maintain it at http://agr.com/research/htm.

96. Risk Premia and the Conditional Tails of Stock Returns
(Spring 2010)

Bryan T. Kelley, Professor, Finance Department, Stern School of Business, New York University, presented, “Risk Premia and the Conditional Tails of Stock Returns.”

Kelly began his presentation by questioning whether the value of assets depends upon the potential for infrequent, extreme, events, or whether that is just a convenient, though unrealistic, explanation. Because tail risk varies over time it is difficult to measure, even conditionally. Thus it is difficult to answer the question of plausibility versus the convenience of the tail-risk explanation. He developed what he calls an economically motivated conditional tail-risk measure that he extracted from the cross section of asset returns. He has three objectives: to gain a structural understanding of how tail risk is priced; to econometrically identify the conditional tail-risk distribution of returns; and to develop and use his data to evaluate the theories relating tail risk to risk premia. Using his model he finds that that tail risk varies substantially over time and is highly persistent.

He first looked at a Gaussian baseline to ask whether variance is sufficient to characterize risk of extreme events. He provided the following illustration of tail risk by combining the standard normal with a heavier tailed distribution, the Laplace distribution. As can be seen, the combination of the two distributions shows the fat-tailed characteristic.
Kelly says that theory suggests that
the risk of infrequent yet extreme events has
a large impact on asset prices. Three varied
theoretical settings have emerged to explain
the impact of extreme events; long run risks
accompanied by heavy-tailed shocks; time-
varying rare disasters; and long run risks
plus large swings in confidence. Testing
models of this hypothesis remains a
challenge due to the difficulty of measuring
tail-risk fluctuations over time. Kelly
proposed a new measure of time-varying
tail risk that is directly estimable from the
cross section of returns. Using it he found
an increase in tail risk is associated with an
increase in excess market returns the
following year: cross-sectionally, stocks
that highly positively covary with the tail-
risk measure earn lower average annual
returns than stocks with low tail-risk
covariation. In addition, he says, the past
research shows the results are consistent
with predictions from two models: a long
run risks economy with heavy-tailed
consumption and dividend growth shocks;
and a time-varying rare disaster framework.

In his framework he fuses asset
pricing theory with extreme value econometrics. The structural models tightly
link the time-varying tail exponent to
expected excess returns on risky assets
since both are driven by the tail-risk
process. This generates two key testable
implications: tail risk should positively
forecast excess aggregate market returns;
and high tail risk should be associated with
bad states of the world and high marginal
utility.

To test the implications he developed
two consumption-based asset pricing
models that generate a dynamic power law
structure in the tail distribution of returns
and produce clear testable implications for
the link between tail risk and risk premia.
The first is a modification of a long run
risks economy adapted to include non-
Gaussian shocks to both consumption
growth and idiosyncratic dividend growth.

The second is a version of a time-
varying rare disaster model. However,
since these models pose estimation problems, Kelly proposed a strategy using a quasi-likelihood technique, an example of a widely used econometric method. The general idea is to use a partial, or even mis-specified, likelihood to consistently estimate an otherwise intractable model. The model-implied pricing effects of tail risk can be tested with estimates of the time-varying component in the return power law exponents.

The structural economic models predict a close link between the risk of extreme events in the real economy and risk premia across assets and over time. Direct estimation of conditional tail risk from consumption and dividend data is essentially infeasible due to their infrequent observation and poor measurement. The two structural models highlight the path to an alternative estimation strategy: because returns are frequently and precisely observed, so estimates of their tail distribution can be used to identify the process. Most importantly, the tight structure that these models place on the return tail distribution implies that the cross section can be exploited to extract conditional tail-risk estimates at high frequencies. The model-implied pricing effects of tail risk can be tested, he says, with estimates of the time-varying component in return power law exponents to determine if:

1. The dynamic power law exponent is time-varying and persistent.
2. The tail risk series positively forecasts excess market returns.
3. Stocks with high betas on the tail risk process earn a negative risk premium in relation to those with low tail risk betas.

For estimates for the dynamic power law model, Kelly used daily CRSP data from August, 1962 to December, 2008 for NYSE/AMEX/NASDAQ stocks. He also used daily Fama-French return factors, monthly risk free rates with codes 10 and 11, and size/value-sorted portfolio returns from French's Data Library, market return predictor variables from Welch's website, variance risk premium estimates from Zhou's website 18, and macroeconomic data from the Federal Reserve.

Kelly focused the empirical analysis on the tails of raw returns and found that the tail exponent is highly persistent. The upper tail is slightly fatter and with less persistence, though with more time series variability. When stock returns are converted to factor model residuals, estimation results are qualitatively unchanged. Moreover, the estimated tail-risk series appears moderately countercyclical with declines corresponding with market peaks, and increases during periods of crisis such as the 1970’s oil crisis and the bursting of the dot-com bubble. This is shown in the following chart. In 2008 the tail risk sees a modest climb after falling in the first half of the year.
In addition, he found that increases in the tail-risk measure significantly predict increases in excess returns on the market over short and long horizons, and that the price of tail risk is negative, hence high tail-risk betas stocks earn comparatively low average returns.

To explain the economic impact, Kelly says that the evidence suggests that tail risk has large predictive power for excess aggregate stock market returns over horizons of one month to five years, outperforming all alternative predictors commonly considered in the literature: a one standard deviation increase in tail risk forecasts a 4.4 percent increase in excess market returns over the following year. Furthermore, individual stock tails have large, significant, explanatory power for the cross section of average stock returns. Stocks that covary highly with the estimated tail-risk series earn average annual returns 6.0 percent below stocks with low tail risk covariation.

Kelly concluded that the price of tail risk is negative. Because tail risk is detrimental to investors' utility, assets that pay off in high tail-risk states are valuable hedges and thus earn low average returns. In addition, high tail risk increases the return required by investors to hold the market portfolio, which results in return forecastability. Kelly wants to extend this work to examine other asset classes, particularly options and credit.

97. What Drives the Value of Analyst’s Recommendations: Earnings Estimates or Discount Rate Changes? (Spring 2010)

Roni Michaely, Rudd Family Professor of Management, Professor of Finance, The Johnson School, Cornell University, and the Interdisciplinary Center, presented “What Drives the Value of Analyst's Recommendations: Earnings Estimates or Discount Rate Estimates?” coauthored with Ambrus Kecskés, Virginia Polytechnic Institute and State University, and Kent Womack, Dartmouth College.
Security analyst reports provide earnings estimates and stock recommendations that can, if revised, have a significant price impact. This study goes to the heart of what drives analyst recommendation changes – estimates of earnings and/or discount rates.

Michaely said that discount rate estimates are based on softer information, made over a longer horizon, noisy and not verifiable. Earnings-based recommendation changes, in contrast, are characterized by harder information, greater verifiability, and are the focus of analysts. As such, they are less subject to analysts’ cognitive and incentive biases and should be more informative. This is the proposition Michaely and his coauthors address in this research.

To test their hypothesis that earnings-based recommendations are more informative than discount rate-based recommendations, they used the common discounted cash flow valuation model. In this model changes in value can come from different assessments of cash flows and/or discount rates. Michaely labels recommendations changes that are coincident with short-term earnings estimates as ‘earnings-based recommendations’ and those not accompanied by earnings-estimate changes as ‘discount rate-based/non-earnings based recommendations’. An upgrade, he says, with an earnings increase should be viewed more positively than an upgrade without an earnings increase (discount rate-based). Conversely, a downgrade with an earnings decrease should be viewed more negatively than a downgrade without an earnings decrease.

In their research, the authors used a sample of stocks that have been publicly traded for at least one year at the time of the recommendation change and use returns data from CRSP between 1994 and 2007. Data on recommendations, earnings estimates, and long-term earnings growth rates issued between 1994 and 2007, are taken from I/B/E/S. They do not use recommendations that are initiations or reiterations, or come as a result of a rating system change associated with the Global Settlement. The earnings estimate changes must be classifiable into increases, no change, or decreases, and the stock must be covered by a minimum of two analysts. Their sample results in 123,250 recommendation changes comprising 7,040 unique firms and 3,517 unique trading dates, and they are sorted into six categories as shown below. Two categories, he says, were especially curious – upgrades with earnings decreased and downgrades with earnings increased. The intuition is that while earnings decreased, (increased) the cash flows did (did not).
Earnings-based recommendation changes are more informative than discount rate-based recommendation changes. In particular, upgrades with earnings increases should have a more positive total price reaction (initial price reaction and post-recommendation change drift) than upgrades with no earnings changes. Downgrades should show the reverse behavior. To test for this they used event study methodology on benchmark portfolios matched on size, book-to-market, and momentum. Since most reports come out after trading hours, the event day they use is from the close of market one day to the opening the following day. As can be seen from the following chart, one that Michaely calls the most important he presents, initial price reaction to and the drift after recommendation changes are between 50 to 200 percent bigger for earnings-based than discount rate-based recommendation changes. Trading on earnings-based recommendation changes earns average risk-adjusted returns of over 3 percent per month from 1994-2007.

<table>
<thead>
<tr>
<th>Recommendation change category</th>
<th>Mean Excess Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[-1,0]</td>
</tr>
<tr>
<td>All upgrades</td>
<td>2.45***</td>
</tr>
<tr>
<td>Upgrades with earnings increased</td>
<td>3.55***</td>
</tr>
<tr>
<td>Upgrades with no earnings change</td>
<td>2.13***</td>
</tr>
<tr>
<td>Upgrades with earnings decreased</td>
<td>1.11***</td>
</tr>
<tr>
<td>All downgrades</td>
<td>-2.81***</td>
</tr>
<tr>
<td>Downgrades with earnings increased</td>
<td>-0.35***</td>
</tr>
<tr>
<td>Downgrades with no earnings change</td>
<td>-1.72***</td>
</tr>
<tr>
<td>Downgrades with earnings decreased</td>
<td>-5.11***</td>
</tr>
</tbody>
</table>
The event-based stock return differences and the magnitude of the drift in the multivariate analysis are shown in the chart below. This drift is very similar to the magnitude of the drift in their univariate analysis.

**[F1] Stock returns for rec chgs and earnings chgs**

![Chart showing stock returns for recommendation and earnings changes](chart.png)

They did test whether other things, such as changes in the market's estimates on regressions, various misclassifications, or other factors such as growth rates, growth rate changes, "double signal" effects (those with two reported changes), big recommendation or earnings changes, and changes in an earnings estimate relative to the consensus, could influence the results, and found there was little incremental impact.

Finally, Michaely reported on the trading strategy they developed based on their research. They formed calendar-time long-minus-short portfolios for two strategies: an unconditional strategy that buys all upgrades and sells all downgrades, and a conditional one where they buy all upgrades with earnings increases and sell all the downgrades accompanied by earnings decreases. Looking at the raw returns over several holding periods they find that:

1. Mean raw daily returns are almost always positive for the long portfolios for both strategies and negative for the short portfolios of both strategies.
2. Raw returns for long-minus-short portfolios are therefore always positive for both strategies.
3. The magnitudes of the mean raw daily returns for all three portfolios (long, short, and long minus short) are all decreasing over time but the decrease is much greater for the short side of the portfolios for both strategies.
4. The magnitude of the raw returns for the conditional strategy is roughly two-thirds larger than the magnitude of raw returns for the unconditional strategy.

Michaely concluded that earnings-based recommendations are more informative and of greater investment value than discount rate-based recommendations, the economic difference between earnings-based and discount-rate based recommendations is consistent with
standard economic models and agents’ behavior, and the Investment value emerging out of these findings is large and persists through time. One may ask, he concluded, why analysts don’t issue more earnings-based recommendations?”

98. Accrual Reversals, Earnings and Stock Returns (Spring 2010)

Richard G. Sloan, L. H. Penny Chair in Accounting, Hass Business School, University of California, Berkeley, presented “Accrual Reversals, Earnings and Stock Returns,” coauthored with his colleagues, Eric Allen, PhD candidate, University of California, Berkeley, and Chad Larson, Washington University. Sloan had previously presented papers at the Q-Group® in the Spring of 2003.

Sloan began his presentation with a reference to Graham and Dodd’s (1934) discussion of how earnings can be distorted though accounting judgments. In this research, the authors looked at accruals and in particular at extreme accruals accompanied by subsequent revisions and earnings changes. The main thesis of their work is that stock prices act as if investors do not fully anticipate predictable extreme accrual reversals and subsequent earnings changes.

Sloan said an inherent property of accrual accounting is that accrual estimation errors must reverse. To the extent extreme accruals are attributable to estimation errors, extreme accruals should be followed by extreme accrual reversals. He categorized estimation errors as “good” accruals and accrual errors. “Good” accruals, he says, correctly anticipate future cash flows and persist depending upon the underlying economic growth of the business, and have no direct consequences for the change in future earnings. Accrual estimation errors do not anticipate future cash flows, completely reverse in a subsequent period, and temporarily inflate earnings now and temporarily deflate earnings later, causing a future earnings change that is opposite in sign and twice the magnitude of the error.

In doing this work, the authors had four predictions:

1. Accruals mean revert more rapidly than cash flows.
2. Extreme accruals exhibit a disproportionately high rate of extreme accrual reversals (and corresponding earnings changes).
3. After controlling for accrual reversals, accruals are not negatively related to future earnings changes and future stock returns.
4. Inventory write-downs are preceded by a disproportionately high frequency of extreme positive accruals.

In this research they used their knowledge of accrual accounting, testing their predictions using two sources of inventory data: accrual data from Compustat for non-financial companies from 1962-2006 and information on inventory write downs hand collected from 10-K filings for years 2001-2004. The later data set, Sloan noted, is limited by collection costs. The financial variables used are accruals, cash flows, and operating income. To focus on reversals occurring in the next year, without concern about a loss of power from the omission of longer term reversals, accruals are restricted to current or working capital accruals and exclude non-current or investing accruals. Stock returns data are from CRSP. The descriptive statistics for the sample, Sloan says, are both consistent with prior literature
and show that inventory accruals are a major contributor to the accrual anomaly.

To verify whether accruals mean-revert more rapidly than cash flows, Sloan said they estimated annual cross-sectional auto-regressions for cash flows, total accruals, and inventory but found that accruals mean-revert more rapidly than cash flows.

As to whether extreme accruals exhibit a disproportionately high rate of extreme accrual reversals, Sloan used transition matrices that show the proportion of the sample that belongs in each transition cell, the change in net income for the cells, and finally abnormal stock returns. He found that extreme accruals are associated with a disproportionately high frequency of extreme reversals and they explain the predictable earnings changes and stock returns following extreme accruals.

For inventory accruals, Sloan looked at whether inventory write-downs were preceded by a disproportionately high frequency of extreme positive accruals. With their unique data they looked for two things: relatively high frequency of accrual reversals for inventory, and a direct link between accrual reversals and the write-down of prior positive accrual estimation errors. They found that these reversals are particularly pronounced for this asset. As can be seen from their charts below:

### Proportion of Inventory Write-Downs Belonging to Each Inventory Accrual Transition Cell

<table>
<thead>
<tr>
<th>Inventory Accrual Rank in Period t-1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8.27%</td>
<td>2.49%</td>
<td>1.06%</td>
<td>0.21%</td>
<td>0.16%</td>
<td>0.37%</td>
<td>0.69%</td>
<td>1.06%</td>
<td>1.80%</td>
<td>2.92%</td>
</tr>
<tr>
<td>2</td>
<td>3.50%</td>
<td>3.23%</td>
<td>1.22%</td>
<td>0.90%</td>
<td>0.27%</td>
<td>0.37%</td>
<td>0.80%</td>
<td>1.70%</td>
<td>1.48%</td>
<td>1.59%</td>
</tr>
<tr>
<td>3</td>
<td>1.01%</td>
<td>1.59%</td>
<td>1.27%</td>
<td>0.32%</td>
<td>0.16%</td>
<td>0.32%</td>
<td>0.58%</td>
<td>0.85%</td>
<td>0.90%</td>
<td>0.53%</td>
</tr>
<tr>
<td>4</td>
<td>0.42%</td>
<td>0.53%</td>
<td>0.64%</td>
<td>0.42%</td>
<td>0.11%</td>
<td>0.11%</td>
<td>0.32%</td>
<td>0.16%</td>
<td>0.48%</td>
<td>0.21%</td>
</tr>
<tr>
<td>5</td>
<td>0.11%</td>
<td>0.00%</td>
<td>0.11%</td>
<td>0.21%</td>
<td>0.05%</td>
<td>0.05%</td>
<td>0.05%</td>
<td>0.16%</td>
<td>0.11%</td>
<td>0.11%</td>
</tr>
<tr>
<td>6</td>
<td>0.16%</td>
<td>0.42%</td>
<td>0.11%</td>
<td>0.16%</td>
<td>0.16%</td>
<td>0.21%</td>
<td>0.16%</td>
<td>0.42%</td>
<td>0.37%</td>
<td>0.05%</td>
</tr>
<tr>
<td>7</td>
<td>0.69%</td>
<td>1.43%</td>
<td>1.17%</td>
<td>0.58%</td>
<td>0.05%</td>
<td>0.21%</td>
<td>0.53%</td>
<td>0.58%</td>
<td>0.85%</td>
<td>0.42%</td>
</tr>
<tr>
<td>8</td>
<td>1.96%</td>
<td>2.17%</td>
<td>0.95%</td>
<td>0.64%</td>
<td>0.16%</td>
<td>0.37%</td>
<td>0.85%</td>
<td>1.17%</td>
<td>1.33%</td>
<td>1.22%</td>
</tr>
<tr>
<td>9</td>
<td>4.29%</td>
<td>2.65%</td>
<td>1.43%</td>
<td>0.32%</td>
<td>0.21%</td>
<td>0.16%</td>
<td>0.85%</td>
<td>1.75%</td>
<td>2.49%</td>
<td>1.54%</td>
</tr>
<tr>
<td>10</td>
<td>7.21%</td>
<td>2.49%</td>
<td>0.58%</td>
<td>0.42%</td>
<td>0.11%</td>
<td>0.21%</td>
<td>0.37%</td>
<td>1.11%</td>
<td>2.07%</td>
<td>4.19%</td>
</tr>
</tbody>
</table>
Sloan concluded his presentation with the major implications from this research:

1. Accountants, auditors, regulators, and investors should pay more attention to extreme accruals and their reversals.

2. Accrual estimation errors may arise from active manipulation of accruals; distortions created by GAAP and/or delayed business and accounting responses to changes in economic conditions.


