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Summary of Proceedings

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Active Asset Management –
Alpha

Anna Scherbina, Associate Professor of Finance at the University of California, Davis, presented a lecture that contributed to our understanding of how information gets impacted into stock prices. She showed that it is possible, using Granger causality methodology, to identify, statistically, a collection of bellwether stocks that lead other followers. Most of the previous literature has focused on using ex-ante identifiable company characteristics to identify the leaders. These have included firm size, analyst coverage, supplier/customer relationships, strategic alliances, and merger prospects. In contrast, Scherbina focuses on situations where the information may be related to important news developments, may be transitory, and is difficult to identify, ex-ante.

Scherbina motivated her empirical analysis by discussing several examples of firm-level news that could be relevant for other firms: Texaco and an employee discrimination lawsuit in 1994-1996, Novartis and an Indian patent law case in 2012, John Wiley & Sons and the resale of U.S. items priced cheaper abroad in 2008-2013, and Worldcom’s earnings manipulation in 1999-2002. On average, she noted that there are about 218 important firm-level news items issued daily, and that only about 20% are related to financial information. Her empirical results looked at whether these information releases cause some firms to be market leaders --- with information only gradually over time reflected in followers’s stock prices.

She identified a set of market leaders using the following Granger causality specification to run a series of rolling one-year regressions for all possible pairs of stocks:

\[
\text{Ret}_t^i = b_0^i + b_1^i \text{Ret}_{t-1}^{mk} + b_2^i \text{Ret}_{t-1}^i + b_3^i \text{Ret}_{t-1}^j + \epsilon_t^i
\]

Stock \( j \) is considered a leader for stock \( i \) if the t-statistic of coefficient \( b_3^i \) is statistically significant in the above regression, and, hence, the lagged return on stock \( j \) predicts the current period return of stock \( i \). It is defined as a positive (negative) leader if the coefficient \( b_3^i \) is positive (negative). This regression is run for all possible pairs of stocks using monthly data, and, on average, she finds 286.89 statistically significant leaders. This compares with ~150 false positives one would have expected out of 3,305 pairs of stocks. Other summary information is contained in the following table:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average # of leaders</td>
<td>286.89</td>
</tr>
<tr>
<td>% positive leaders</td>
<td>53.03%</td>
</tr>
<tr>
<td>( b_3 ) for positive leaders</td>
<td>0.87</td>
</tr>
<tr>
<td>( b_3 ) for negative leaders</td>
<td>-0.90</td>
</tr>
<tr>
<td>% obs. with at least one leader</td>
<td>90.97%</td>
</tr>
</tbody>
</table>

Having identified a set of \( J_t^i \) leaders for stock \( i \) at time \( t \), Scherbina aggregates all of the leaders’ signals:

\[
\sum_{j=1}^{J_t^i} w_{j,t-1} b_{3,t-1}^j \text{Ret}_{t-1}^j
\]

Leadership summary
where the weights \((w)\) are either equal or value weights, and then examines whether the signals have out-of-sample forecasting ability. Ten decile portfolios are formed based on the composite leader signal. Portfolio 1 (10) contains the stocks that are predicted to perform the most poorly (the best). The results for the equally-weighted signal are in the following table; they indicate an out-of-sample alpha of 0.64% per month,