Kogan offered a number of comments to develop the innovation idea: innovation generates systematic risks; existing firms may lose market share to competition, resulting in risk to financial capital. Thus, human capital of the current generation of workers is less compatible with new technologies than human capital of new generations. This risk to human capital they called displacement risk.

In specifying their new model, they provided the following graph showing future per-capita aggregate consumption is not the same as the future per-capita consumption of the current population of agents.

99. The Demographics of Innovation and Asset Returns (Fall 2009)

Leonid Kogan, Massachusetts Institute of Technology, and NBER, presented “The Demographics of Innovation and Asset Returns,” a paper he coauthored with Nicolae Garleanu, UC Berkeley, NBER and CEPR, and Stavros Panageas, LBS, and NBER.
Kogan and his colleagues called this new factor that captures the exposure to displacement risk a value-growth factor. Placing this squarely in the investment markets, Kogan said, the value premium in the market is due to hedging demand for growth stocks, and long-horizon investing does not keep up with the market average in the face of innovation. This, he said, is done only with a portfolio with a growth tilt in the portfolio. However, it is costly.

To test their idea, they used household-level consumption data, creating cohorts of households that entered the market at various dates. They estimated the displacement factor as a change in relative consumption of a group of households. They found evidence that supported their model, and Kogan shared four conclusions:

1. Displacement risk is a fundamental risk factor.
2. There is empirical evidence for displacement risk.
3. Calibration is quantitatively realistic.
4. The theory gives us a better understanding of the value-growth factor, value premium, equity premium.

To clarify value/growth in identifying companies, Kogan said that new companies are value firms that produce but do not invent and growth firms both invent and produce. He does say that older companies can capture some of the innovation by owning growth firms.

100. The Rational Part of Momentum (Spring 2008)


Scott’s object was to provide a rational explanation for momentum and to show why a momentum investment strategy should be successful. First, the authors deal with the efficient markets theory. If the efficient markets hypothesis holds and prices reflect all information, then clearly there is no rationale for a momentum strategy. However, in a noisy rational expectations equilibrium, some investors become “informed” by spending time and money to obtain valuable information. Their trades partially reveal the information by moving prices. Later, when the information is released, formerly uninformed investors trade causing the momentum effect. Thus, both the empirical momentum literature and the noisy rational expectations theory suggest that past returns should predict future returns.

While the authors found that stock return deciles appear to predict future changes in fundamental value and they found some evidence that analysts’ estimates tend to predict future changes in stock prices, the more pronounced effect works in the opposite direction: stock returns appear to predict future changes in analysts’ estimates as much as a year into the future.

Since the tests Scott described concern rate of return, the authors did not need to measure fundamental value directly. They needed only to measure the rate of change in fundamental value, $R_v$. They then related that change to the rate of change in price. They began with a multi-period dividend discount formula. In particular, they assumed that the $R_v$ per share of a firm’s equity is given by the discounted
present value of the stream of expected future dividends, and the growth expectation in the formula comes from analysts.

The authors next assumed that in many instances news that affects fundamental value in a cross-sectional analysis also affects expected earnings within the next two years and that value-sensitive news that has an effect only beyond two years is less likely and often more difficult to assess.

They define the return on a particular stock as the rate of change in fundamental value, \( R' \), or smoothed earnings estimates. In a cross section of stock returns, macro factors, such as the level of the overall stock market will be common for all stocks. As a result they assumed that cross-sectionally the return on a stock will be proportional to the change in the firm’s fundamental value \( R' \). They approximated the cross-sectional change in \( R \) by changes in expectations about firm-specific near-term events. Their model requires monthly analysts’ estimates for earnings one year and two years hence.

Scott presented a table containing the characteristics of his sample. In an average month the sample covered 1,977 firms. In terms of size and book-to-market quintiles the sample appears slightly skewed towards smaller low book-to-market stocks. The sample includes NASDAQ and AMEX as well as NYSE stocks, and covers a wide range of industries.

A second table provided initial evidence consistent with the momentum effect, the noisy rational expectations hypothesis, and the power of their measure of fundamental value to explain concurrent stock returns. Next Scott turned to a more dramatic view of these issues by tracing the time paths of both fundamental value and the returns of stocks sorted into momentum deciles. The authors created overlapping momentum deciles by ranking stocks each month according to their trailing 6-month returns. They call each 6-month ranking period Period 0, e.g., for the 6-month period beginning January, 2000 and ending June, 2000 they ranked the stocks by their six month returns at the end of June. They then calculated six months returns for the stocks in each period 0 decile for five additional periods. The 6-month period immediately preceding the ranking period is Period -1 (in the example July 1999 – December 1999). The six month period before that is Period -2. They skip one month between Period 0 and the next 6-month period (Period 1) as is common in the momentum literature, to avoid bid-ask bounce problems as well as lags in analysts’ earnings changes. Immediately following Period 1 are the final six month periods, Periods 2 and 3. Counting the month skipped after the ranking period, the data cover 37 months for each momentum decile. Each month begins another (overlapping) ranking period. In our example, the next Period 0 would start at the beginning of February, 2000.

Scott displayed graphically the behavior of the returns of the stocks through time. Period 0 is the ranking period. As expected, deciling stocks on six-month returns resulted in huge return differentials, shown clearly in the graph. Return differentials this large are most likely the result of investors reacting to significant new information. The heterogeneity of the returns suggests that the news is company specific or at most industry specific.

Period 1 of the graph showed the familiar momentum effect. The deciles in Period 1 lined up just as they did in Period
0. Stocks in decile ten had higher returns than stocks in decile 9 and so on, monotonically down to decile one. The difference in returns between deciles ten and one was large, at 8.1% per six-month period, and the t-statistic of the difference was statistically significant at 5.4. By Period 2, the t-statistic of the top decile average return minus the bottom decile return was negative and insignificant. In Period 3, the familiar reversal effect was evident. The decile returns were again monotonic but in the opposite direction. Stocks that 19-months earlier had the highest returns now had the lowest and underperformed the lowest momentum decile by a statistically significant -4.5%.

Next, Scott considered the returns in Period -1, the period preceding the ranking period. The decile returns in Period -1 or in any period before Period 0 are not realizable as in investment strategy. Nevertheless, the decile returns in Period -1 under the efficient market hypothesis should be independent of those in those in Period 0. However, they were not, and the actual relationship between Period 0 and Period -1 might be called a reverse momentum effect. Though somewhat peculiar, this reverse momentum effect would seem as great a challenge to market efficiency as the more familiar momentum effect. On the other hand, a noisy rational expectations interpretation of this reverse momentum effect is that in Period -1 informed investors successfully traded stocks that subsequently out- or under-performed in Period 0.

A third figure showed each momentum decile’s average return, the authors’ estimate in the change in fundamental value, \( R^v \). The graph traces the path of this change for each momentum decile from 1 ½ years before the formation of each momentum decile until a year and seven months after formation. If there were no predictability in the time series of these changes in fundamental value, the third graph would be like the first. However, although the third graph resembles the second it does not resemble the first. The monotonicity of the fundamental values in Periods 0 and 1 suggest predictability in the time series of analysts’ earnings revisions and thus in the fundamental values. Further, there seems to be greater predictability in the high momentum deciles which had above-average fundamental values for Periods 1 and 2, or a little over two-years.

Next, instead of ranking stocks by returns in Period 0, Scott showed them ranked into deciles based on the percent change in fundamental value, \( R^v \). Then the authors followed these deciles through time in terms of both \( R^v \) and \( R \) (Return). If their hypotheses are correct, a more powerful link between stock price and fundamental value should be apparent when they sort the stocks in \( R^v \) deciles. This is because \( R^v \) is based on near-term earnings estimates and will be most powerful when information about fundamentals changes near-term earnings (the next two or three years).

Further figures presented by Scott showed the time path of \( R^v \), and \( R \). The changes in fundamental value seem less predictable than in the momentum ranking. It looks as though analysts were surprised, particularly in the extreme deciles.

Scott posed the question: Do prices predict fundamentals or do analysts chase prices? He commented that the results so far suggested that prices lead analysts’ expectations and thus their measure of \( R^v \). The authors believe the data suggest a noisy rational expectations equilibrium. That is, informed or professional investors either
obtain information more quickly or analyze existing data better than the average analyst. These professional investors make their decisions and move prices before analysts publish their opinions. Nevertheless, another interpretation is that analysts’ expectations of earnings simply follow prices.

In conclusion, the authors observed that the similarity between actual returns and changes in fundamental value is striking and suggests that the primary force underlying the momentum effect is changing company fundamentals as reflected in analysts’ expectations. Further, when stocks are ranked into deciles based on the change in fundamental value, stock returns appear to predict subsequent changes in fundamental value well in advance. These finding are consistent with capital market equilibrium models where rational investors have heterogeneous expectations, particularly models with noisy rational expectations.

The noisy rational expectations model is attractive in terms of assumptions and implications. It requires the plausible assumption that the acquisition and interpretation of information about equity pricing requires skill and resources. It also implies that less well informed investors base their investment decision, in part, on past returns.

The findings suggest that the behavioral hypotheses that rely on investor reactions to price movement may be less important than hypotheses about how investors form expectations about stock fundamentals.

101. The Franchise Cycle (Fall 2006)

Martin L. Leibowitz, Managing Director, Morgan Stanley, made available a paper by himself and Anthony Bova entitled “P/E and Pension Fund Ratios.”

The paper begins with the observation that there is some evidence for the intriguing conjecture that P/E ratios may decline under both significantly low and significantly high real interest rates. The P/E response pattern would then resemble a flat-top tent that angles downward at both ends. The paper explores the risk implications of such a low rate scenario and the equity valuations that could give rise to such a tent pattern.

A number of historical studies of price/earnings (P/E) ratios for US stocks have exhibited generally declining P/Es as a function of higher nominal interest rates. A different perspective emerges when real rates are substituted for nominal rates. For 1978 to 2004, in place of the traditional picture of P/E declining with nominal rates, the highest P/Es for real rates lie within a “sweet spot” of 2-3% and then fall off for both higher and lower rate levels.

A possible explanation for the tent diagram is that in the 2-3% sweet spot, economic and profit growth might be reasonably normal. However, as growth and demand for funds push real rates beyond 3%, valuation begins to be impaired by the increasing cost of funds. Very low real rates could be associated with poor economic conditions and poor prospects for future growth. Leibowitz set up an example of a dollar pension fund and showed the pattern for the funding ratio. The funding ratio, which is 100% at a 3% real rate, does not vary much at rates above 3%, but falls significantly at rates below 3%. The overall
pattern for the funding ratio shows a surprisingly high degree of stability at higher interest rates, but a horrendous falling off at lower rates.

The standard present value models do not fit the tent pattern, so Leibowitz turned to a valuation approach referred to in previous papers as the “franchise value” model, in which equity valuation is separated into the tangible value, – the value associated with a firm’s current book of business as articulated in a “perpetual-equivalent” stream of earnings that could be generated without further investment – and the franchise value, derived from the growth of productive investment opportunities available to the enterprise. The franchise value is approximated by the product of two basic factors, one characterizing the growth of the opportunities for investment, and a second factor representing the net present value generated from their average excess return. With the franchise value model, it is possible to generate regime-dependent parameter values that create the tent-like P/E pattern.

The franchise value approach subjects growth prospects to a rigorous discounting that damps the value contribution at higher discount rates. P/Es turn down at some point as higher rates overwhelm the associated higher growth prospects. At lower rates, the corresponding lower growth rates help to generate lower P/Es. The combination of these two effects at the extremes in interest rates is a key ingredient in creating theoretical P/Es having the tent shape.

The preceding discussion had been focused on the real rate liability of the defined benefit plan that is fully funded at the outset. Leibowitz next turned to the current transition from defined benefit plans to the defined contribution and IRA format. Defined contribution plans are really defined benefit plans in microcosm. In contrast to the DB format, an individual’s DC plan does not have the benefits of aggregated mortality risk, investment and administrative efficiencies, a broad time span for discharge of liabilities, or the potential for contingent support from a backup sponsor. The DC plan also faces largely a real, rather than a nominal, liability.

DC plans also suffer from a special form of cognitive dissonance. Individuals are prone to poor retirement planning. Even at comparable levels of appropriately defined funded ratios, a DC plan may be more fragile than the corresponding DB analog.

The problems of the DC plan would become exacerbated by descent into a left-hand (low real interest rate) scenario. For one thing, unlike DB plans, an individual may not have the luxury of being able to “ride-out” a left-hand rate scenario, even one that turns out to last for only a short time period. Leibowitz also pointed out that it is well known that DB plans help smooth market movements by their strategy of short-term rebalancing. This contrasts with the more momentum-like responses of other market participants that tend to “pile-on” and thereby exacerbate market volatility. To the extent that DB plans move into structures that no longer call for automatic rebalancing, a major source of smoothing activity will be lost. If such a trend becomes widespread, it could eventually create a more volatile environment for risky investments. Together, DB and DC plans already form the largest cohort of long-term investment funds in the US market. To some extent these funds have objectives and concerns that could lead them to move in
concert to lower risk strategies, all within a limited space of time. As such, they could become a potent factor affecting both the long-term reallocation of risky assets as well as the shorter term volatility response to fundamental events.

In concluding, Leibowitz observed that the key point of his paper is that the “left-hand scenario” evoked by the tent diagram may represent the ultimate “black hole” for investors subject to some form of long-term liability. Such an environment, especially if persistent over time, could lead to low growth prospects, reduce risk tolerance, a move to lower risk assets, increased risk premia, and adverse correlations across alternative asset classes. The good news, however, is that such events are rare and for the most part real interest rates and the associated market conditions tend to be localized within or near the sweet spot.

102. Persistence, Predictability, and Portfolio Planning (Spring 2006)

Michael Brennan, Emeritus Professor Anderson School of Management, UCLA made available a paper by himself and Yihong Xia, entitled: “Persistence, Predictability and Portfolio Planning.” Brennan spoke at the Fall, 1981 Seminar of the Q-Group®.

In introducing the topic of dynamic portfolio optimization, the authors observe that the debate about excess stock price volatility, the evidence of mean reversion in stock prices, and of the predictive power of instruments such as the dividend yield, the book-to-market ratio, the term spread and the short term interest rate, have revived interest in dynamic portfolio theory in recent years. This interest has been further stimulated by the behavior of stock prices in the late 1990’s, which drew attention to the implications of valuation ratios such as the market dividend yield and the book to market ratio for expected future returns of equity securities, and therefore portfolio strategies. Failure to take account of time variation in expected returns may carry significant costs.

In concluding, their paper the authors summarize: we have shown that time variation in expected returns that implies both large variation in stock market valuation ratios and substantial gains to long term dynamic investment strategies is likely to be hard to detect by standard statistical methods. As a result, weak statistical evidence for return predictability does not in itself imply that return predictability is economically insignificant. We suggest that it is likely to be more productive to estimate the expected long run rate of return by comparing the current level of stock prices with forecasts of expected future dividends in the dividend discount model (DDM) paradigm. This forward-looking approach has the advantage that it does not rely on hard-to-estimate regression coefficients from past data. The disadvantage is that the rate of return that emerges from the dividend discount rate model is a long run expected rate of return. In order to use the DDM expected rate of return estimate in a dynamic portfolio planning, we show how the instantaneous expected rates of return can be estimated from the DDM long run expected rate of return.

For the standard Dividend Discount Model (DDM) the authors used growth estimates from various sources, including IBES. The DDM gave long-run expected returns $k_t$. For estimating the series of shorter run rates, the authors employed two methods to convert the DDM results into
estimates of $\mu$, the instantaneous expected rate of return. The first assumed that the dividend growth rate is a known constant and the second assumed that the growth rate followed an Ornstein-Uhlenbeck process. Both methods assumed that the instantaneous rate of return follows the O-U process described by:

\begin{align}
(1) \quad \frac{dP}{P} &= (\alpha + \beta \mu)dt + \sigma P dz_P \\
(2) \quad d\mu &= \kappa(\bar{\mu} - \mu)dt + \sigma_\mu dz_{\mu}.
\end{align}

Where $dz_P$ and $dz_{\mu}$ are correlated standard Brownian motion with the correlation $\rho_{P\mu}$. In this formulation $\mu$ is to be thought of as a perfect signal of the drift of the asset price process, $\alpha + \beta \mu$. However for the most part they assumed that $\alpha = 0$, and $\beta = 1$. Then $\mu$ can be interpreted as the drift of the stock price. $\bar{\mu}$ is the long run mean of $\mu$, and $\kappa$ is the speed of mean reversion. For the development of this particular model, the unconditional distribution of $\mu$ was fixed by $\bar{\mu} = 9\%$, with a standard deviation of 4%. So a single sigma interval for $\mu$ was 5%-14%. This is consistent with a 14% annual stock return volatility. They also assumed a risk free rate constant at 3%, implying a 6% equity premium. The authors developed nine scenarios from the combination of $\kappa = 0.02, 0.10, 0.5$, and $\rho = corr(dz_P, dz_{\mu}) = 0.0, -0.5, -0.9$. The nine scenarios make up the simulation model.

The time series of $\mu$ can be estimated from the time series of $k_t$ by an iterative process using a set of parameters, starting with assumed values. They calculated $\mu$, and then from the time series of $\mu$ they estimated the parameters and a new series of $\mu$ was calculated and the process was continued until convergence was reached. If the dividend growth rate expectations are stochastic, the instantaneous dividend growth rate is assumed to follow an O-U process and two steps are required to derive $\mu$ from $k_t$.

Quarterly data for real and for nominal dividends and the price-dividend ratio for the S&P 500 Index were used for the sample period 1950 first quarter to 2002 second quarter. The real and nominal long-run expected rates of return were determined at each date. Four series were actually estimated, using different sources for the long-run growth rates. Brennan discussed the differences in results among the methods, particularly the differences between forecasts of real and nominal rates of return.

To test the return predictability of the model, the authors regressed actual quarterly rates of return on the S&P 500 Index on the series of estimated $\mu$. The results indicated weak statistical evidence of predictive power of the $\mu$ series at a quarterly horizon.

The next step was to simulate the optimal and unconditional asset allocation policies using each of the four series forecasts for $\mu$. A graph showed that the investor who had followed either of two of the strategies would have vastly outperformed one following an unconditional strategy. Two of the strategies showed smaller superiority.

In conclusion, the authors said while we should be careful from inferring too much from these historical simulations which represent only a single path of stock prices for a single level of risk aversion, it is
encouraging that the optimal dynamic strategies tend to outperform naïve unconditional strategies even when they are based on real time data.

Trading

103. Determinants of Value In Dark Pools (Fall 2010)

Mark J. Ready, Jeffery Diermeier Chair of Finance, Wisconsin School of Business, University of Wisconsin - Madison, presented his paper “Determinants of Volume in Dark Pools.” Ready had previously presented a paper at the Q-Group® seminar in the Spring of 1996.

To begin, Ready describes dark pools:

- Institutional orders (pools of liquidity)
- No quotes to show trading interest (dark)
- No brokers and no dealers (cheap)
- No guarantee of execution (must be another institution there at the same time)
- Execution prices based on quotes from other market centers (no price discovery)

These pools try to keep the sharks out, thus some hedge funds are excluded.

To determine whether dark pools are acting in the best interest of investors, in his research Ready uses the buy side only in investigating institutional trades that are important drivers of market price and thus important in the regulation of markets and institutions. Using data from three dark pools that cater to institutional traders, he finds information to suggest that dark pool usage is lower for stocks with the lowest spreads per share, which is consistent with trader routing of these stocks to other venues in order to satisfy soft-dollar agreements.

Dark pools trade in a variety of places, three of the largest are: 1) LIQUIDNET, a buy-side trader order management system that alerts an opposite direction trader; 2) PIPELINE that mainly has hidden limit orders; and 3) and two versions of POSIT – POSIT Match, matches with periodic crosses at the midpoint of the quote, and POSIT Alert which is similar to LIQUIDNET.

Ready focused on two stocks traded in dark pools, Microsoft, a stock which has a high daily volume of trading, and American Commercial Lines, a stock with lower average daily volume. He provides the following chart showing dark pool and other trading information for the two stocks:
<table>
<thead>
<tr>
<th>MPID</th>
<th>Name</th>
<th>Volume</th>
<th>Pct</th>
<th>Volume</th>
<th>Pct</th>
<th>Volume</th>
<th>Pct</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITGI</td>
<td>ITG Inc.</td>
<td>3,753</td>
<td>0.1%</td>
<td>948</td>
<td>3.2%</td>
<td>480,162</td>
<td>0.5%</td>
</tr>
<tr>
<td>LQNT</td>
<td>Liquidnet</td>
<td>7,968</td>
<td>0.1%</td>
<td>596</td>
<td>2.0%</td>
<td>424,300</td>
<td>0.4%</td>
</tr>
<tr>
<td>BLOK</td>
<td>Pipeline</td>
<td>3,700</td>
<td>0.1%</td>
<td>72</td>
<td>0.2%</td>
<td>136,600</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td>Dark Pools</td>
<td>15,421</td>
<td>0.3%</td>
<td>1,616</td>
<td>5.5%</td>
<td>1,041,062</td>
<td>1.0%</td>
</tr>
<tr>
<td>4 ECN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Sell-side</td>
<td></td>
<td>2,599,002</td>
<td>44.5</td>
<td>8,260</td>
<td>28.3</td>
<td>40,254,520</td>
<td>39.8</td>
</tr>
<tr>
<td>NITE</td>
<td>Knight</td>
<td>59,451</td>
<td>1.0%</td>
<td>556</td>
<td>1.9%</td>
<td>2,439,568</td>
<td>2.4%</td>
</tr>
<tr>
<td></td>
<td>Other Nasdaq</td>
<td>649,347</td>
<td>11.1</td>
<td>4,344</td>
<td>14.9</td>
<td>10,586,148</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>Other Exch.</td>
<td>1,210,882</td>
<td>20.8</td>
<td>7,274</td>
<td>24.9</td>
<td>22,394,952</td>
<td>22.2</td>
</tr>
<tr>
<td>Cons. Volume</td>
<td></td>
<td>5,832,192</td>
<td>100.0%</td>
<td>29,246</td>
<td>100.0%</td>
<td>101,082,433</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Ready asks why the dark pool volume is not higher, especially for high volume stock? He has three testable hypotheses:

- H1: Soft dollars. Traders sort stocks by spread per share and then route shares with the lowest spreads to soft-dollar venues, not to dark pools (measured by a spread rank).

- H2: Busy traders. Traders sort orders by dollar spread per order and route highest value orders to dark pools (measured by dollar value rank).

- H3: Traders want price certainty. Traders trade off proportional spread against proportional volatility.

To examine the trades, Ready used the 13F filings to gather quarterly changes in holdings as a proxy for the institutional trades. He notes that some institutions are not allowed in the dark pools and that some of 13F identifiers in the Thompson database are incorrect. To trade in a dark pool, orders in opposite directions must arrive at the same time. Orders are assumed to be routed to dark pools based on the following value function. $X$ is a vector containing characteristics of institution $i$, stock $s$, and the institution’s order of that stock in quarter $q$.

$$V_{i,s,q} = \alpha_q + \beta X_{i,s,q} + \hat{Z}_{i,s,q} + \epsilon_{i,s,q}$$

The order is routed to the dark pools if $V$ is greater than 0.

Ready assumes that dark pools are approximately linearly related to stock characteristics and total and average institutional order information. Using a variety of market activity factors and a series of interaction variables, he finds the following:
Panel Data Estimation

- Assume dark pool volumes (scaled by total consolidated volume) are approximately linearly related to stock characteristics and total and average institutional order information. Includes random effects by stock.

<table>
<thead>
<tr>
<th>Coefficient on:</th>
<th>Estimate</th>
<th>T-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matched small institutional orders</td>
<td>0.164†</td>
<td>27.4†</td>
</tr>
<tr>
<td>Extra (imbalance in ) small institutional orders</td>
<td>0.038</td>
<td>10.0</td>
</tr>
<tr>
<td>Increase in Matched orders if large orders are included</td>
<td>0.099</td>
<td>8.0</td>
</tr>
<tr>
<td>Increase in Extra if large orders are included</td>
<td>0.013</td>
<td>1.6</td>
</tr>
<tr>
<td>Matched small orders interacted with:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>daily return volatility</td>
<td>0.006</td>
<td>2.5</td>
</tr>
<tr>
<td>relative speed</td>
<td>0.009</td>
<td>3.0</td>
</tr>
<tr>
<td>indicator: spread rank measure &lt;0.2</td>
<td>-0.054</td>
<td>-7.9</td>
</tr>
<tr>
<td>average dollar value rank measure</td>
<td>-0.107</td>
<td>-3.2</td>
</tr>
<tr>
<td>average institutional position value</td>
<td>0.011</td>
<td>1.4</td>
</tr>
<tr>
<td>average institutional turnover</td>
<td>-0.084</td>
<td>-10.4</td>
</tr>
</tbody>
</table>

†averages of quarterly values

When he sets the interacted variables to zero (dollar spread per share is not particularly narrow, and all of the other characteristics are average), for a very low dollar spread stock like Microsoft, and 1,000 shares of additional 13F buy and sell volume, predicted dark pool volume increases by 110 shares. For a high dollar-spread stock, the number is 164.

Ready returns to his three hypotheses and concludes:

**Supported by the data:**

Hypothesis 1: Traders sort stocks by spread per share (agreements are for a fixed number of shares) and then route shares with the lowest spreads to soft-dollar venues, and not to dark pools.

**NOT Supported by the data**

Hypothesis 2: (busy traders) Traders sort orders by dollar spread per order (= shares times spread per share) and route highest value orders to dark pools.

Hypothesis 3: Traders want price security and trade off proportional spread against proportional volatility.

In other words, dark pool usage is lower for stocks with the lowest spreads per share, which is consistent with trader routing of these stocks to other venues in order to satisfy soft-dollar agreements.

104. Market Microstructure in the Crosshairs (Spring 2010)

Lawrence E. Harris, Fred V. Keenan Chair in Finance, Professor of Finance and Business Economics, Marshall School of Business, University of Southern California, presented “Market Microstructure in the
Crosshairs.” Over the years, Harris has presented many papers to the Q-Group®.

Harris began his informative and thought provoking presentation with the following fact: the NYSE share of the market has gone from 80 percent ten years ago to 20 percent today, and the NASDAQ has experienced the same decline. Harris uses this as one example of how the markets have been changed by technology. Automated trading and dealing have largely replaced floor-based trading with systems that are extraordinarily fast and active.

Traders, he says, still seek to find the other side of a trade at low cost by avoiding well-informed traders, front runners, and scaring away the market, while still being the last trader to fill a block order. Traditionally, traders have split orders and used floor and upstairs brokers to hide their orders and to avoid informed traders. While the objectives of job are the still the same now, major technological changes have led to much faster execution. He showed a number of charts demonstrating the resulting greater volume, smaller spreads, more quotes per stock, lower average trade size and greater quoted sizes that this change has brought. The chart for market order execution speed, shown below, demonstrates the change.

Indeed, while order execution speed has increased, there also are more quotes per stock, particularly among the S&P 500 stocks, as shown below:

There is no doubt that markets are more liquid than ever before and that there have been changes in strategies to take advantage of this. The strategies include using hidden order facilities and dark pools, IOIs (indication of interest) to avoid informed traders, and algorithms to manage the search for liquidity. These technological changes, and the changes in trading volumes and speed, lead Harris to pose three questions:

1. Are markets vulnerable to failures in computerized trading systems?
2. Has off-exchange trading impaired price formation or raised transaction costs?
3. Is high frequency trading fair?

He discussed each of these questions and concluded that computerized trading systems are less vulnerable than those involved in the 1987 crash, that price formation and trading costs have not been negatively impacted, and, as evidence, he showed that spreads have decreased as shown in the chart below:
At the same time quotation sizes, shown below, have dramatically increased.

As to the question of fairness, Harris said there is concern, but much of the legislative questioning of fairness may not yet rest on firm evidence.

He does have a number of concerns:

1. Make-or-take pricing is distorting.
2. Regulators should ban front-running client orders in correlated securities and contracts.
3. Naked sponsored access is unwise and exchanges and clearinghouses should consider additional safeguards against runaway algorithms.

For the SEC, Harris laid out specific issues: flash orders, short-selling restrictions and settlement; dark pools; indications of interest. Further he discussed the extent to which the fixed income market has not taken advantage of technology as have the
equity and options markets. He provided some interesting suggestions for improvements. Finally, he discussed best execution versus best representation, clearing and settlement timing, and OTC derivatives and security loans.

While electronic traders have largely displaced traditional dealers, and markets are now more liquid, regulators must be careful, Harris says, lest they accidentally harm our markets and thereby retard or reverse the economic recovery. To deal with all these concerns he laid the solution not on regulation but squarely on transparency saying, “the best regulator of foolish behavior is a deep appreciation of its consequences.” That is what this presentation and his papers attempt to help us gain.

As a final addition to the presentation Harris listed further readings: papers of his, with or without coauthors, that provide significantly more information about this topic.


- “Price Inflation and Wealth Transfer during the 2008 SEC Short-Sale Ban,” coauthored with Ethan Namvar, Paul Merage School of Business, University of California, Irvine, Blake Phillips University of Waterloo, School of Accounting and Finance; analyzes the impact the SEC imposed short-sale ban had on financial stocks.

- “The Economics of Flash Orders,” December 4, 2009 is a tutorial-like introduction to flash orders and the effects they have on the options markets. This paper was requested of Harris by the Chicago Board Options Exchange, Inc. and the International Securities Exchange, Inc.

**105. Shackling Short Sellers: The Effects of the Recent and Proposed Restrictions (Spring 2010)**


Jones started his presentation by asking the question, Are short sellers heroes or villains? He said that the answers to the following questions help determine the role of short sellers and should guide short-selling policy choices:

1. Are short sellers able to identify overvalued stocks, thus helping them get to the “right” price?
2. Do they help pop bubbles or keep them from forming?
3. Can they sometimes drive prices below fundamental value?

For the most part, Jones says, financial economists consider short sellers to be the “good guys,” who unearth overvalued companies and contribute to market efficiency. Regulators have shared that view by repealing the NYSE’s uptick
rule and other short-sale price tests that impeded shorting activity since the Great Depression. However, short sellers often are the scapegoats when prices fall sharply, and as the financial crisis continued in 2008, restrictions on short selling grew. In September 2008 the U.S. Securities and Exchange Commission (SEC) adopted an emergency order that temporarily banned most short sales in nearly 1,000 financial stocks.

Jones described the short selling ban of 2008 and how it differed from that imposed during the Great Depression when all shorting was banned on the New York Stock Exchange following England’s announcement that it was abandoning the gold standard. This ban included short selling by specialists and market makers, provoking, Jones said, something akin to a short squeeze by buyers who realized that, at least in the short term, there would be few who could stand in the way of their efforts to drive prices up. The stock prices in this period, and the impact of the 1931 NYSE short-selling ban are shown below. Jones pointed out that the US Senate’s release in 1932 of a list of the biggest short sellers was meant, he says, to shame them as ‘unpatriotic’; a term many still apply to short sellers even now.

In issuing the 2008 order the SEC did not repeat the 1931 NYSE policy of a full ban, but provided a limited exception for market-makers selling short as part of bona fide market making activity. Further, since the ban became effective on a so-called “triple witching day,” options market makers were allowed a 24-hour delay so that they too could sell short, thus attempting to prevent large price swings. Jones deftly laid out the events that occurred during this time.

With all the empirical evidence suggesting that shorting restrictions cause prices to be wrong, Jones said that to defend the new 2008 restrictions, something seems to have been seen as different this time. He suggested the following possibilities:

- Short sellers are (now) manipulators, driving prices below fundamental value.
• Manipulative “bear raids” are a particular threat for financials due to multiple equilibria (a bank run).
• This is a time when we need stocks to be overvalued (due to systemic risk).
• Behavioral finance is right and investors are unduly pessimistic due to something like herding or extrapolation bias.

There are three theories regarding limiting or suspending short sales: differences in beliefs that leave only optimists to hold stocks when shorting is prohibited; rational expectations, leaving unbiased prices adjusting more slowly to negative information; and manipulative shorting. Prior empirical research, Jones concluded, uniformly finds prices are more efficient when there are short sellers and, he adds, shorting restrictions cause prices to be wrong.

In this research, Jones and his coauthors study changes in stock prices, the rate of short sales, aggressiveness of short sellers, and various liquidity measures before, during, and after the shorting ban. Using five sources they obtained data on 465 short-sale banned stocks from Aug 1, 2008 – Oct 31, 2008 and matched each banned stock to a non banned stock obtained from a control group. The data included a list of banned stocks, stock characteristics from CRSP, intraday data on trades and quotes from TAQ, short interest data from the exchanges, and a proprietary NYSE and NASDAQ intraday short sale data set.

Jones said that the SEC had three goals for this ban: reduce volatility; improve liquidity; and boost prices. Jones reported that the ban did not reduce volatility, did not improve liquidity and, with regard to boosting prices, they rose but the increase was probably caused by the reaction to other news. September 19th was a triple witching day, had very heavy intraday volatility, and announcements were made regarding several programs and rules changes: TARP; the money market fund guarantee, and asset backed commercial-paper programs; widened allowable collateral for existing lending programs. The impact on prices for all banned firms was large and an annotated share price impact on part of the sample, large Wall Street banks, is shown below:

![Share price effects on large Wall St. banks](image)

Equal-weighted cumulative returns on 8 primary dealers vs. 396 other firms on the original SEC ban list, and the corresponding matched non-banned stocks.
As for market quality, Jones discussed the impact of the ban on spreads: effective spreads widened by 22 basis points for stocks in the top quartile, and 58 and 45 basis points for the middle two quartiles. For the subset they call the eight systemically important firms, effective spreads widened by 18 basis points. Still, when the shorting ban took effect, short sellers did not significantly change their overall aggressiveness in non-banned stocks, and there were no significant changes in short-sale price impacts for this set of stocks. There was, as can be seen in the following chart, a burst of volatility on September 19th in the banned-stock price spreads.