<table>
<thead>
<tr>
<th>Decile</th>
<th>Leader signal</th>
<th>Excess return</th>
<th>Market alpha</th>
<th>3-factor alpha</th>
<th>4-factor alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-3.58%</td>
<td>0.52%</td>
<td>-0.27%</td>
<td>-0.47%</td>
<td>-0.37%</td>
</tr>
<tr>
<td></td>
<td>(1.93)</td>
<td>(-2.25)</td>
<td>(-5.81)</td>
<td>(-4.61)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>-1.99%</td>
<td>0.71%</td>
<td>0.00%</td>
<td>-0.16%</td>
<td>-0.10%</td>
</tr>
<tr>
<td></td>
<td>(3.02)</td>
<td>(0.03)</td>
<td>(-2.78)</td>
<td>(-1.62)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-1.26%</td>
<td>0.80%</td>
<td>0.10%</td>
<td>-0.08%</td>
<td>0.02%</td>
</tr>
<tr>
<td></td>
<td>(3.44)</td>
<td>(1.13)</td>
<td>(-1.75)</td>
<td>(0.44)</td>
<td></td>
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<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1.88%</td>
<td>1.21%</td>
<td>0.45%</td>
<td>0.21%</td>
<td>0.29%</td>
</tr>
<tr>
<td></td>
<td>(4.68)</td>
<td>(4.07)</td>
<td>(3.02)</td>
<td>(5.04)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>3.54%</td>
<td>1.35%</td>
<td>0.52%</td>
<td>0.25%</td>
<td>0.27%</td>
</tr>
<tr>
<td></td>
<td>(4.66)</td>
<td>(3.82)</td>
<td>(3.29)</td>
<td>(3.52)</td>
<td></td>
</tr>
<tr>
<td>10-1</td>
<td><strong>0.83%</strong></td>
<td><strong>0.79%</strong></td>
<td><strong>0.71%</strong></td>
<td><strong>0.64%</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>(7.35)</strong></td>
<td><strong>(7.03)</strong></td>
<td><strong>(6.68)</strong></td>
<td><strong>(5.73)</strong></td>
<td></td>
</tr>
</tbody>
</table>

based on the Fama French 4-factor alpha, from going long Portfolio 10 and short portfolio 1. Scherbina found that the leaders can be smaller stocks and they can belong to different industries than their followers.

Although the results are strongly significant over the entire sample period, Scherbina presented a graph (not reproduced) of cumulative monthly returns that showed the predictability at monthly frequencies has declined over time, and that the strategy may no longer be profitable. A similar graph (reproduced below) shows that some profitability remains when the strategy is executed on a weekly basis. The strategy requires high turnover; the break-even trading costs are about 45 bps for the equally-weighted portfolio strategy and about 27 bps for the value-weighted strategy—the same order of magnitude as the effective bid-ask spread for a typical stock.

Bibliography


2. Dissecting Factors (Spring 2014)

It is the widely used Fama French (FF) equity pricing model and its problems that intrigue Juhani Linnainmaa, Assistant Professor of Finance at the University of Chicago’s Booth School. Because the model cannot price corner portfolios when stocks are sorted by size and book-to-market value, Fama and French (1996) themselves rejected the three factor model. In spite this rejection by the creators, the FF model remains widely used by academics and practitioners nearly
twenty years later. Curious about the problems with FF, instead of further mapping the model’s boundaries, Linnainmaa turns to the model itself for an explanation of its problems.

The idea behind the FF model is that stocks co-move with other stocks of their type. Thus value co-move with value, growth with growth and small stocks with others in their category. But, Linnainmaa says, stocks based on style and cap can be in the group for many reasons, not all of which earn a premium or discount. This leads him to ask two questions: are all value stocks (and small stocks) created equal; if not, what are the implications for performance evaluation and “new” anomalies?

Small stocks Linnainmaa points out, co-move with other small stocks and value stocks co-move with other value stocks, but not all versions of size and value are compensated with higher average returns. HML and SMB can each be split into two systematic parts with different risk premia, one with a positive price of risk and the other with a zero price of risk. Because of the mismatch between covariances and average returns, the three-factor model incorrectly penalizes some small and value stocks. Simply, Linnainmaa says, not all flavors of size and value are compensated with higher average returns.

How can this happen? A value a stock can be deemed value if it has always been a value firm, or when the market value of its equity decreases or the book value of the equity increases. Similarly a company is small if it was small at the time of its IPO or when the market value of equity decreases. These different reasons for categorization result in a mismatch between covariances and average returns. Thus, the three-factor model does not condition on enough information to pick up on these distinctions: a small value stock, gets penalized in alphas while a large growth stock gets a credit. In fact, the two strategies, HML and SMB, really are bundles of multiple factors Linnainmaa calls “baby factors.” The strategies themselves each can be split into two systematic parts each with different risk premia: one with a positive price of risk; one with a zero risk price.

To look at this Linnainmaa takes the part of firm size orthogonal to value and project it on long-term changes in the market value of equity. The priced components are the projections and the unpriced components are the residuals. The results of this analysis are shown below.

Linnainmaa then asks how this insight this would impact mutual fund performance evaluation. Answer this he creates an augmented model that includes the insights into priced and unpriced factors. The original and augmented models are shown below.

\[ r_{jt} - r_{ft} = \alpha_j + b_j MKTRF_t + s_j SMB_t + h_j HML_t + e_{jt} \]

Where: \( r_{jt} \) is fund j’s month t return net of fees, \( r_{ft} \) is the one-month Treasury bill rate, MKTRF_t is the return on the value-weighted market portfolio in excess of the Treasury bill
rate, SMBₜ and HMLₜ are the size and value factors of the three-factor model, \( \beta_t \) is the month \( t \) return on along-short portfolio based on the unpriced part of book-to-market, and \( \gamma_t \) is the month \( t \) return on a long-short portfolio based on the unpriced part of size.

Using this augmented model Linnainmaa finds that estimated alphas shift significantly to the right. He says that most managers trade the uncompensated flavors of size and value and thus do not offset the costs they impose on investors for their skill. He reports that in 2010 only 2% of fund managers had enough skill to cover the costs they imposed on investors. Using the augmented model, up to 18% of fund managers had cost-offsetting skill.

Linnainmaa concludes his presentation talking about the power of gross profit as an addition to the model. He says that a strategy that combines value and profitability is very attractive. On the basis of this work, managers should be aware that HML and SMB are bundles of multiple factors, some of which are not priced. To deal with this, the manager must either clean the value signal by taking into account recent changes in the market value of equity or combine book-to-market with gross profitability so as to separate “good” value from “bad” value.

3. The Surprising “Alpha” From Malkiel’s Monkey And Upside-Down Strategies (Fall 2013)

Jason Hsu of Research Affiliates (RAFI) said that investment practitioners and many academics are understandably preoccupied with identifying strategies based on stock characteristics that can deliver high risk-adjusted returns. Many have translated these strategies into portfolio weighting schemes to create indices that outperform the Cap-Weighted Benchmark. Hsu focuses on indices whose weights are rebalanced annually and are based on volatility, market beta and downside semi-deviation. He finds that all of these alternative indices produce higher returns and higher Sharpe Ratios than the U.S. Capitalization-Weighted Benchmark, as shown in the above table.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Return</th>
<th>Standard Deviation</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volatility Weighted</td>
<td>13.2%</td>
<td>19.1%</td>
<td>0.66</td>
</tr>
<tr>
<td>Market Beta Weighted</td>
<td>13.9%</td>
<td>19.8%</td>
<td>0.64</td>
</tr>
<tr>
<td>Downside Semi-Div Deviation</td>
<td>13.1%</td>
<td>19.9%</td>
<td>0.67</td>
</tr>
<tr>
<td>U.S. Cap Weighted</td>
<td>9.7%</td>
<td>16.3%</td>
<td>0.52</td>
</tr>
</tbody>
</table>

Is this the pot of gold? Before we leap, let’s have some confirmation, and Hsu provides it.

To confirm these results Hsu inverts each of the strategies. He anticipates that the inverted algorithms will underperform the benchmark by a roughly same amount it had outperformed. They did not. Not only do the inverted algorithm strategies not perform as expected, they outperform the benchmark (following table). This outcome was unexpected.

Looking further Hsu finds that these same results hold for global stocks using the same weighting schemes and for U.S. and global stocks indices that utilize fundamental weights such as book value, 5-year average earnings, a blend of fundamentals, and earnings growth. Not only do fundamentally weighted indices outperform, the inverse strategies outperform. Hsu goes on to say that the following smart beta strategies also outperform:

- Diversity Weighting - a blend between cap weighting and equal weighting.
- Fundamental Weighting - strong fundamentals deliver high returns.
- Maximum Diversification – return is proportional to volatility.
- Minimum Variance - low risk generates high return.
- Risk Cluster Equal Weight - equally weighted country/industry clusters.
- Risk-Efficient - return proportional to downside semi-deviation.

As did the inverse of the smart beta strategies!
How can this be? What is going on? This is what Hsu sets out to discover. He and his co-authors first ask if Burton Malkiel might have been right when, in *A Random Walk Down Wall Street*, he wrote, “A blindfolded monkey throwing darts at a newspaper’s financial pages could select a portfolio that would do just as well as one carefully selected by experts.”