**Remaining short sellers are aggressive**

Regardless of the market quality measure they used, Jones said that it seems quite clear that market quality was markedly worse for all but the smallest stocks subject to the shorting ban. This makes sense, he says, because the shorting ban temporarily excluded many market participants, including hedge funds and proprietary trading desks that were not formally market-makers but typically would provide substantial amounts of liquidity via shorting.

To sum up the impact of the ban, Jones quoted two major players involved in instituting the ban. December 2008: SEC chairman Christopher Cox stated that the biggest mistake of his tenure was the shorting ban, and SEC Commissioner Troy Paredes in February 2009 said: “...it became apparent that the ban did not stabilize the markets but did result in inefficiencies and other market dislocations and disruptions. In short, the benefits of the ban did not materialize but the costs clearly did.”

Jones then noted that two price test alternatives have been proposed: the return of some sort of uptick rule and a prohibition on marketable short sale orders. Since the earlier market uptick rule had been repealed on July 6, 2007, the authors looked at the impact of it on shorting activity, stock
returns, and market quality. Using proprietary data they created two groups: a treatment group of stocks that experienced the repeal; and a control group that was free of the uptick rule throughout the period. They found the uptick repeal did not cause or worsen the 2007 quant meltdown, that there was more shorting after the tick test was repealed, short-sale orders became more aggressive, and the repeal slightly widened effective spreads.

In conclusion, Jones said that shorting bans are very bad for markets.

- Uptick repeal did not cause or worsen the 2007 quant meltdown.
- Price tests would have big effects on some trading strategies, particularly strategies requiring rapid implementation over short time horizons.
- The imposition of a new uptick rule would affect market-making.
- Imposing price tests should have very modest effects on market quality, but should cause a slight improvement in bid-ask spreads and ask depths.

He reported that the SEC has recently adopted a new rule with regard to stocks whose price has dropped by 10 percent in one day. In looking at the rule, Jones said that in normal times it will impact only about 50 stocks per day out of more than 6,000 that trade. In the fourth quarter of 2008, the number would have been about 500 stocks per day that would have reached the 10 percent limit.

106. **Market Microstructure Invariants** *(Fall 2009)*

Albert S. Kyle and Anna A. Obizhaeva, both of University of Maryland, presented “Market Microstructure Invariants.” Kyle presented the theory and Obizhaeva, the empirical results. Kyle had previously presented papers at the Spring 1989, the Spring 1995, and the Spring 2001 seminars of the Q-Group®.

Kyle began the presentation, stating that it is important for the asset manager to understand the level of transactions costs, both market impact and bid-ask spread, and how transactions costs vary cross-sectionally across stocks as the level of trading activity varies. He posed following questions:

- What percentage of “alpha” is lost due to transaction costs?
- How much money can be allocated to a seemingly profitable strategy before it becomes non-economic due to high transaction costs?
- Is it reasonable to restrict the rate of trading to a fixed percentage of trading volume, or should the maximum percentage of average daily volume vary across stocks?
- If one broker executes orders for small stocks and another broker executes orders for large stocks, can their performances be compared?

To explain why market impact and bid-ask spread vary across stocks with different trading activity, they developed a model of market microstructure invariants that generated predictions concerning cross-sectional variations of these variables. They tested predictions using a set of portfolio transitions and a trading game approach first described by Jack Treynor. Since managers trade many different stocks, we can think of them as playing many different trading games simultaneously, a different game for each stock.
Kyle described three proposed theories and their implications; the first he characterized as “preferred,” the others as “naïve”:

Preferred:

- *Trading Game Invariance*, has deep parameters (number of bets and their size) that are invariant, but the length of the trading games vary across stocks. The model implies that when trading activity increases by one percent:
  - The size of a bet increases by 1/3 of one percent.
  - Frequency of bets per calendar day increases by 2/3 of one percent.
  - Length of trading game decreases by 2/3 of one percent.

Naïve:

- *Invariant Bet Frequency* has more volume resulting from larger liquidity trades but not from more liquidity trades per calendar day. Kyle pointed out that this is the default model for managers and it incorrectly justifies trading no more than 1% of average daily volume for all stocks, regardless of level of trading activity and imputing the same number of basis points in transactions costs for individual stocks in a basket with both active and inactive stocks. This model implies that:
  - All variation in trading activity is explained exclusively by variation in bet size.
  - The bid-ask spread is constant.

- *Invariant Bet Size* suggests more volume results from more liquidity trades but not from larger liquidity trades per calendar day. All variation in trading activity is explained by variation in bet frequency alone. The model prediction is that when trading activity increases by one percent, the
  - Average size of a liquidity trade/average daily volume decreases by one percent;
  - Market impact of trading percent of average daily volume increases by 1/2 of one percent.
  - Bid-ask spread decreases by 1/2 of one percent.

Kyle noted that the level of market impact, bid-ask spreads, and the average size of liquidity trades are not identified by the theory but can be estimated from data. In addition, the length of the trading day was not identified and cannot be estimated using their methodology.

Obizhaeva presented the empirical implications of the three proposed models that were tested using a proprietary dataset of portfolio transitions that occurred when a legacy portfolio is replaced with a new portfolio during fund manager or asset allocation changes. The data included more than 2,680 portfolio transitions executed by a large vendor of portfolio transition services from 2001 to 2005. Using data on transition orders to examine which model made the most reasonable assumptions about the frequency of liquidity trades and how size varies with trading activity, she reported that the three models differ only in their predictions of alpha.
Tests for Liquidity Orders Size - Design

All three models are nested into one specification that relates trading activity $W$ and the average size of liquidity trade $\hat{Q}$, proxied by a transition order of $X$ shares, as a fraction of average daily volume $V$:

$$\ln\frac{X_i}{V_i} = \bar{c} + a_0 \times \ln\frac{W_i}{W_0} + \xi$$

The variables are scaled so that $10^6 \times 10^4$ is the average size of liquidity trade as a fraction of daily volume (in bps) for a benchmark stock with:

- daily standard deviation of 2%,
- price of $40$ per share,
- trading volume of 1 million shares per day,
- trading activity $W_v = 2\% \times 40 \times 1$ million.

Obizhaeva concluded that their tests provided strong support for the model of Trading Game Invariance and showed that using this model extrapolates these estimates, and can calculate expected trading costs, $C$, for any order of $X$ shares for any security using a simple formula:

$$C(X) = \frac{1}{2}\chi^2\left(\frac{W}{(40)(10^6)(0.02)}\right)^{1/3}\frac{\sigma_r}{0.02}X \left(\frac{W}{(40)(10^6)(0.02)}\right)^{-1/3}\frac{1}{2}k^2\left(\frac{W}{(40)(10^6)(0.02)}\right)\frac{1}{0.02}$$

where trading activity $W = \sigma_r \times P \times V$

- $\sigma_r$ is the expected daily volatility,
- $V$ is the expected daily trading volume in shares,
- $P$ is the price.

Obizhaeva concluded with a list of practical implications for the trading rate, components of trading costs and execution of trading quality.

107. Do Noise Traders Move Markets? (Fall 2008)

Terrance Odean, William H. Booth Professor of Banking and Finance, Haas School of Business, University of California at Berkley had made presentations to previous Q-Group seminars in the Fall of 1999, 2000 and 2002. He presented “Do Retail Trades Move Markets?” he coauthored with Brad M. Barber and Ning Zhu, of University of California at Davis.

Odean notes that a central question in the debate over market efficiency is whether investor sentiment, as reflected in the retail investor demand, causes prices to deviate from underlying fundamentals. The authors’ research is motivated by this theory of investor sentiment, though Odean stated that they do not claim to definitively test the theory.

Investor sentiment is generally attributed to individual retail investors.
Since such investors tend to place small trades, their purchases and sales must be correlated if they are to appreciably affect prices. In a previous paper the authors showed that the trading of individual investors at a large discount brokerage (1991-1996) and at a large retail brokerage (1997-1999) was systematically correlated: in any month the investors at these brokerages tend to buy and sell the same stocks. Additionally, they found that the monthly imbalance of purchases and sales by these investors ((purchases – sales)/ (purchases + sales)) is correlated over time. As a consequence, they conclude that investors are likely to be net buyers (or net sellers) of the same stocks in subsequent months as they are in the current month. The current work was provoked by these findings.

From the current research they find that the imbalances of buyer and seller initiated small trades on the New York Stock Exchange, the American Stock Exchange and NASDAQ are highly correlated with the imbalance of purchases and sales by individual investors at the two brokerages and that, measured over both long and short horizons, the imbalance of small buyer and seller initiated trades forecasts subsequent cross-sectional differences in stock returns.

The data they use for the study of individual investors trading behavior consist of tick-by-tick transaction level data for US stock markets using the Trade and Quotes and Institute for the Study of Security Markets transaction data over the period 1983 to 2001. Odean says that they differ from other researchers in two important ways: they test the implications of persistent buying (or selling) by individuals for subsequent, rather than contemporaneous, cross-sectional returns and they analyze a much longer and broader sample than that used in prior research.

Specifically, trades are identified as buyer- or seller-initiated using a quote rule and a tick rule. They identify whether a trade is buyer- or seller-initiated and use trade size as a proxy for individual investor and institutional trades. Trades are partitioned into five bins based on trade size from small trades ($5,000 or less) used as a proxy for individual investor trades, to large trades ($50,000) used as a proxy for institutional trades. Note that, in any given period buyers (or sellers) can initiate the majority of trades.

The authors test the effectiveness of using signed small trades as a proxy for individual investor trading, by comparing the trading patterns for small signed trades in TAQ/ISSM database to trades of individual investors at a large discount broker in the early 1990s and a large retail broker in the late 1990s. The pattern of correlations presented in Table 1, Panels A and B of the paper provides strong support for the use of small trades as a proxy for individual investor trading and the correlations indicate the trading patterns of individual and institutional investors are quite different. In addition, they find that order imbalance based on TAQ/ISSM data indicates strong herding by individual investors.

Odean next turned to whether coordinated buying (selling) of individual investors support prices above (below) levels that would otherwise be justified by the stock fundamentals, thus forecasting subsequent returns. To answer this they construct monthly time series of returns on value-weighted and equally-weighted portfolios of stocks in each quintile, also constructing analogous portfolios using the
proportion of buyer initiated trades based on large trades. They find that during the ranking year, with one exception, stocks heavily sold by both individual and institutional investors earn poor returns while stocks heavily bought earn strong returns. The one exception to this pattern is value-weighted portfolios based on small trades.

For small, medium, and large stocks, annual retail buy imbalances forecast the next year’s return. The authors conclude that over short and long horizons retail trade imbalances forecast future returns and that for all stocks over short horizons and for small stocks over annual horizons, retail trades also move markets.

108. Agency Costs of Institutional Trading (Fall, 2007)

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 the Portfolio Manager who chooses \( \Omega \) to minimize total costs:

- Execution costs,
- Opportunity cost of partial fill, and
- 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 \( \sigma_{NT}^2 \equiv \) 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.

**109. Algorithmic Trading: A Quant Perspective (Fall, 2007)**

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® 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.

110. Order Flow and Prices (Fall, 2007)

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.

111. Panel: Exploring Capacity Issues (Spring 2007)

Joanne M. Hill, Managing Director, Goldman Sachs & Co. moderated a panel exploring capacity issues. The panel consisted of Dan Bienvenue, Portfolio Manager-Global Equities, CALPERS, Knut Kjaer, CEO Norges Bank Investment Management, and Matt Yamini, Managing Director –Head of Global Equity Trading, TIAA-CREF. Hill had made available an article she wrote for The Journal of Trading entitled “Equity Trading Capacity Revisited: Growth, Fragmentation and Fluidity.”

The article reviews developments in securities trading, including the trading of portfolios, the use of derivatives, and exchange traded funds (ETFs). It explores some trends and issues in cross-product equity market capacity. In the last several years, trading costs (both explicit and implicit) have fallen with greater applications of technology, more competition, and lower equity market volatility. But questions on capacity of strategies and markets are becoming more difficult to answer because of the fragmentation and fluidity of market capacity. Some equity derivative products, like futures, swaps and ETFs, tend to attract a larger than average number of sellers (short positions), while others, like stock options, index options and portfolio trading have more balanced flows but tend to have more net flow from buyers.

Capacity growth still has a “dark” side. Flow-induced volatility can occur when macro needs or a sizeable shift in risk tolerance leads many investors to attempt to transact in a short time window in different products and venues. These short-term liquidity demands can spiral into a volatility shift as a large magnitude market move leads high risk position holders to liquidate further, exacerbating price movements and causing feedback effects that can produce an even greater strain on market capacity.

The purpose of the panel was to explore, for three large pools of capital, the connection between strategy and capacity, the practical factors affecting capacity, and effects on the use of external and internal management. Kjaer, distributed a set of slides entitled “Exploring Capacity Issues: Building a Fund from $30 bn in 1998 to $324 bn at year end 2006 While Keeping the Alpha Capability.” The $324 bn consists of the Global Pension Fund of Norway at $286 bn, Norway’s Foreign Exchange Reserves at $36 bn, and the Petroleum Reserve Insurance Fund at $2 bn. The largest asset by far consists of petroleum in the ground, at $200 bn. The balance of the fund is invested in an oil fund, equities, and bonds. He identified
four important conclusions from his trading experience.

- Actively managing and monitoring all trading costs is important.
- Lowering commissions is only a small start.
- The ability to influence the trading mix has changed dramatically over the last 5 years giving the buyside the tools to actively manage total trading costs.
- The key to lowering trading costs is data and access to data. Good data are important not only for improving trading costs but should also be extended to improving portfolio management decisions.

With respect to the alpha challenge, he said that a move to more scalable alpha-strategies may imply a decline in the information ratio which was at present 1.22. NBIM prefers relative value and fundamental strategies but they may be forced to move to more factor based strategies. He went on to discuss the principles behind NBIM’s active management, and observed that active managers should forecast as often as possible (the fundamental law), and that mathematics cannot overcome ignorance/lack of information.

Continuing the discussion of the consequences of rising capacity, Yamini observed that while transactions costs are important, process was especially important. Bienvenue added that for CALPERS the emphasis is on beta strategies, and that alpha strategies may not be worth the capacity complications. High capacity strategies are best done in-house to keep costs low, while lower capacity strategies can be managed externally.

Hill turned to the importance of quantitative methods and their ability to deal with high capacity. The three panelists agreed that quantitative methods were becoming more important. Yamini saw them leading to more products, a decrease in volatility, and more complete markets. Transaction cost models were especially useful. He expects to see more quantitative tools made available, and an increase in trading efficiency with reduced transactions costs. Kjaer added that quantitative developments are creating more opportunities.
THE Q® GROUP
The State-of-the Art
in Investment Management

- SEMINAR PROGRAMS 2006-2010
- AUTHORS INDEX
- SUBJECT INDEX
- 2005 - 2009 ROGER F. MURRAY PRIZE WINNERS
# SEMINAR PROGRAMS

Listed in Chronological Order

# 2006-2010

*Page numbers will direct the reader to appropriate summary.*

*In some cases the title of the summary will differ from the program listing.*

## APRIL 2-5, 2006

### PORTFOLIO AND RISK MANAGEMENT

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2</td>
<td>I Know What to Do, Why Don’t I Do It?</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Speaker: Nick Hall, Director, Saddlebrook Wellness Center</td>
<td></td>
</tr>
<tr>
<td>April 3</td>
<td>A Rational Model of the Closed-End Fund Discount</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Speaker: Jonathan Berk, Professor of Finance, Haas School of Business, University of California at Berkeley</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Downside Risk and Its Implications for Financial Management</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Speaker: Robert Engle, Professor of Finance, Leonard W. Stern School of Business, New York University</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Harvard, Yale and the Future of Investing</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Speaker: Andre F. Perold, Sylvan C. Coleman Professor of Financial Management, Harvard Business School</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roughing it up: Including Jump Components in the Measurement, Modeling and Forecasting of Return Volatility</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Speaker: Francis X. Diebold, W.P. Carey Professor of Economics, School of Arts and Sciences, University of Pennsylvania</td>
<td></td>
</tr>
<tr>
<td>April 4</td>
<td>Buy Side Risk Management</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Speaker: Kenneth J. Winston, Chief Risk Officer, Morgan Stanley Investment Management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Putting Economics (Back) Into Quantitative Models</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Speaker: Vineer Bhansali, Head of Analytics, PIMCO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Liquidity Risk in the Corporate Bond Markets</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Speaker: George Chacko, Associate Professor of Finance, Harvard Business School</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Returns to Portfolios of Movies</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Speakers: Andrew Rudd, Managing Partner, Procinea Management LLC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mark Ferrari, Director of Research, Procinea Management LLC</td>
<td></td>
</tr>
<tr>
<td>April 5</td>
<td>Participant Reaction and the Performance of Funds Offered by 401(k) Plans</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Speakers: Edwin Elton, Nomura Professor of Finance, Leonard N. Stern School of Business, New York University</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Martin J. Gruber, Nomura Professor of Finance, Leonard N. Stern School of Business, New York University</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Persistence, Predictability, and Portfolio Planning</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Speaker: Michael Brennan, Emeritus Professor, Anderson School, UCLA</td>
<td></td>
</tr>
</tbody>
</table>
OCTOBER 15 – 18, 2006
40TH ANNIVERSARY CONFERENCE
PRESENTING THE “ALL STARS” OF INVESTMENT STRATEGIES

October 16
Market Equilibrium in NonCAPM Worlds
Speaker: Harry M. Markowitz, Nobel Laureate, Fellow of the Institute and
President, Harry Markowitz Company

Equilibrium Simulation
Speaker: William F. Sharpe, Nobel Laureate, Fellow of the Institute, STANCO
25 Professor of Finance, Emeritus, Stanford University,
Chairman, Financial Engines, Inc.

Flirting With Danger: Optimizing Leverage and Shorting
Speaker: Ronald N. Kahn, Barclays Global Investors

Attribution: A Unified, Portfolio Based Approach
Speaker: Richard Grinold, Barclays Global Investors

Capital Allocation
Speaker: Stewart C. Myers, Gordon Y. Billard Professor of Finance,
Sloan School of Management

Sinking Globalization: What Could Go Wrong?
Speaker: Niall Ferguson, Laurence A. Tisch Professor of History, Harvard University

October 17
On the Implications of Modern Risk Management for
Equity and Credit Analysis
Speaker: Robert C. Merton, Nobel Laureate, Fellow of the Institute and
John and Natty McArthur University Professor, Harvard Business School

A Speculator’s Look At Risk Management
Speaker: Myron S. Scholes, Nobel Laureate, Fellow of the Institute and
Managing Partner, Oak Hill Platinum Partners

Capital Ideas: Out of This World Or In The Thick Of It?
Speaker: Peter L. Berstein, President, Peter L. Berstein, Inc.

What’s New and Old In Behavioral Economics And Finance?
Speaker: Richard H. Thaler, Professor of Behavioral Science and Economics,
University of Chicago

October 18
Will The Phillips Curve Cause World War III?
Speaker: Jack L. Treynor, President, Treynor Capital Management, Inc.

The Franchise Cycle
Speaker: Martin L. Leibowitz, Managing Director, Morgan Stanley

MARCH 25 – 28, 2007
EVOLVING ALPHA AND BETA CONCEPTS AND WEALTH DEMOGRAPHICS

March 26 - EVOLVING ALPHA AND BETA CONCEPTS
Alpha/Beta Separation
Speaker: James L. Haskel, Director-Portfolio Strategy, Bridgewater Associates, Inc.
Panel: Exploring Capacity Issues
Moderator: Joanne M. Hill, Managing Director, Goldman Sachs & Co.
Panelists: Dan Bienvenue, Portfolio Manager-Global Equities, CALPERS
           Knut Kjaer, CEO, Norges Bank Investment Management
           Matt Yamini, Managing Director –Head of Global Equity Trading, TIAA-CREF

The FundCreator Approach to Hedge Fund Return Replication,
Fund Creation and Performance Evaluation
Speaker: Harry M. Kat, Professor of Risk Management, Sir John Cass Business School

Modeling Alpha
Speakers: Eric H. Sorensen, President and CEO PanAgora Asset Management
          Edward Qian, Director-Macro Strategies, PanAgora Asset Management

National Politics Today – As I See It
Speaker: Cynthia Tucker, Editorial Page Editor, The Atlanta Journal-Constitution

March 27 - WEALTH DEMOGRAPHICS
Major Provisions of the Pension Protection Act of 2006: Implications for
Pension and Investment Management
Speaker: Mark J. Warshawsky, Director – Retirement Research, Watson Wyatt Worldwide

Panel: Future Sources of Alpha
Moderator: Katrina F. Sherrerd, Principal – Strategic Planning & Affiliate Relations,
           Research Affiliates, LLC
Panelists: Chris Brightman, CEO, UVA Investment Management Company
          Craig W. French, Director of Quantitative Research, Corbin Capital Partners, L.P.
          Harinda de Silva, President, Analytic Investors

Demographics and Finances of the Baby Boomers
Speaker: Olivia S. Mitchell, Professor, The Wharton School, University of Pennsylvania

Non-Cap Weighted Indexes
Speakers: Robert D. Arnott, Chairman, Research Affiliates, LLC
          Clifford S. Assness, Managing Principal, AQR Capital Management, LLC

March 28 - WEALTH DEMOGRAPHICS
Alpha Migration: Issues and Consequences
Speaker: Andrew B. Weisman, Managing Director, Hedge Fund Development,
         Sandeep Patel, Portfolio Analytics, Merrill Lynch

Extreme Bound Analysis
Speaker: John Benson Durham, Chief, Monetary and Financial Market Analysis
        Section Federal Reserve Board

OCTOBER 14 – 17, 2007
NUANCES IN INVESTING

October 15 - IDIOSYNCRATIC RISK AND EXPECTED STOCK RETURNS
High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence
Speaker: Andrew Ang, Roger F. Murray Professor of Finance,
         Columbia Business School, Columbia University, and NBER

Cross Sectional Variation of Stock Returns: Liquidity and Idiosyncratic Risk
Speaker: Matthew Spiegel, Professor of Finance,
         Yale School of Management, Yale University
### October 15 - VILLAINS OF INVESTING AND PARTISAN ECONOMICS

**The Investment Behavior of Buyout Funds: Theory and Evidence**
Speaker: Matthew Richardson, Charles Simon Professor of Applied Financial Economics and Director, New York University Salomon Center, The Stern School of Business, New York University

**Corporate Political Contributions and Stock Returns**
Speaker: Michael J. Cooper, Associate Professor of Finance, The David Eccles School of Business, University of Utah

**Influence: The Ultimate Power Tool**
Speaker: Robert B. Cialdini, President, Influence At Work and Regent's Professor of Psychology and Marketing, Arizona State University

### October 16 - TRADING AND MARKET MICROSTRUCTURE

**Agency Costs of Institutional Trading**
Speaker: Roger M. Edelen, Assistant Professor, Carroll School of Management, Boston College, and ReFlow Management, LLC

**Algorithmic Trading: A Quant Perspective**
Speakers: Ananth Madhavan, Global Head of Trading Research, Barclays Global Investments; George Sophianos, Vice President, Equity Execution Strategies, Goldman, Sachs & Co.

**Order Flow and Prices**
Speaker: Ekkehart Boehmer, Associate Professor of Finance, Mays Business School, Texas A&M University

**Implied Liquidity From Redundant Futures Markets**
Speaker: John Curran, MD, Products and Services, CME Group
Discussant: Larry Harris, Professor, University of Southern California, Los Angeles

### October 17 - VILLAINS OF INVESTING AND PARTISAN ECONOMICS, CONTINUED

**Hedge Fund Activism, Corporate Governance, and Firm Performance**
Speaker: Alon Brav, Associate Professor of Finance, The Fuqua School of Business, Duke University

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

**Party Influence in Congress and the Economy**
Speaker: Eric Zitzewitz, Associate Professor of Economics, Dartmouth College

### MARCH 30 – APRIL 2, 2008

**IMPORTANT “COGS” IN THE INVESTMENT PROCESS**

March 31

**The Fundamentals of Commodity Futures Returns**
Speaker: K. Geert Rouwenhorst, Professor of Finance, Deputy Director International Center for Finance, Yale School of Management

**Life Cycle Funds**
Speaker: Luis M. Viceira, Professor of Business Administration Harvard Business School

**The Theory of Life-Cycle Savings and Investing**
Speaker: Paul S. Willen, Senior Economist and Policy Advisor, Federal Reserve Bank of Boston

**Patents in the Asset Management Industry**
Speaker: Ralph P. Albrecht, Esquire, Venable, LLP
Investment Implications of the 2008 Elections
Speaker: Gregory R. Valliere, Consultant, Stanford Washington Research Group

April 1

What Happened to the Quants In August 2007
Speaker: Andrew Lo, Harris and Harris Group Professor, Director MIT Laboratory for
Financial Engineering, MIT Sloan School of Management

Trends in the Money Management Industry: Systemic Imperatives
Speaker: Michael L. Goldstein, Managing Partner, Empirical Research Partners, LLC

The Divergence of Liquidity Commonality
Speaker: Ronnie Sadka, Assistant Professor of Finance,
University of Washington School of Business

How Basic Are Behavioral Biases
Speaker: M. Keith Chen, Assistant Professor of Economics, Yale School of Management

April 2

Stale or Sticky Stock Prices
Speaker: Donald B. Keim, John B. Neff Professor of Finance,
The Wharton School, University of Pennsylvania

The Rational Part of Momentum
Speaker: James H. Scott, Managing Director, Global Public Markets, GM Asset Management

OCTOBER 19 – 22, 2008
BUBBLES AND CRASHES ~ THE INDIVIDUAL INVESTOR

October 20 - VALUE AND INVESTMENT TAXATION

The Origins of Value: The Financial Innovations that Created Modern Capital Markets
Speaker: William Goetzmann, Edwin J. Beinecke Professor of Finance and
Management Studies, Yale School of Management, Yale University

Investment Taxation and Portfolio Performance
Speaker: Jeffrey Pontiff, Professor of Finance, Carroll School of Management, Boston College

October 20 - LIQUIDITY AND SOURCES OF ALPHA

Financial Liquidity and Savings: Evidence from 401(k) Loans
Speaker: Brigitte Madrian, Aetna Professor of Public Policy and Corporate
Management, Kennedy School of Government, Harvard

Structural Alpha
Speaker: Martin Leibowitz, Managing Director, Morgan Stanley & Co. Incorporated

McWages
Speaker: Orley Ashenfelter, Joseph Douglas Green 1895 Professor
Economics, Director of the Industrial Relations Section, Woodrow Wilson
School of Public and International Affairs, Princeton University

October 21 - BOND LIQUIDITY AND MARKET MICROSTRUCTURE

Liquidity and Corporate Bonds
Speaker: Jiang Wang, Mizuho Financial Group Professor, Sloan School of Management, MIT

Financial Intermediary Leverage and Value-at-Risk
Speaker: Tobias Adrian, Federal Reserve Bank of New York

Capital Flows and the Returns to Private Equity
Speaker: Antoinette Schoar, Associate Professor of Finance and
Entrepreneurship, Sloan School of Management, MIT
Do Noise Traders Move Markets?  
Speaker: Terrance Odean, William H. Booth Professor of Banking and Finance,  
Haas School of Business, University of California at Berkley

October 22 - RISK PREFERENCES AND ASSET ALLOCATION

The Cross Section of Managerial Ability and Risk Preferences  
Speaker: Ralph S. J. Koijen, Assistant Professor of Finance,  
University of Chicago Graduate School of Business

Rebalancing and Asset Allocation  
Speaker: Sébastien Page, Senior Managing Director, State Street Associates

MARCH 29 – APRIL 1, 2009  
CREDIT, THE REAL ECONOMY AND INVESTING

March 30

Market Disruption, Economic Crisis, and Investor Behavior  
Speaker: Kenneth A. Froot, André R. Jakurski Professor of Business  
Administration, Harvard Graduate School of Business  
Administration and Founding Partner, FDO Partners

The Global Financial Crisis  
Speaker: H. Franklin Allen, Nippon Life Professor of Finance,  
Wharton School, University of Pennsylvania

Regulatory Reform in Light of the Current Crisis  
Speaker: Richard R. Lindsey, CEO, The Callcott Group LLC & the Courant Institute, NYU

Panel: E The Financial Crisis and its Discontents: Where Now?  
Moderator: Brett Hammond, TIAA-CREF  
Panelists: Kent Smetters, Associate Professor of Insurance & Risk Management  
Wharton School, University of Pennsylvania  
Kenneth A. Froot, André R. Jakurski Professor of Business  
Administration, Harvard & Founding Partner, FDO Partners  
Philippe Jorion, Chancellor’s Professor, University of California, Irvine  
Sandip Bhagat, The Vanguard Group  
Bennett Golub, Blackrock, Inc.

Reflections on the Actions of the New Administration  
Speaker: William G. Gale, Vice President and Director, Economic Studies,  
The Brookings Institution

March 31

Credit Contagion from Counterparty Risk  
Speaker: Philippe Jorion, Chancellor’s Professor, University of California, Irvine

Should Benchmark Indices Have Alpha? Revisiting Performance Evaluation  
Speaker: K.J. Martijn Cremers, Associate Professor of Finance, Yale School of Management

Do Arbitrageurs Amplify Economic Shocks?  
Speaker: Harrison Hong, John Scully ’66 Professor, Princeton University

Best Ideas: Finding Outperforming Managers  
Speaker: Randolph B. Cohen, Associate Professor of Business Administration,  
Harvard Business School

April 1

Optimal Portfolio Analysis with Wage Indexed Social Security  
Speaker: Kent Smetters, Associate Professor of Insurance and Risk Management,  
The Wharton School, University of Pennsylvania
OCTOBER 18 – 22, 2009
FINANCIAL MARKETS AND INVESTOR BEHAVIOR

October 19

Inexperienced Investors and Bubbles
Speaker: Robin Greenwood, Associate Professor of Business Administration
Harvard Business School

The Failure Mechanics of Dealer Banks
Speaker: Darrell Duffie, Dean Witter Distinguished Professor of Finance
Graduate School of Business, Stanford University

Depression Babies: The Effect of Experiencing Macro-Economic Shocks On Individual Risk Taking
Speaker: Ulrike M. Malemendier, Associate Professor of Economics
Department of Economics, University of California, Berkeley

The Dynamics of Leveraged and Inverse ETFs
Speaker: Ananth Madhavan, Head of Global Trading Research, Barclays Global Investors

The “Harry Markowitz Effect,” 50 Years Later and Still Counting
Speaker: Martin L. Leibowitz, Institute Fellow and Managing Director,
Morgan Stanley & Co. Incorporated

October 20

False Discoveries in Mutual Fund Performance: Measuring Luck in Estimated Alphas
Speaker: Russ Wermers, Associate Professor of Finance, Robert H. Smith School of Business, University of Maryland at College Park

Portfolio Choice In Retirement: Health Risk and the Demand For Annuities, Housing and Risky Assets
Speaker: Motohiro Yogo, Assistant Professor of Finance,
The Wharton School, University of Pennsylvania

The Demographics of Innovation and Asset Returns
Speaker: Leonid Kogan, Nippon Telephone & Telegraph Professor of Management, Sloan School of Management
Massachusetts Institute of Technology

Pension Funds: Performance, Costs and Benchmarks
Speaker: Rob Bauer, Full Professor of Institutional Investors, Maastricht University

October 21

Market Microstructure Invariants
Speakers: Albert S. Kyle, Smith Chair Professor of Finance, Robert H. Smith School of Business, University of Maryland at College Park
Anna Obihaeva, Assistant Professor of Finance, Robert H. Smith School of Business, University of Maryland at College Park

Risk and Return Characteristics of Venture Capital – Backed Entrepreneurial Companies
Speaker: Arthur G. Korteweg, Assistant Professor of Finance, Graduate School of Business, Stanford University
MARCH 21 – 24, 2010
SPEED AND CROWDING: CONVERGING DILEMMAS FOR QUANT INVESTING

March 22

Retirement Investing: Analyzing the “Roth” Conversion and Re-characterization Options
Speaker: Chester B. Spatt, Pamela B. Dunn Professor of Finance, Director, Center for Financial Markets, Tepper School of Business, Carnegie Mellon University

Value and Momentum Everywhere
Speaker: Clifford S. Asness, Managing & Founding Principal, AQR Capital Management

Risk Premia and the Conditional Tails of Stock Returns
Speaker: Bryan T. Kelley, Professor, Finance Department, Stern School of Business, New York University

What Drives the Value of Analyst’s Recommendations: Earnings Estimates or Discount Rate Changes?
Speaker: Roni Michaely, Rudd Family Professor of Management, Professor of Finance, The Johnson School, Cornell University

Why Diversity is Crucial in Nature and in Markets
Speaker: Michael J. Mauboussin, Chief Investment Strategist, Legg Mason Capital Management

March 23

Are Stocks Less Volatile in the Long Run?

And

On The Size of The Active Management Industry
Speaker: Robert F. Stambaugh, Miller Anderson & Sherrerd Professor of Finance, Professor of Finance and Economics, The Wharton School, University of Pennsylvania

Portfolio Choice for Resource Based Sovereign Wealth Funds
Speaker: Bernd Scherer, Professor of Finance, EDHEC Business School

Accrual Reversals, Earnings and Stock Returns
Speaker: Richard G. Sloan, L. H. Penny Chair in Accounting, Hass Business School, University of California, Berkeley

Market Microstructure in the Crosshairs
Speaker: Lawrence E. Harris, Fred V. Keenan Chair in Finance, Professor of Finance and Business Economics, Marshall School of Business University of Southern California

March 24

Shackling Short Sellers: The Effects of the Recent and Proposed Restrictions
Speaker: Charles Jones, Richard W. Lear Professor of Finance and Economics, Chair, Finance and Economics Division, Columbia Business School

Cross Section of Stock Returns, Alphas and Information Ratios
Speakers: Steven Sapra, Portfolio Manager, Analytic Investors, LLC

OCTOBER 17 – 20, 2010
NO ALPHA NOW? SO, LET'S WORK ON BETA!!

October 18

The Active Vs. Passive Decision By Sovereign Wealth Funds
Speaker: William N. Goetzmann, Edwin J. Beinecke Professor of Finance and Management Studies, Yale School of Management

Portfolio Choice for Resource Based Sovereign Wealth Funds
Speaker: Bernd Scherer, Professor of Finance, EDHEC Business School
Forecasting Returns – The Sum of the Parts Approach
Speaker: Miguel Ferreira – Universidade Nova de Lisboa Pedro Santa-Clara, Universidade Nova de Lisboa and NBER

Liquidity Risk and Interbank Markets
Speaker: Brenda González-Hermosillo, Deputy Division Chief, Global Financial Stability, Monetary and Capital Markets Department, International Monetary Fund, and NBER

The Next 100 Years: A Forecast for the 21st Century
Speaker: George Friedman, Chairman, Strategic Forecasting, Inc.