Challenged by Malkiel’s contention, Hsu tests with a blindfolded monkey. To be clear, he does not actually use a monkey: it would be time-consuming and costly to arrange for a monkey to throw darts at the Wall Street Journal’s stock pages, not to mention dealing with the problem of tracking down 50 years of archived copies of WSJ stock lists. Instead he simulates a dart-throwing monkey by picking a random 30-stock portfolio out of the top 1,000 largest market capitalization-weighted stocks once a year. These random stock selections are equal-weighted to form a “Malkiel monkey” portfolio. Only twice did the simulated monkey underperform the Capitalization-Weighted Benchmark. Even simulated monkies do better.

Ditch the algorithms and the computer farms, grab some Wall Street Journals? No, Hsu says the source of these odd results lies in the data. When he looks at a four-factor model decomposition for the U.S., and finds that the data is tilted toward value and small size stocks. Hsu finds the same tilts to small and value when he looks at the global and fundamental data. In fact, he finds the same bias in all non-cap weighted strategies (shown in the following table), including the inverse strategies.

Finally, Hsu asks, what we are to make of the result that popular strategies, when inverted, produce outperform the strategies themselves? Hsu says that intuition about the results can be gleaned from the following relationship that holds true for any portfolio:

$$E[R_p] = E[R_{ew}] + n \times \text{cov}(w_i, r_i)$$

The expected return on any portfolio (p) is equal to the expected return on an equally-weighted portfolio of n securities plus n times the cross-sectional covariance between the portfolio weights of each security (i) and its returns. Hsu argues that due to mean reversion the covariance between market capitalization weights and returns is negative. Hence, the right-hand-term in the above equation is negative for a market capitalization weighted index. For any other weighting scheme Hsu expects this term to be close to zero. This suggests that all non-capitalization weighted indices should outperform those that are cap-weighted. Hsu concludes that it is the benchmark that is skewed, not the inverse results that are odd.


Lisa R. Goldberg, Executive Director of Analytic Initiatives at MSCI Barra and Adjunct Professor of Statistics, University of California, Berkeley presented the last paper of the 2012 Spring Q-Group Meetings, “Will My Risk Parity Strategy Outperform?” she coauthored with Robert M. Anderson, Director, Coleman Fung Risk Management Research Center and Professor of Economics and Mathematics, University of California, Berkeley and Stephen W. Bianchi, doctoral candidate, University of California, Berkeley.

The question Goldberg tackles, as have many of her predecessors, is “Can We Beat the Market?” In this paper she looks
specifically at whether the lower-beta-higher-return/higher-beta-lower-return anomaly, thought to be the result of investor constraints on leverage, can be exploited to achieve a realized Sharpe ratio that is higher than that of the value-weighted market portfolio with same volatility. She says that one of the major reasons for this work was the content of a paper by Frazzini and Pedersen given at Fall Q-Group meetings.

Goldberg starts with three general strategies typically used to beat the market:

1. Levered Risk Parity: Equal risk contributions from stocks and bonds levered to match the market volatility.
2. Unlevered Risk Parity: Equal risk contributions from stocks and bonds fully invested.
3. Fixed Asset Mix: A constant asset allocation, typically 60% Stocks/40% Bonds.

To assess whether levered risk parity outperforms the other strategies, Goldberg uses stock and bond data 1926-2010 to examine what would have happened. The performance of each of her four strategies, including one that is value weighted, is shown in the next column (the end points of the lines are shown in the order listed in the legend). Overall, levered risk parity outperforms.

She then breaks the data into the following subsamples:

- Pre-1946 (1926-1945)
- Post-War (1946-1982)
- Dot-Com & Beyond (2001-2010)

Goldberg finds a time dependent difference: for the Post-War period the 60/40 portfolio is superior to all other strategies.

Critical to the success of the levered risk parity strategy is the cost of borrowing. She evaluates the strategy, first assuming a risk-free borrowing rate and then the Eurodollar rate, making sure to include trading costs. Taking costs into account the 60/40% constant asset allocation strategy outperforms leveraged risk parity for the entire period and all sub periods. The levered risk parity strategy premium is significant only when it is financed at the risk free rate and trading costs are neglected. Her results are shown in the chart on the next page.

Goldberg concludes that on the basis of this research:

- While CAPM investors hold the market portfolio and lever or delever to adjust risk, practical considerations imply that leveraging a portfolio diminishes Sharpe Ratio.
- A weaker strategy may outperform a stronger one over periods of several
decades, certainly beyond the investment horizon of most individuals and institutions like pension funds or endowments.

- Results of back tests depend on the test period and assumptions about transaction costs.