October 19

Returns to Buying Earnings and Book Value: Accounting for Growth and Risk
Speaker: Stephen H. Penman, George O. May Professor of Accounting and Morgan Stanley Research Scholar, Graduate School of Business, Columbia University

The Effects of Stock Lending on Security Prices: An Experiment
Speaker: Steven N. Kaplan, Neubauer Family Professor of Entrepreneurship and Finance, Booth School of Business, University of Chicago and NBER

Lifetime Consumption and Investment for Retirement
Speaker: Philip H. Dybvig, Boatman Bancshares Professor of Banking and Finance, Olin School of Business, Washington University, Saint Louis

The Origin of Behavior
Speaker: Andrew Lo, Harris & Harris Group Professor, Director, MIT Laboratory for Financial Engineering, MIT Sloan School of Management

October 20

Determinants of Value In Dark Pools
Speaker: Mark J. Ready, Jeffery Diermeier Chair of Finance, Wisconsin School of Business, University of Wisconsin, Madison

A Matter of Style: The Causes and Consequences of Style Drift In Institutional Portfolios
Speaker: Russ Wermers, Associate Professor of Finance, Robert H. Smith School of Business, University of Maryland at College Park
**AUTHORS INDEX TO VOLUMES I, II, III, IV, V, VI and VII**

(References are to volume and page number)
(Does not include papers prior to 1975, that are listed in Volume V)

<table>
<thead>
<tr>
<th>Author</th>
<th>Volume(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adler, F. Michael</td>
<td>II:13</td>
</tr>
<tr>
<td>Adrian, Tobias</td>
<td>VII:170</td>
</tr>
<tr>
<td>Ahlers, David M.</td>
<td>I:112</td>
</tr>
<tr>
<td>Albrecht, Ralph P.</td>
<td>VII:49</td>
</tr>
<tr>
<td>Alexander, Carol V.</td>
<td>V:135</td>
</tr>
<tr>
<td>Allen, Edward L.</td>
<td>I:30</td>
</tr>
<tr>
<td>Allen, H. Franklin</td>
<td>VI:35, VII:78</td>
</tr>
<tr>
<td>Altman, Edward I.</td>
<td>I:12, 27, 92, II:4, 37, III:4, 7, 8, IV:24</td>
</tr>
<tr>
<td>Ambachtsheer, Keith</td>
<td>I:58, 63, 150, 155, II:30, III:68, 71, IV:95, VI:53</td>
</tr>
<tr>
<td>Ang, Andrew</td>
<td>VI:15, VII:93</td>
</tr>
<tr>
<td>Angelica, Robert E.</td>
<td>IV:9</td>
</tr>
<tr>
<td>Anson, Mark VI:</td>
<td>108</td>
</tr>
<tr>
<td>Apgar, Sandy II:</td>
<td>38</td>
</tr>
<tr>
<td>Armentrout, Steven</td>
<td>IV:68</td>
</tr>
<tr>
<td>Ameriks, John VI:</td>
<td>95</td>
</tr>
<tr>
<td>Ashenfelter, Orley</td>
<td>VII:104</td>
</tr>
<tr>
<td>Asness, Clifford II:</td>
<td>64, VII:131, 185</td>
</tr>
<tr>
<td>Ayres, Herbert F.</td>
<td>I:11, 89, II:66</td>
</tr>
<tr>
<td>Babcock, Guilford C.</td>
<td>I:140</td>
</tr>
<tr>
<td>Bader, Lawrence N.</td>
<td>III:72</td>
</tr>
<tr>
<td>Baghat, Sanjai V.</td>
<td>71</td>
</tr>
<tr>
<td>Bagot, Gordon M.</td>
<td>III:30</td>
</tr>
<tr>
<td>Bagwell, Laurie S.</td>
<td>IV:17</td>
</tr>
<tr>
<td>Baker, Charles (Tony)</td>
<td>VI:159</td>
</tr>
<tr>
<td>Baker, David A.</td>
<td>I:34, 99, 152</td>
</tr>
<tr>
<td>Barber, Brad M.</td>
<td>V:21</td>
</tr>
<tr>
<td>Barberis, Nicholas VI:44</td>
<td></td>
</tr>
<tr>
<td>Barclay, Michael J.</td>
<td>III:110</td>
</tr>
<tr>
<td>Barnett, Gregory A.</td>
<td>I:57</td>
</tr>
<tr>
<td>Barr, Dean IV:</td>
<td>68, V:94</td>
</tr>
<tr>
<td>Barry, John V.</td>
<td>I:11, 89, 152</td>
</tr>
<tr>
<td>Bauer, Robb VII:</td>
<td>127</td>
</tr>
<tr>
<td>Bauman, W. Scott</td>
<td>I:110</td>
</tr>
<tr>
<td>Beaver, William H.</td>
<td>I:42, 152</td>
</tr>
<tr>
<td>Beebower, Gilbert I:</td>
<td>157, II:73, III:96, IV:81</td>
</tr>
<tr>
<td>Benartzi, Shlomo V.</td>
<td>130, 156</td>
</tr>
<tr>
<td>Bergstrom, Gary</td>
<td>I:59</td>
</tr>
<tr>
<td>Berk, Jonathan V:</td>
<td>37, 162, VI:163, VII:53</td>
</tr>
<tr>
<td>Bernhard, Arnold I:</td>
<td>143</td>
</tr>
<tr>
<td>Bernstein, Peter L.</td>
<td>II:60, III:23, VII:105</td>
</tr>
<tr>
<td>Bernstein, Robert J.</td>
<td>II:4, III:7, IV:60</td>
</tr>
<tr>
<td>Bhagat, Sandip IV:</td>
<td>68, VII:76</td>
</tr>
<tr>
<td>Bhansali, Vineer VII:</td>
<td>125</td>
</tr>
<tr>
<td>Bienvenue, Dan VII:</td>
<td>223</td>
</tr>
<tr>
<td>Bierwag, Gerry O.</td>
<td>I:1, 8</td>
</tr>
<tr>
<td>Biggs, John VI:</td>
<td>91</td>
</tr>
<tr>
<td>Black, Fischer</td>
<td>III:32, IV:45</td>
</tr>
<tr>
<td>Bloch, Ernest I:</td>
<td>101</td>
</tr>
<tr>
<td>Block, Frank E.</td>
<td>I:76, 124, II:26</td>
</tr>
<tr>
<td>Blood, Charles I:</td>
<td>145</td>
</tr>
<tr>
<td>Bodie, Zvi II:9, VI:</td>
<td>99</td>
</tr>
<tr>
<td>Boehmer, Ekkehart VII:221</td>
<td></td>
</tr>
<tr>
<td>Bogle, John C.</td>
<td>II:41, V:85</td>
</tr>
<tr>
<td>Bookstaber, Richard I:</td>
<td>68, III:19, 21, V:138, 149</td>
</tr>
<tr>
<td>Booth, David G.</td>
<td>II:73</td>
</tr>
<tr>
<td>Boquist, John I:</td>
<td>127</td>
</tr>
<tr>
<td>Botkin, Donal II:</td>
<td>12</td>
</tr>
<tr>
<td>Brav, Alon VII:</td>
<td>27</td>
</tr>
<tr>
<td>Brennan, Michael J.</td>
<td>IV:47, VII:203</td>
</tr>
<tr>
<td>Brightman, Chris VII:</td>
<td>11</td>
</tr>
<tr>
<td>Brinson, Gary P.</td>
<td>II:11, 46, III:63</td>
</tr>
<tr>
<td>Briten-Jones, Mark V:</td>
<td>122</td>
</tr>
<tr>
<td>Brock, William A.</td>
<td>III:13</td>
</tr>
<tr>
<td>Brunie, Charles H. I:</td>
<td>100</td>
</tr>
<tr>
<td>Brush, John S. III:</td>
<td>107</td>
</tr>
<tr>
<td>Burroughs, Eugene I:</td>
<td>81</td>
</tr>
<tr>
<td>Buntless, Gary VI:</td>
<td>93</td>
</tr>
<tr>
<td>Calderwood, Stanford</td>
<td>I:137, II:43</td>
</tr>
<tr>
<td>Campbell, John Y.</td>
<td>V:48</td>
</tr>
<tr>
<td>Carhart, Mark V:</td>
<td>109</td>
</tr>
<tr>
<td>Carleton, Willard T.</td>
<td>I:51, II:62, IV:82</td>
</tr>
<tr>
<td>Carty, Lee V.</td>
<td>66</td>
</tr>
<tr>
<td>Cavaglia, Stefano V:</td>
<td>89</td>
</tr>
<tr>
<td>Chacko, George VII:</td>
<td>120</td>
</tr>
<tr>
<td>Chalmers, John M. R.</td>
<td>V:57</td>
</tr>
<tr>
<td>Chan, Louis K. C. V:</td>
<td>26</td>
</tr>
<tr>
<td>Chen, Dan V:</td>
<td>67</td>
</tr>
<tr>
<td>Chen, Joseph VI:</td>
<td>46</td>
</tr>
<tr>
<td>Chen, M. Keith VII:</td>
<td>57</td>
</tr>
<tr>
<td>Chiene, John I:</td>
<td>55</td>
</tr>
<tr>
<td>Chordia, Tarun VI:</td>
<td>19</td>
</tr>
<tr>
<td>Cialdini, Robert B. V:</td>
<td>151, VII:59</td>
</tr>
<tr>
<td>Clarke, Roger I:</td>
<td>68</td>
</tr>
<tr>
<td>Clossey, David II:</td>
<td>39</td>
</tr>
<tr>
<td>Cochran, John V:</td>
<td>1</td>
</tr>
<tr>
<td>Cohen, Susan I. III:</td>
<td>45</td>
</tr>
<tr>
<td>Cohen, Randolph B. VII:44</td>
<td></td>
</tr>
<tr>
<td>Collin-Dufresne, Pierre VI:87</td>
<td></td>
</tr>
<tr>
<td>Condon, Kathleen I:</td>
<td>157</td>
</tr>
<tr>
<td>Conrad, Jennifer VI:</td>
<td>14</td>
</tr>
<tr>
<td>Cooper, Michael J. VI:</td>
<td>10, VII:139</td>
</tr>
<tr>
<td>Cooperman, Leon G. III:119</td>
<td></td>
</tr>
<tr>
<td>Cottle, Sidney I:</td>
<td>154</td>
</tr>
<tr>
<td>Cremers, K. J. Martijn</td>
<td>VII:129</td>
</tr>
<tr>
<td>Cress, Steven III:</td>
<td>34</td>
</tr>
</tbody>
</table>
Fama, Eugene I:43
Faurot, Allen R. I:42
Ferguson, Niall VII:104
Ferguson, Robert I:71, 87, II:20, IV:5, 10, 107
Fernholz, E. Robert I:108, VI:1
Ferreira, Miguel VII:181
Ferson, Wayne E. V:23, VI:12
Fewings, David R. I:144
Figlewski, Stephan I:65, 67
Fisher, Jeffrey D. IV:86
Fisher, Lawrence I:120
Fleischman, Edward III:93
Fogler, Russell I:14, III:90, 101, IV:68, 116

Fong, H. Gifford I:2, 4, 18, III:17, 37, 135, IV:21, 76, V:157, VI:81
Frankel, Richard M. V:167
Freeman, John D. IV:1
French, Craig W. VII:11
French, James C. III:98
French, Kenneth R. III:27, 61, IV:108
Friend, Irwin II:69
Froehiss, Kenneth I:71
Froot, Kenneth A. IV:47, 53, V:100, VII:73, 76
Fuller, Russel J. IV:112, V:16
Fulmer, Jeffrey I:124

Gadkari, Vilas III:31
Gale, William G. VII:134
Gallimore, Michael J. III:80
Garman, Mark B. II:18
Gastineau, Gary VI:161
Gau, George W. I:97
Gecko, Christopher C. VI:102
Geller, Jeffrey IV:29
Geltner, David IV:86
Geyer, Carter T. I:102
Gibbons, Michael R. II:71
Giliberto, Michael IV:88
Gillard, William I:143
Glick, Madeline Einhorn I:19
Glosten, Lawrence R. III:133, IV:80
Goetzmann, William N. V:160, VI:140, VII:38, 85
Goldstein, Michael L. VII:51
Golub, Bennett VII:76
González-Hermosillo, Brenda VII:62
Good, Walter I:37
Goodman, David A. I:132
Gordon, Myron J. III:126
Granito, Michael R. II:8, III:103, 138, VI:71
Greeley, John I:157
Green, David L. VI:89
Greenwood, Robin VII:65
Grinblatt, Mark S. II:54
Grinold, Richard III:109, VII:132
Grossman, Sanford J. III:84, IV:97
Gultekin, N. Bulent II:69