Finally she says, “When the experiments are done, we still have to decide what to believe.” (Jonah Lehrer, *The Truth Wears Off*)

**Active Asset Management – Mutual Fund Performance**

5. Target Date Funds (Fall 2015)

Q Members experienced a neat “tag-team” presentation, where both Ned Elton and Marty Gruber presented their paper on Target Date Funds. Of course, Ned and Marty are well-known for a long history of research in investments, and their textbook is a classic that has been in print for over 30 years (this writer, Wermers, learned investment theory from an early edition, perhaps the 1st Edition, in 1986).¹

Ned Elton noted that there is a vast literature that indicates that participants in 401(k) plans make suboptimal decisions, such as the tendency to invest equal amounts in all funds in their plan (the Benartzi and Thaler, 2001, 1/N rule). Investors also tend to chase past returns and don’t invest enough.

Elton then told Q members that 72% of 401(k) plans, in 2013, offer Target Date Funds (TDFs), and 41% of 401(k) investors hold positions in these funds—amounting to 20% of the total dollar value of 401(k) assets. Further, the growth of TDF’s has been astounding over the past several years.

Chiefly, Elton and Gruber set out, in this presentation, to show the characteristics and performance of TDFs.

The below table shows a typical “glide path,” that of a Vanguard TDF. The numbers are percentages allocated to each asset class starting today, and is inferred from the holdings of Vanguard TDFs in 2011 with different maturities:

<table>
<thead>
<tr>
<th>*</th>
<th>Current</th>
<th>5 years</th>
<th>10 years</th>
<th>15 years</th>
<th>20 years</th>
<th>At maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total stock market index</td>
<td>60</td>
<td>55</td>
<td>50</td>
<td>44</td>
<td>38</td>
<td>29</td>
</tr>
<tr>
<td>Total international stock index</td>
<td>26</td>
<td>24</td>
<td>21</td>
<td>19</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>Total bond market index</td>
<td>14</td>
<td>22</td>
<td>29</td>
<td>37</td>
<td>40</td>
<td>42</td>
</tr>
<tr>
<td>Inflation-protected securities</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Prime money market</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equity percent</th>
<th>Debt percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 70</td>
<td>9.7%</td>
</tr>
<tr>
<td>70–75</td>
<td>25.8%</td>
</tr>
<tr>
<td>75–80</td>
<td>22.6%</td>
</tr>
<tr>
<td>80–85</td>
<td>25.8%</td>
</tr>
<tr>
<td>85–90</td>
<td>16.1%</td>
</tr>
<tr>
<td>Above 20</td>
<td></td>
</tr>
</tbody>
</table>

it-yourself” portfolio of the underlying funds. This results because the TDF gains access to lower fee share classes of the underlying funds than can be obtained by direct investment. The below table shows that the “Total fees” of TDFs roughly match those of a do-it-yourself (“Investor matching portfolio fees”) strategy that replicates the TDFs holdings of underlying funds:

<table>
<thead>
<tr>
<th></th>
<th>Total fees</th>
<th>Underlying fees</th>
<th>Investor matching portfolio fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>A shares (22 funds)</td>
<td>1.117</td>
<td>0.587</td>
<td>1.021</td>
</tr>
<tr>
<td>No-load shares</td>
<td>0.767</td>
<td>0.71</td>
<td>0.725</td>
</tr>
</tbody>
</table>

Gruber then took over the podium to discuss the performance and fund selection ability of TDFs. He noted the potential problem of changing betas (changing risk exposures) of TDFs over time—which is what they are designed to do, but which brings problems to a factor model that assumes constant risk exposures. Elton and Gruber use a “bottom-up” approach, which computes alphas and betas each month for each underlying fund of a TDF, and then computes the value-weighted average beta for the TDF.

The results from these factor models indicate that TDFs do not exhibit selection abilities in choosing their underlying funds. Overall, TDFs perform, net of expenses, at about the same (or slightly worse) than the average mutual fund. Of course, this is an analysis of “alpha,” and does not capture the ability of TDFs to potentially counteract common investor asset-allocation mistakes.

Elton and Gruber conjecture that there is a trade-off in TDF funds. They should benefit from having non-public information on the abilities of the underlying fund managers, but they suffer from a conflict-of-interest. For instance, the management company could potentially pressure a TDF fund to purchase a same-family fund that is underperforming in order to assist that fund.

Investigating this issue further, E&G found that TDFs tend to invest in new underlying funds which tend to underperform, indicating that TDFs “seed” the new funds.

Overall, E&G conclude that TDFs appear to roughly match what investors could do themselves (if they were disciplined enough to follow a glide path), but that TDFs would do a lot better if they held higher allocations to index funds.

Bibliography


6. Patient Capital Outperformance (Spring 2015)

Martijn Cremers, Professor of Finance at the University of Notre Dame, built on his prior well-known paper with Antti Petajisto that introduced “Active Share”. Active Share (AS) uses the portfolio holdings of a fund to compute the average absolute distance of weights from the “best fit benchmark” for that fund. In that paper, AS was shown to predict fund performance over the next several months.

In his new paper with Pareek, Cremers more deeply investigates the role of AS in predicting fund performance by separating funds in a second dimension: the holding duration of stocks. For instance, one can imagine two extreme types of high AS managers. The first trades a lot, which results
in holding portfolios that vary a lot over time, but that usually deviate from the benchmark. The second type are “patient managers,” who trade very little, holding stocks potentially for years at a time, but also in weights that deviate significantly from the benchmark.

The research question that Cremers and Pareek (CP) address is “which of these two types of high AS managers performs better?” This is an important follow-on question to the AS paper, as it is natural to think of a high AS manager as having high portfolio turnover—but, this need not be the case! In addition, Cremers stated that over the past 10 years (since 2001), the highest AS funds have not outperformed their benchmarks; therefore, the AS measure is insufficient, by itself, to find outperforming fund managers.

Thus, CP suggest adding their measure of the holding period of a stock, the “duration measure,” as a second “conditioning variable” in addition to the AS of a fund manager. What is the duration measure? It is simple: it is the average length of time a dollar in a manager’s portfolio has been invested in the same stock (over the past 5 years). For example, in 2010, Berkshire Hathaway had a duration measure of roughly 4 years, while Fidelity had a measure of about 2 years.

Cremers conducts his tests of AS combined with duration with 3 samples: all-equity retail mutual funds (net returns), all institutional portfolios (long-only 13(f) data), and hedge funds (long-only 13(f) data). As a side note, Cremers recommends a new easier-to-compute version of AS:

\[
\text{Active Share} = 100\% - \sum_{i=1}^{\text{w}_{\text{fund},i}\text{w}_{\text{benchmark},i}}
\]

where the summation in the above expression is across all overlapping positions.

Cremers showed that U.S. equity mutual funds ranked in the top quintile by their AS measures have very different following-year alphas (using a four-factor Fama-French plus momentum model, plus a liquidity factor), depending on each fund’s duration measure. High AS funds with a long duration measure (those that deviate strongly from the benchmark, but have low turnover) produced an alpha that exceeded 2%/year, while short duration funds produced an alpha below -2%/year (see the red bars below):

What explains the outperformance of these high AS, long duration funds? Cremers finds that about half of the alpha can be explained through the tendency of such funds to invest in high quality stocks (those that are profitable and growing).

Finally, Cremers showed that high AS, long duration funds also outperform when we examine all 13(f) institutional investors, as well as when we examine hedge funds (that file 13(f) statements).

The takeaway for Q members is that Active Share, by itself, is not sufficient to locate skilled managers. One must also find patient managers!

Bibliography


7. Do Funds Make More When They Trade More? (Spring 2015)

Robert Stambaugh, the Miller Anderson & Sherrerd Professor of Finance at the Wharton School, presented new research examining the empirical link between mutual fund trading activity and future performance. Many previous papers have looked at aspects related to the *cross-sectional* relationship between trading activity and performance, including the Cremers paper (“Paper #1” above) at this conference. Cremers, for instance, finds that funds that are more patient (i.e. trade less than other firms in the cross-section) tend to have superior returns to other funds that trade more intensely.

In contrast, Stambaugh focused on the *time series* relationship between trading activity and future performance for each fund. In particular, he examined whether periods of above-average trading activity (relative to a time series mean of trading activity for that fund) result in subsequent periods of above-average returns. The test, conducted on a sample of 3,126 mutual funds during the 1979 to 2011 period, is based on the simple idea that skillful managers should trade more when the opportunity set is more promising.