Hagin, Robert L. II:55, IV:123, V:24
Haldeman, Robert G. I:27
Hall III, J. Parker IV:113
Hall, Nick VII:61
Hamada, Robert I:145
Hamao, Yasushi III:136
Hammond, Brett VII:76
Liang, Bing VI:111
Light, Jay O. IV:12
Lindenberg, Eric III:3
Lindsey, Richard R. VI:107, VII:70
Litt, Michael C. VI:97
Litterman, Robert III:9, IV:11, V:132, 150, VI:53
Litzenberger, Robert IV:33
Lo, Andrew W. IV:65, 103, V:8, 141, VI:59, 115, VII:54, 88
Loeb, Thomas F. I:132
Logue, Dennis I:158
Long, William F. III:52
Longstaff, Francis VI:77
López-de-Silanes, Florencio IV:85
Lorie, James H. II:60
Lotsoff, Seymour N. I:66
Love Douglas A. II:27, III:82
Lucas, Charles M. IV:34
Lucas, Deborah V:2
Luce, R. Duncan V:13
Lucky-Malone, Laura III:34
Mackay, Robert J. IV:27
Madansky, Albert I:65, 66
Madden, William B. I:22
Madhavan, Ananth IV:44, VI:151, VII:15, 219
Madrian, Brigitte VII:156
Mahabir, Kris IV:29
Maksimovic, Max II:46
Malemendier, Ulrike M. VII:68
Manolis, J. Steven II:38
Mark, Robert IV:29
Markowitz, Harry M. I:109, IV:75, 121, V:118, 125, VI:21, VII:122
Marsh, Terry A. II:65
Marshall, William, VI:51
Mauboussin, Michael J. VII:56
Mayhew, Stewart VI:164
Mcafee, R. Preston IV:15
McCloskey, Donald IV:117
McConnell, Pat III:80
McCulloch, J. Huston I:52
McDonald, Robert L. II:9
McEnally, Richard W. I:24
McGahan, Richard P. II:23
McLaren, Constance H. I:110
McMillan, John IV:13
McTaggart, James I:142
McWilliams, James D. I:141
Meagher, David I:75
Melnikoff, Meyer I:96
Mendelson, Haim IV:40
Mennis, Edmund A. II:49
Meyer, Jack III:49, IV:9, 12
Michaely, Roni VII:191
Michaud, Richard I:82, 107, 138, II:64, III:99, IV:61, 70, V:17, 30, 36, 120, VI:8, 68, 158
Miles, Michael III:87
Milken, Michael R. II:5
Miller, David W. I:102
Mitchell, Mark L. III:56, VI:155
Mitchell, Olivia S. VII:166
Meigs, A. James I:46
Modest, David M. III:123, V:102
Monahan, James P. I:107
Morck, Randall II:24
Motley, Brian IV:59
Muller, Frederick L. III:67, 71
Mulvey, John M. V:115
Murphy, Joseph E. I:92
Murray, Roger F. I:79, III:118
Musto, David K. VI:102, 157
Myers, Stewart C. VI:105, VII:96
Naik, Narayan VI:122
Nakamura, Takeo II:57
Nalebuff, Barry V:43
Nicholson, David J.S. I:153
Nowak, Martin A. V:38, VI:38
Nowakowski, Christopher A. II:11
Obizhaeva, Anna VII:214
Odean Terrance V:14, 104, VI:37, VII:216
Oldfield, George I:27
Osborne, Maury I:91
Owens, Paul III:7
Pakianathan, Vinod IV:63
Page, Sébastien VII:144
Pang, Eric III:1
Patel, Jayendu V:28
Patel, Sandeep VII:12
Pearson, James I:19
Peavy, John W. I:132
Penman, Stephen H. VI:31, VII:184
Peters, Edgar III:60
Peters, Helen F. II:2
Pezier, Jacques V:133
Pfleiderer, Paul III:93, V:98
Phillips, Thomas K. IV:77, V:53
Plott, Charles R. IV:16
Pohl, Charles I:139; IV:113
Pontiff, Jeffery VII:135
Post, Larry II:5
Poterba, James M. V:73
Poundstone, William V:40
Powell, Shari L. IV:97
Pozen, Robert Charles I:82, VI:98
Rainville, Henry B. II:72
Ramaswami, Murali III:5, 7, IV:26, 29
Ramaswamy, Krishna III:9
Ramezani, Cyrus A. VI:165
Ramond, Charles I:40
Rappaport, Alfred VI:2
Ready, Mark J. V:82, VII:205
Record, Eugene E. I:132, II:22, 73, III:15, 47, 49
Reed, Adam VI:104
Reid, Kenneth I:132
Reinganum, Mark R. III:128
Rennie, Edward P. II:22
Rentzler, Joel I:71
Rich, Don V:146
Richards, Thomas M. III:102
Richardson, Matthew VII:25
Rie, Daniel II:63, III:37, 118
Rigobon, Roberto VI:133
Ritter, Jay R. III:107
Rock, Kevin IV:38
Rogoff, Kenneth IV:56
Roll, Richard I:86, II:68, VI:148
Roman, Theodore S. III:28
Ronan, Ehud III:25
Rosenberg, Barr M. I:26, 88, 119, 127, 131, V:124
Ross, Stephen A. III:131
Rossi, Peter E. III:101, 102
Ruback, Richard S. III:55
Rubinstein, Mark E. I:69, II:20, III:17, IV:102, V:78
Rudd, Andrew I:67, 70, 120, 127, II:24, 44, 70, III:29, 50, 95, V:93, 143, VII:32
Russell, George F. I:74
Sack, Paul I:95
Sadka, Ronnie VII:113
Sakaguchi, Yusaku III:39
Salisbury, Dallas L. II:32, III:73
Sandor, Richard I:71
Sapra, Steven VII:1
Sauter, George U. VI:160
Schaefer, Stephen M. I:48, 52, VI:78
Scherer, Bernd VII:36
Schielke, Hugo J.H. I:19
Schick, Kenneth E. VI:160
Schoar, Antoinette VII:20
Scholes, Myron S. II:28, IV:32, VI:117, VII:175
Schreyer, Gary W. II:3
Schulman, Evan I:157, 159, II:59
Schwartz, Eduardo S. I:47
Schwartz, Robert A. I:100, 101
Schwert, G. William III:139
Scott, James H. I:27, 91, II:40, 44, IV:9, VII:198
Seagars, Alan D. I:14
Searcy, William N. III:79
Seidel, David III:101, 102
Senft, Dexter I:11
Shanken, Jay V:10, 34
Shapira, Zur IV:100
Sharpe, William F. I:63, 84, 113, 134, 137, III:64, 75, 100, V:16, 111, 127, 148, VI:52, 72, VII:123
Sheikh, Aamir V:143
Sherrerd, Katrina F. VII:11
Shiller, Robert J. I:140
Shleifer, Andrei IV:84
Shone, Polly I:113
Shultz, Robert E. II:22, III:52, 70, 71, 79, 101, 102, IV:1, 61
Shumaker, Robert V:26
Sims, Ian IV:60
Singleton, Kenneth V:59, 68
Sirri, Eric IV:123
Sivert, Steven IV:33
Skinner, Frank S. V:62
Smetters, Kent VII:76
Smith, Roger I:115
Smith, Vernon L. IV:42
Smetters, Kent VI:92, VII:76, 153
Solnik, Bruno I:54, V:87
Sophianos, George VII:219
Sorenson, Eric H. IV:26, VII:9
Spatt, Chester V:70, VI:22, VII:148
Speidel, Lawrence S. III:35
Spence, A. Michael I:106, II:40, 52
Spiegel, Matthew VII:95
Spivack, Joseph II:37
Stambaugh, Robert F. VII:41, 101
Stanley, Peter W. IV:79
Stapleton, Richard I:114
Starks, Laura T. III:45
Statman, Meir IV:106, V:6
Staub, Renato VI:57
Stein, David M. IV:77
Stephens, Phillip E. II:38
Stewart, Scott D. IV:113
Stoll, Hans R. II:57, IV:41
Stout, Lynn A. V:153
Strongin, Stephen H. VI:6
Sulz, René M. V:91
Summers, Lawrence III:111
Taheri, Hadi V:124
Tartaglia, Nunzio I:134
Tepper, Irwin I:75, II:29, 31, III:74
Terada, Noboru II:57
Testa, David I:57
Thomas, Lee VI:7
Tierney, David E. I:75, IV:6
Abnormal stock returns V:21-25, 33-38, 50
Absolute Risk VI:67
Accounting & Financial Reporting I:42, 76, 152, VI:24, 26, 28, 32
(see also FASB statements)
Acquisitions, corporate I:142-3
Active management of bond portfolios I:2, II:3
Active management of international portfolios I:57, 58, II:12
Active management of pension funds I:75, II:22, 35, 36
Active management of stock portfolios I:111, 155, III:122, IV:1, 2, 3, 4, V:1-42, 85, VI:1-47
Actuaries I:5, 6, 76, 78, 82, 83, 89
Adjustable rate mortgage II:1
Agency theory III: 44, 45, 47, V: 28, 45, 71, 113
Alpha I:86, 124, VI:6, 7, VII:1-14, 129
Alternative assets VI:57, VII:15
Analyst forecasts I:112, 125, 134, 140, 144, 147, 148, 149, 151, 154, 155, V:45, VI:17
Appraisal premium I:120
Appraisal ratio I:88
Arbitrage I:50, 77, IV:46
Arbitrage Pricing Theory II:67, 68, 69, 70, 71, III:123, 131
ARCH models III:135
Artificial Intelligence IV:69
Artificial Stock Market IV:67
Asset allocation I:74, 75, 101, 110, 115, 116, II:14, 16, 23, 24, 46, 49, III:1, 37, 41, 60, 61, 62, 63, 71, 75, 81, 87, 90, 102, 103, 104, 121, IV:6, 7, 9, 11, 12, 19, 57, V: 47, 48, 53,56, VI:47, 49, 65
Asset Management Industry VII:34
Auction Theory IV:13, 15, 16, 17

BAI study I:85
Balance of payments crises V:97
Bankruptcy prediction I:27, 28, 91, 92, 93, II:4, 6, 37
Bankruptcy, theories of I:91
Baseline bond portfolio I:16, 18, 24
Behavioral finance V: 6-19, VI:33-42, 95, 97, VII:54
Beta coefficients I:107, 115, 122, 124, 125, 126, 127, 128, 134, 137, 145, IV:107, 108, VI:15, 46
Bias in dividend discount model I:138-139
Bias in performance measurement I:88
Bid-ask spread I:100, 103, III:133
Black Scholes option model I:25, 65, 67, 69, 70, 91
Block positioning I:104, III:110
Bond betas I:19, III:10
Bond defaults III:4, 5, 7, 8, V: 60, 66, VI:74, 76, 77, 81
Bond futures I:65
Bond hedging V:62
Bond horizon volatility I:21
Bond market, world I:57, II:11, IV:60
Bond options I:65, 66, 67
Bond performance components I:2, 3, 14, 16, 21, 22, 23, 24, 26, IV:76
Bond performance measurement I:2, 14, 16, 18, 19, IV:76
Bond pricing I:47, 48, IV:19, V: 60, 63, 68, VI:135
Bond portfolio improvements I:53, II:3, IV:20
Bond proportional volatility I:22
Bond ratings I:20, IV:24, V: 65, 67
Bond refunding I:61, III:12, IV:23
Bond risk I:20, II:4, 5, IV:21, V: 65-68, VI:74, 76, 77, 81
Bond sinking fund management IV:23
Brady report III:96, 97
Bubbles V: 153, 154, VI:39, 64, VII:62, 65
Bull and Bear markets V: 47,154
Burden ratio I:50
Buyouts III:52, 54, 55, 56, 58
Call options on bonds I:66, 67
Call options on stocks I:72, 79, III:15, 16, 17
Callable bonds I:61, III:21
Capital International indices I:56
Capital structure V:63
Capitalization weights IV:10
Cash return I:95
CATS II:10
Certainty equivalent I:129
Chaos theory III:13
Closed end country funds III:34
Closed end real estate funds I:95
Cluster analysis of stocks I:123
Collateralized mortgage obligation II:1
Commingled pools of real estate I:94
Commissions I:159
Commodity funds II:7
Commodity futures VI:83, 85, 87
Commodity prices IV:58, V: 70, VII:22
Fixed Income (see Bonds)
Floor brokerage I:103
Forecasting I:63, 91, 92, 110, 111, 112, 125, 134, 139, 140, 144, 147, 148, 149, 151, 154, 155, II:16, 55, 56, III:118, 126, IV:117, VII:181
Forecasting ability I:35, 40, 63, 64, 66
(see also Information coefficient)
Foreign exchange I:33, 40, 129, II:8, 13, III:31, 32, 33, IV:49, 51, 53, 54, VII:
Foreign investor effects V: 91
Foreign stock markets I:59
Foreign yield curve II:10
Forward contract II:8
Forward interest rates I:26, 52
Fourth market I:37
Franchise factor IV:109, V: 161, 165
Funding policy for pension plans I:75, 76, 77, 78, 83, II:24, IV:93
Funding Ratio return IV:93
Futures I:65, 66, 71, II:18, III:19
(see also Commodity futures)
Game theory IV:3, 4, V: 38, 40, 42
GASP Model I:1
GDP growth as risk factor V: 4
Geometric mean return VI:68
Global mergers III:35
Global portfolio II:11, 14, IV:11, 57, 59, 60, V: 36, 87, 149
Global stocks V: 93, 98
GNMA securities I:11, 71, II:1, 2, III:22
Gold I:54
Governance VI:91
Government bond market I:12
Groupement I:12, 13
Growth, components of I:140
Growth models I:136, 137, 140, 144, 145, II:55, 72
Growth rate estimation II:62
Growth stocks I:144, 145
Hakansson certificate I:71, 72
Harvard Management Co. IV:12, VII:14
Hedge funds VI:107-122
Hedge portfolio I:131, V: 141
Heterogeneous information VI:22
Hedging I:43, 65, 71, II:8, V: 62
Hicks' theory of interest rates I:49
High yield bonds II:4, 5, III:4, 5, 7, 8, 9
Historical rates of return V: 159, 160
Horizon volatility of bonds I:21
Human engineering I:134
Ibbotson and Sinquefield I:90, 117
Illiquidity premium VI:57, 59
Immunization I:1, 4, 6, 8, 9, 10, 48, II:3, 8, 18, 23, III:1, 90, IV:20
Implied volatility I:69
Incentive fees III:45, 47, 48, 49, IV:5
Income growth I:85, 112
Index for real estate I:96, 97
Index funds I:35, 37, 38, 39, 58, 115, III:121, V: 85
Individual investor behavior V: 14, 104, VI:36, VII:54
Industrial organization I:106, II:50-52
Inflation I:5, 14, 40, 42, 43, 44, 45, 46, 49, 95, 100, 121, 143, IV:55, 56, 57, 58, 59, 60, VI:124, 126, 128, VII:104
Information coefficient I:58, 63, 99, 151, 152, 155, 156, IV:2
Information effect I:32, 103
Inefficiency in markets I:130-133, 140
In-house trading I:38
Initial public offerings III:107, VI:168
Insider trading reports I:150
Institutional trading I:102
Insurance, portfolio II:20
Interest rate futures I:66, 71
Interest rate parity I:33
Interest rate targets I:46
Interest rate theory I:49-50, II:9, III:25
International diversification I:55, 56, 57, 58, 59, II:10, 11, 12, 13, 14, 23, III:28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 41, V: 87, 98, 100, 144, VI:129, 131, 133
International manager I:57, II:12, 23
International performance measurement I:55, II:12, IV:123
International portfolio flows V: 136
Inventory index fund I:35, 36, 37
Investment firm size I:99, VII:41
Investment management business II:40, 41, III:43, 44, 45, 47, 48, 49, 118, 119, V: 7
Investment portfolio size I:99
Investment process III:118, 119
IPOs and takeovers VI:168
January effect I:130, 131, 138, III:114
Japan Fund III:35
Japanese stock market II:57, III:27, 33, 39
Junk bonds III:4, 5, 7, 8, 9
Keynes' natural rate of interest I:50
Learning curve I:106
Leverage effect I:141, III:3
Leverage in real estate I:94, 97
Leveraged buyouts III:52, 54, 55, 56, 58
Lifestyle finance VI:92-101
Liquidity I:105, 139, VI:22, 117, VII: 109-120
Liquidity in markets I:100, 101, 104, 153, 158, IV:35, 36, 37, VI:57
Liquidity in real estate I:96
Liquidity theory I:158
Long/short strategy IV:1, 61, 62, 63, 64
<table>
<thead>
<tr>
<th>Phrase</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Term Capital Management (LTCM) V</td>
<td>102, 138, 140</td>
</tr>
<tr>
<td>LORENDAS model I</td>
<td>30</td>
</tr>
<tr>
<td>Losses, prediction of I:91, 92, 93</td>
<td></td>
</tr>
<tr>
<td>Loss reduction strategies IV:97</td>
<td></td>
</tr>
<tr>
<td>MAD ratio II:6</td>
<td></td>
</tr>
<tr>
<td>Manager selection I:75, II:22, 35, 41, IV:120</td>
<td></td>
</tr>
<tr>
<td>Managerial incentives V:113</td>
<td></td>
</tr>
<tr>
<td>Market crisis V:138</td>
<td></td>
</tr>
<tr>
<td>Market efficiency VI:19</td>
<td></td>
</tr>
<tr>
<td>Market fragmentation I:102, IV:41</td>
<td></td>
</tr>
<tr>
<td>Market line I:19, 21, 22, 86, 124, 139, 144</td>
<td></td>
</tr>
<tr>
<td>Market liquidity I:100, 101, 104, 153, 158</td>
<td></td>
</tr>
<tr>
<td>Marketability and stock value III:108</td>
<td></td>
</tr>
<tr>
<td>Marketmakers I:34, 35, 100, 103, 104, 158</td>
<td></td>
</tr>
<tr>
<td>Market mechanisms IV:40</td>
<td></td>
</tr>
<tr>
<td>Market, simulated IV:67</td>
<td></td>
</tr>
<tr>
<td>Market structure IV:35, 36, 37, 38, 40, 41, 42, 43, 44,</td>
<td></td>
</tr>
<tr>
<td>Market-to-book-value effect I:132</td>
<td></td>
</tr>
<tr>
<td>Market volatility I:100</td>
<td></td>
</tr>
<tr>
<td>Markowitz portfolio model I:119, 146, III:99, IV:70,</td>
<td></td>
</tr>
<tr>
<td>71, 73, 75, V: 118, 125, VII:109</td>
<td></td>
</tr>
<tr>
<td>Mean reversion III:112, 113</td>
<td></td>
</tr>
<tr>
<td>Mean-variance models I:107, 114, III:99, VI:21, 59</td>
<td></td>
</tr>
<tr>
<td>Mergers III:35, VI:153, 155</td>
<td></td>
</tr>
<tr>
<td>Minimum rate of return on bond portfolio I:2</td>
<td></td>
</tr>
<tr>
<td>Mispricing of bonds I:50, 51</td>
<td></td>
</tr>
<tr>
<td>Mispricing of futures I:71</td>
<td></td>
</tr>
<tr>
<td>Momentum V: 19, 26, 36, VII:185, 198</td>
<td></td>
</tr>
<tr>
<td>Money illusion I:44</td>
<td></td>
</tr>
<tr>
<td>Money supply I:45, 46</td>
<td></td>
</tr>
<tr>
<td>Monitoring research recommendations I:148</td>
<td></td>
</tr>
<tr>
<td>Morningstar V: 112, 148</td>
<td></td>
</tr>
<tr>
<td>Mortgage Index IV:88</td>
<td></td>
</tr>
<tr>
<td>Mortgages I:11, II:1, 2, III:21, IV:88</td>
<td></td>
</tr>
<tr>
<td>Movies VII:32</td>
<td></td>
</tr>
<tr>
<td>Multi-factor risk models I:123, III:33</td>
<td></td>
</tr>
<tr>
<td>Multi-firm bond issues I:12</td>
<td></td>
</tr>
<tr>
<td>Multiperiod models I:107, V: 115-116</td>
<td></td>
</tr>
<tr>
<td>Multiple factor portfolio I:131</td>
<td></td>
</tr>
<tr>
<td>Multiple managers I:59, 75</td>
<td></td>
</tr>
<tr>
<td>Multiple markets index II:12, 46</td>
<td></td>
</tr>
<tr>
<td>Municipal bonds and finance I:25, V: 57</td>
<td></td>
</tr>
<tr>
<td>Mutual funds V: 104-115, VI:157-163</td>
<td></td>
</tr>
<tr>
<td>Nasdaq VI:143</td>
<td></td>
</tr>
<tr>
<td>National Market System I:103</td>
<td></td>
</tr>
<tr>
<td>Negative earnings, likelihood of I:91, 92, 93, II:55</td>
<td></td>
</tr>
<tr>
<td>New York Stock Exchange order processing I:102</td>
<td></td>
</tr>
<tr>
<td>Neural networks IV:68</td>
<td></td>
</tr>
<tr>
<td>News, effect of VI:36</td>
<td></td>
</tr>
<tr>
<td>Noise trading III:111, VII:216</td>
<td></td>
</tr>
<tr>
<td>Nonlinear Dynamics IV:66</td>
<td></td>
</tr>
<tr>
<td>Non-parametric methods IV:65, 68</td>
<td></td>
</tr>
<tr>
<td>Normal portfolio II:22, 23, 24</td>
<td></td>
</tr>
<tr>
<td>Offshore mutual funds I:57</td>
<td></td>
</tr>
<tr>
<td>Oil prices I:30</td>
<td></td>
</tr>
<tr>
<td>Oil reserves VI:89</td>
<td></td>
</tr>
<tr>
<td>OPEC I:30, 31</td>
<td></td>
</tr>
<tr>
<td>Open end real estate funds I:96</td>
<td></td>
</tr>
<tr>
<td>Opportunity cost I:157</td>
<td></td>
</tr>
<tr>
<td>Optimizing models for bonds I:18, 21, 26</td>
<td></td>
</tr>
<tr>
<td>Optimizing models for stocks I:59, II:14, III:99, IV:70, 71, 73, 75,</td>
<td></td>
</tr>
<tr>
<td>VII:127</td>
<td></td>
</tr>
<tr>
<td>Optimizing techniques I:109, 113, 146, III:102, V: 115-127</td>
<td></td>
</tr>
<tr>
<td>Options I:65, 66, 67, 68, 69, 70, 72, 79, II:18, 20,</td>
<td></td>
</tr>
<tr>
<td>III:15, 16, 17, V: 78, 80, VI:164, 165</td>
<td></td>
</tr>
<tr>
<td>Option valuation models I:69, V: 78, 80</td>
<td></td>
</tr>
<tr>
<td>Order flow VI:138, 146, 148</td>
<td></td>
</tr>
<tr>
<td>Order imbalance VI:148</td>
<td></td>
</tr>
<tr>
<td>Passive bond management II:3</td>
<td></td>
</tr>
<tr>
<td>Passive market portfolio I:36, 37, 57, 58, 155</td>
<td></td>
</tr>
<tr>
<td>PBGC I:83, 84, II:27, 28, 29</td>
<td></td>
</tr>
<tr>
<td>P/E ratios II:55, 56</td>
<td></td>
</tr>
<tr>
<td>Pension fund management IV:95, V: 127, VII:146 (see also Retirement)</td>
<td></td>
</tr>
<tr>
<td>Pension fund real estate I:94-96, II:38</td>
<td></td>
</tr>
<tr>
<td>Pension funds I:74-84, II:22-33, III:67, 68, 69, 71, 73, 74, 76, 80, IV:79, 93, 95, V: 52, 130, VI:53, 71, 72</td>
<td></td>
</tr>
<tr>
<td>Pension liabilities I:75, 76, 83, II:24, 25, 26, 28, 29, 30, 31, 32, 33, III:74, 75, 76, 82, IV:93, VI:51, 52, 72</td>
<td></td>
</tr>
<tr>
<td>Pension surplus management VI:71</td>
<td></td>
</tr>
<tr>
<td>Pension plan termination II:29, 32</td>
<td></td>
</tr>
<tr>
<td>Performance fees IV:5</td>
<td></td>
</tr>
<tr>
<td>Plan sponsor I:74, II:22, III:79</td>
<td></td>
</tr>
<tr>
<td>Policy portfolios VI:7, 53</td>
<td></td>
</tr>
<tr>
<td>Political and taxation effects VII:134-143</td>
<td></td>
</tr>
<tr>
<td>Portfolio insurance II:20, III:19, 22, 103</td>
<td></td>
</tr>
<tr>
<td>Portfolio models for bonds I:55</td>
<td></td>
</tr>
<tr>
<td>Portfolio models for real assets I:46</td>
<td></td>
</tr>
<tr>
<td>Portfolio optimization I:59, 113, 16</td>
<td></td>
</tr>
<tr>
<td>Portfolio revision I:120</td>
<td></td>
</tr>
<tr>
<td>Portfolio size I:99</td>
<td></td>
</tr>
<tr>
<td>Predictability of returns V: 1, VI:10, 12</td>
<td></td>
</tr>
</tbody>
</table>
Price level adjustment I:42
Price pressure I:32
Private placements IV:82, VII:15