The primary test of this hypothesis is whether the coefficient $b > 0$ in the following regression:

$$ R_{i,t} = a + b \cdot \text{FundTurn}_{i,t-1} + \epsilon_{i,t} $$

Where $R_{i,t}$ is the benchmark-adjusted return for fund $i$ at time $t$, $\text{FundTurn}_{i,t-1}$ is the turnover over the most recent 12 month period for fund $i$, and $\epsilon_{i,t}$ is the error term. Stambaugh presented results from four basic variants of this regression that have different assumptions about the intercept term: (i) the intercept is fixed over time and the same for all funds (no fund or month fixed effects), (ii) the intercept can vary by fund but is fixed over time (fund-only fixed effects), (iii) the intercept can vary by month but is the same for each fund every month (time-only fixed effects), and (iv) there are both month and fund fixed effects. The main results of the paper can be summarized in the following table. The bottom row of the table shows that, once one allows fund fixed effects (i.e. the intercept can differ across funds), the coefficient $b$ is estimated to be positive and very statistically significant:

<table>
<thead>
<tr>
<th>Fund Fixed Effects</th>
<th>Month Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>No</td>
<td>0.00040 (1.92)</td>
</tr>
<tr>
<td>Yes</td>
<td>0.00123 (6.63)</td>
</tr>
</tbody>
</table>

The 0.00123 estimate for $b$ (with a t-statistic of ~6.6) suggests that a one standard deviation increase in turnover is associated with a 0.65% per year increase in performance for the typical fund.
Stambaugh then showed that the relation between turnover and future performance is stronger for smaller funds and funds with high expense ratios. He argued that the results are concordant with a priori theory: the result should be stronger for smaller funds where the alpha potential is less hurt by the decreasing returns to scale in asset management, and the link should be stronger for more talented managers who are likely to command a higher fee.

Stambaugh also found that, in aggregate, funds trade more when investor sentiment is high, when cross-sectional volatility is high, and when stock market liquidity is low; and that the predictive link between trading activity and future performance weakens in periods when funds act more in concert. Despite the fact that high turnover funds (in a time series sense) outperform low turnover funds, he found that both sets of funds have negative benchmark adjusted returns on the order of 5 bps per month.

### Bibliography

Pastor, Lubos, Robert Stambaugh, and Lucian Taylor, Do Funds Make More When They Trade More?


Kent Smetters, Boettner Professor of Business Economics and Public Policy at the Wharton School, presented a new and “Sharper Ratio”! It is known that, when trading occurs at a higher frequency (e.g., daily) than the periods used to compute a Sharpe Ratio (e.g., monthly), a fund manager can use a dynamic strategy to artificially boost the Sharpe Ratio without any particular investment skills (e.g., Goetzmann, Ingersoll, Spiegel, and Welch, 2007). It is also known that certain strategies, such as a “selling put option” strategy can generate elevated Sharpe Ratios in the absence of any manager skills. In both cases, the resulting distributions of manager returns are non-normal, violating a key assumption of the Sharpe Ratio. Another perspective on the problem is that these trading strategies alter higher moments of the return distribution in ways that can destroy the Sharpe Ratio’s usefulness as a performance evaluation tool.

Smetters motivated his talk with the following example: Consider the following baseline investment strategy:

1. 50% of wealth invested in a hypothetical risky asset whose returns are generated from an i.i.d. normal distribution, calibrated to have the same mean and standard deviation as the S&P1500
2. 50% in the risk-free asset
3. Portfolio rebalanced each week to 50/50
4. Sharpe Ratio and all return moments are measured on final annual return distribution

The resulting Sharpe Ratio is 0.62, with higher moments shown below:
So far, this is showing that the rebalance strategy—increasing risk when portfolio value drops, and decreasing when it rises—creates a slightly non-normal portfolio return distribution over a year (as shown by, for example, that skewness (M3) equals 0.232, rather than zero—its value when normally distributed.)

Now, let’s add, to this baseline strategy, a strategy of selling 10% out-of-the-money three-month put options on the index—with the number of options sold designed to generate 3%/year return (note that put options are a synthetic dynamic trading strategy that gets rebalanced every instant, again creating a problem for the Sharpe Ratio whose usefulness is predicated on a stationary underlying distribution):

Notice how the “Baseline + Puts” strategy is different from the “Baseline” strategy. The B+P strategy generates lower negative moments (M3, M5, M7, and M9) and higher positive moments—when rational investors will prefer exactly the opposite! Yet, its substantially increased Sharpe Ratio falsely signals that this is a superior investment.