Privatization IV:84, 85
Probability distributions I:129, IV:102
Program trading III:84, 140
Proportional volatility of bonds I:22
Prudent investing I:79, 80, 82, 116, 156
Psychology V: 8, 9, 11, 13, 14, 151

Quantitative active management IV:2, 113, 115, 116, VII:144
Quit rate in manufacturing I:153

Random walk V: 1
Rate anticipation I:12
Rational decision making
(see Behavioral finance)
Real assets II:46
Real estate duration III:86
Real estate in pension funds I:74, 94-96, II:38
Real estate index I:96-97, IV:89, 91
Real estate investment 94-98, II:38, IV:86, 89, 90
Real estate leverage I:94, 97
Real estate, systematic risk in IV:89
Real estate rates of return I:96-98, III:87, IV:86, 88, 89, 90
Real interest rates and returns I:14, 43, 49, 50, 117
REIT I:95, 97, II:38, 39, IV:86
Regulation IV:34, VII:13, 4, 180
Replacement cost I:42
Research concentration I:34
Research recommendation monitoring I: 148
Restructurings IV: 91
Retirement savings and investing IV:97, V: 73-75, 127, 130, 131, VII:146
(see also Pensions)
Return on investment I:86
Return distributions IV:102, V: 159-160
Risk and uncertainty I:129, VII:181
Risk adjustment I: 85
Risk aversion V: 156
Risk control I:37, II:16, IV: 97, V: 2, 3, 143, 146
Risk definition I:112, V:135
Risk measures for stocks I:112, 121-129, 134; VII:170-178
Risk minimizing I:4, 80, 116, 117, IV:97
Risk premium (see Equity risk premium)
Risk psychology IV: 98, 100, V: 3, 4, VII:181
RJR Nabisco LBO III:55
Rule 390 I:101, 102
S & P Futures III:15, 16
Savings I:76, VI:92-101
Scenario approach I:135
SEC I:42, 100, 101, III:93, 97
Sector contribution to bond performance I:3
Securities firms II:40
Securities lending VII:180
Securities markets II:41, III:93, 95, 96, 97, 98, 106, 136, 139
Securitization of mortgage II:1
Security analysis I:112, 125, 134, 139, 140, 143, 144, 146, 147-156, II:60
Security market line I:124, 144
(see also Market line)
Security market plane I:124
Sentiment, investor VI:33
Sharpe ratio I:88, VII:123
Short sales IV:1, 61, 62, 63, 64, VI:167, VII:31
Short-term obsession VI:2
Signaling II:54
Simulated market IV:67
Single index model I:68, 114, 126
Sinking funds IV:23
Size effect I:130, II:57, III:114, 124
Social Security V: 73-75, VI:92-101
Soft dollars I:82
South Africa II:42
Sovereign Wealth funds VII:36
Specialists I:103, IV:38, 44
Speculative bubbles V: 153-154
Spending rules VI:65
Spread I:100, 103, IV:19
Stock-bond ratios I:115
Stock index futures I:65, III:15, 16, 84
Stock holdings V: 3
Stock lending (see Equity lending)
Stock returns IV:108
Stock selection models I:111, II:45, 59, IV:106
Stock splits and dividends II:54
Style V: 25, 30, VI:6, 7, 14
Sunshine trading III:93
Surplus risk management VI:71
Swaps of bonds I:12
Swap trades I:159, IV:30, 32, 33
Takeovers III:36, 55, 56, VI:168
Tax clientele effect I:47, 48, 115, 124, 127
Tax structure of bond prices I:48
Term structure for equities III:138
Term structure of interest rates I: 1, 26, 27, 48-52, II: 9, III: 25, V: 59
Timing strategies I: 61, 62, 63, II: 16
Torpedo effect II: 55, IV: 123
Trade deficit III: 23
Trading III: 98, IV: 3, 35, 36, 103, VII: 205-223
Transaction costs I: 36, 37, 48, 100, 112, 113, 130, 132, 135, 157-159, II: 57, 73, 74, III: 133, IV: 36, 38, 44, 63
Transaction effect I: 103
Transaction prices IV: 103
Treynor model VII: 107
Treynor Black model I: 87
Turnover I: 38

Utility theory I: 128, V: 13

Value at risk (VAR) V: 134, 148-9, 157-8
Value Line I: 143
Variable annuities VI: 172
Variability of earnings I: 91, 121
Variance and covariance of returns I: 109, 113, 126, 140

Venture capital IV: 9, VII: 18
Volatility I: 69, 100, III: 15, 93, 95, 135, 139, 140, IV: 21, 40
Volatility in currencies III: 137
Volatility transmission among markets III: 136
Volcker I: 46
Volume and prices of stocks III: 106

Wavelet models IV: 68
World market II: 11

Yield bias I: 139
Yield curves I: 12, 18, 19, 21, 49, 51, II: 9, 10
Yield effect I: 130, 131, 137, 138, 139
Yield forecasting I: 21
Yield of stocks I: 124, 127, III: 107
Yield, real IV: 60
Yield spreads I: 51, VI: 77, 78

Zero coupon bonds II: 10
Zeta model for bankruptcy prediction I: 28, 92, II: 4, 37
Z score I: 92
THE INSTITUTE FOR QUANTITATIVE RESEARCH IN FINANCE
Roger F. Murray Prize Competition

The Institute for Quantitative Research in Finance, The Q® Group, annually conducts a prize competition to recognize scientific achievement in quantitative research in finance. The prize is awarded for the quality of the research. Major criteria in the judging include:

- originality and novelty of ideas and concepts
- usefulness and timeliness of the results to the institution investment community, such as Q® sponsors
- comprehensibility of verbal and written presentations.

Inquiries are invited.

2005-2009 PRIZE WINNERS

Names of Prize Winners for the Years 2000-2004 Can Be Found in Volume 6

2005 WINNERS

FIRST PRIZE
Campbell R. Harvey
J. Paul Sticht Professor of International Business, Fuqua School of Business, Duke University
and Claude Erb, Managing Director, Trust Company of the West
Title of Work: The Tactical and Strategic Value of Commodity Futures

SECOND PRIZE (tie)
Nicholas Barberis
Professor of Finance
Yale School of Management
Title of Work: Understanding Comovement

SECOND PRIZE (tie)
Kent Smetters
Associate Professor of Insurance and NBER Research Associate, The Wharton School University of Pennsylvania
Title of Work: The Long-Term Budget Outlook and Social Security Reform: Implications For Financial Markets
2006 WINNERS

FIRST PRIZE
Kenneth J. Winston
Chief Risk Officer
Morgan Stanley Investment Management
Title of Work:
Buy Side Risk Management

SECOND PRIZE
Edwin Elton
Nomura Professor of Finance,
Leonard N. Stern School of Business,
New York University
and
Martin J. Gruber
Nomura Professor of Finance,
Leonard N. Stern School of Business,
New York University
Title of Work:
Participant Reaction and the Performance of Funds Offered by 401(k) Plans

THIRD PRIZE
Stewart C Myers
Girdon Y. Billard Professor of Finance,
MIT Sloan School of Management
Title of Work:
Capital Allocation

2007 WINNERS

FIRST PRIZE
Olivia S. Mitchell
The Wharton School
University of Pennsylvania
Title of Work:
Demographics and Finances of Baby Boomers

SECOND PRIZE
Alon Brav
The Fuqua School of Business
Duke University
Title of Work:
Hedge Fund Activism, Corporate Governance, and Firm Performance

THIRD PRIZE
Michael J. Cooper
The David Eccles School of Business,
University of Utah
Title of Work:
Corporate Political Contributions and Stock Returns
2008 WINNERS

FIRST PRIZE
M. Keith Chen
Assistant Professor of Economics,
Yale School of Management
Title of Work:
How Basic Are Behavioral Biases

SECOND PRIZE
Ralph S. J. Koijen
Assistant Professor of Finance,
Graduate School of Business,
University of Chicago
Title of Work:
The Cross Section of Managerial
Ability and Risk Preferences

THIRD PRIZE
K. Geert Rouwenhorst
Professor of Finance, Deputy
Director International Center for
Finance, Yale School of Management
Title of Work:
The Fundamentals of
Commodity Futures Returns

2009 WINNERS

FIRST PRIZE
Albert S. Kyle
Smith Chair Professor of Finance,
University of Maryland at
College Park
and
Anna Obizhaeva
Assistant Professor of Finance,
University of Maryland at
College Park
Title of Work:
Market Microstructure Invariants

SECOND PRIZE
Philippe Jorion
Chancellor’s Professor, University of
California, Irving
Title of Work:
Credit Contagion From Counterparty
Risk

THIRD PRIZE
K. J. Martijn Cremers
Assistant Professor of Finance,
Yale School of Management
Title of Work:
Should Benchmark Indices Have
Alpha? Revisiting Performance
Evaluation
THE INSTITUTE FOR QUANTITATIVE RESEARCH IN FINANCE
BOARD OF DIRECTORS’ COMMITTEES
As of January 1, 2011

ADMINISTRATION, BUDGET & AUDIT
Wayne H. Wagner, Chairman, Dale Berman,
Jon Ender, James L. Farrell, Jr., James P. Garland,
Leopoldo E. Guzman, Gilbert Hammer, Jean W. Thomas

PROGRAM
P. Brett Hammond, Chairmen, Kathleen S. Cummins,* Roger G. Clarke,
James L. Farrell, Jr., Frank Fabozzi, Ralph P. Goldsticker, Lawrence Harris,*
Roy D. Hennriksson, Mark Kritzman, Martin L. Leibowitz, Krishna Ramaswamy,
James H. Scott, Katrina F. Sherrerd, Laurence B. Siegel, Rodney N. Sullivan, Jack L. Treynor

RESEARCH
Joanne M. Hill, Chairman, Sandip A. Bhagat, Walter A. French, Lawrence Harris,
Frank J. Jones, Jesse Phillips, Mark R. Reinganum, Eric H. Sorensen,
Margaret Stumpp, Jack L. Treynor, Kenneth J. Winston

OPERATING COMMITTEES

EVENTS
Robert E. Butman, Chairman, Dale Berman, James L. Farrell, Jr.,
Robert L. Hagin, Arnold S. Wood

INTERNATIONAL
Dale Berman, Chairman, James L. Farrell, Jr., William L. Fouse (Emeritus),
Gilbert Hammer, Martin L. Leibowitz, Richard O. Michaud, Andrew Rudd

MEMBERSHIP
Robert E. Butman, Chairman, Mary L. Cahill, Michelle R. Clayman,
Robert L. Hagin, Edward F. Keon, Jr., Michael J. Hogan, Charles Morris,
Beth Newhouse, Robert E. Shultz, Savita Subramanian

NOMINATING
Arthur Williams III, Chairman, William L. Fouse,
Gilbert Hammer, Wayne H. Wagner, Arnold S. Wood

PRIZE
James P. Gordon Jr., Chairman, John DeTore, James L. Farrell, Jr., Thomas N. Felker,
Jason Hsu, William L. Fouse (Emeritus), Ralph P. Goldsticker, John T. Grier,
Melanie Petsch, James H. Scott, William F. Sharpe (Emeritus), Gregory van Inwegen

* Ex-Officio
BOARD OF DIRECTORS
January 1, 2011

James L. Farrell, Jr., Chairman of the Institute
Ned Davis Research, Inc.

William L. Fouse, Vice-Chairman Emeritus
Mellon Capital Management Corp.

Gilbert Hammer, Vice-Chairman of the Institute

Dale Berman, Secretary-Treasurer of the Institute

Sandip Bhagat, Vanguard Group

Mary L. Cahill, Emory Investment Management

Robert E. Butman, Second Moment Capital Management, LLC

Roger G. Clarke, Analytic Investors

Michelle R. Clayman, New Amsterdam Partners, LLC.

Robert Garvy, INTECH

Ralph P. Goldsticker, Mellon Capital Management Corp.

James P. Gordon, Jr., Federated Investors

Leopoldo E. Guzman, Guzman & Company

Brett Hammond, TIAA-CREF

Joanne M. Hill, Proshares Advisors / Profunds Group

Michael J. Hogan, Delaware Investment Advisers

Marc R. Reinganum, State Street Global Advisors

Katrina F. Sherrerd, Research Affiliates LLC

Laurence B. Siegel, CFA Research Foundation

Rodney N. Sullivan, CFA Institute

Wayne H. Wagner, Chair, Administrative Budget & Audit Committee

Kenneth J. Winston, Western Asset Management Company
THE Q-GROUP

SPONSORS

2010

Acadian Asset Management
Advanced Investment Partners, LLC
Advanced Portfolio Management LLC
Adviser Software, Inc
Alliance Bernstein
Allianz Global Investors Capital
Analytic Investors
AQR Capital Management, LLC
Arizona State Retirement System
Aronson, Johnson, Ortiz Partners
Banc of America Securities / Merrill Lynch & Co
Bank of International Settlements Asset Management Blackrock, Inc
BNY Mellon Asset Management
Boston Company Asset Management, LLC
BP America Inc
Cadence Capital
Caisse de Depot et Placement du Quebec
California State Teachers Retirement System
California Public Employees Retirement System
Cambridge Associates
Canada Pension Plan Investment Board
CapitalIQ
Caxton Associates LLC
CFA Institute
Charter Oak Investment Systems
Chicago Equity Partners LLC
City National Bank
Columbia Business School
Columbia Management
Common Fund
Consulting Services Group
Credit Suisse
Credit Suisse Asset Management
Dartmouth College
Delaware Investment Advisers
Denali Advisors
Denver Alternatives
Dimensional Fund Advisors, Inc
Dupont Capital Management
Emory Investment Management
Ender Capital Management
Ennis, Knupp & Associates, Inc
FAF Advisors, Inc
Federated Investors
Fiduciary Asset Management LLC
First Quadrant LP
Ford Foundation
Forward Management
Freeman Associates Investment Management LLC
Geewax + Partners, LLC
Goldman Sachs Asset Management
Grantham, Mayo, Van Otterloo & Co. LLC
Guardian Life Insurance Co. of America
Guzman & Company
Hamilton College
Harvard Management Company
Highbridge Capital Management
Institute For Advanced Study
Intech
INVESCO, Ltd
Investment Technology Group, Inc
J.P. Morgan Investment Analytics & Consulting Group
TIAA-CREF
TIFF Advisory Services Incorporated
Towers Watson Investment Services, Inc.
Trust Company of the West
UBS Global Asset Management
University of California
University of Chicago Office of Investments
Verizon Investment Management Company
Virginia Retirement System
Wellington Management Company
Western Asset Management Co.
William Penn Foundation
Wilshire Associates Incorporated
Windham Capital Management, LLC