As another example, suppose that we invest $1 in a 50/50 mix of the randomly generated “S&P 1500” plus riskfree asset. Each week, we rebalance according to a “Sharpe-Ratio optimal rule” derived by Smetters, and reflected in the below graph:

Simply put, the graph says to increase risk after losing money and decrease risk after making money. While this could be considered a “cheater’s graph,” a contrarian investing strategy follows this approach (buy when the market is down, sell when it is up). The result, compared with our above two strategies, is shown below:

Again, we have created an increased Sharpe Ratio, over the Baseline strategy, but at the expense of giving the investor worse higher moments.

One common way of dealing with this problem in practice is to use the Sharpe ratio to rank investment alternatives in combination with other measures of risk such as maximum drawdown, Sortino ratio etc. Smetters argues that while using multidimensional measures of risk sounds sophisticated, it lacks a theoretical foundation, often has to resolve conflicting conclusions, and that, ultimately, expected utility is the most compelling way to trade off risk and return.

Smetters motivated his “Sharper Ratio” by briefly reviewing past attempts to extend the Sharpe ratio. The prior literature typically started with a simple problem of maximizing the expected utility of an investor with unknown preferences. This literature showed that the first-order condition for utility maximization (first derivative with respect to allocation to stocks) can be written as an infinite Taylor Series expansion (which has a unique single root). Then, to produce a measure that ranks by the first N moments, you can truncate the Taylor Series expansion at N terms. Unfortunately, this literature stopped here, as there are many roots, some real and some complex (when the series is truncated at N terms), so it’s not clear what to do next!
Smetters’ ability at math becomes apparent next. He proposed an approach for selecting the correct root from the many roots noted above. The idea is that, if a power series (such as a Taylor Series) is truncated at $N$ terms, then it has $N$ roots. Then, under certain regularity conditions on the utility function and portfolio risk distribution (which are not too restrictive), the smallest (in absolute value) real root among the $N$ roots converges to a unique root as we increase $N$ to infinity. And, there is a finite value of $N$ such that we can stop at this $N$ and we will have our unique real root. This solves the problem noted above, and we can now use the $N$-term Taylor Series!

After demonstrating how the Taylor Series can be used to form a new “Sharper Ratio,” Smetters argued that the new ratio retains several attractive properties of the Sharpe Ratio, including that it is independent of leverage, but now properly accounts for higher moments of the portfolio return distribution. The only cost is that the Sharper Ratio depends on the risk tolerance of the investor (while Sharpe Ratio does not). Smetters argued that this should not be too burdensome, as financial advisors are charged with understanding the risk-aversion of their clients anyway!

Bibliography
Smetters, Kent, 2015, A Sharper Ratio, available at

9. Scale And Skill In Active Management (Spring 2014)
Active fund management’s ability to outperform passive benchmarks depends on management’s raw skill in identifying investment opportunities, the supply of those opportunities, and the competition to harvest them. Pastor points out that one potential constraint facing active managers is decreasing returns to scale. He says that if skill impacts performance, then skill and scale interact. The result could be that a more skilled large fund can underperform a less skilled small fund. To understand skill, Pastor says, we must understand the effects of scale. This is exactly what Pastor and his colleagues set out to do.

Pastor asks, what do we know about the skill scale performance interaction? He says that there are two hypotheses regarding the interaction between performance and scale. The first is that decreasing returns to scale are related to fund size. The second is that decreasing returns are related to the aggregate size of all actively managed funds. Whether scale has an impact on returns at either level is not clear. The fund-level hypothesis has been tested in a number of recent studies with mixed results.

Pastor says there are two challenges in estimating the effect of fund size on performance. The first is the endogeneity of fund size: skill might be correlated with both size and performance. A simple OLS estimate of the size-performance relationship is likely to suffer from an omitted-variable bias in that skill is an unobservable variable. The second challenge is the bias that results from the positive, contemporaneous correlation between changes in fund size and unexpected fund returns. To deal with this, Pastor develops a recursive demeaning procedure that eliminates the bias.
To test the model he uses CRSP and Morningstar data from 1979 to 2011 for domestic active equity mutual funds with assets of $15 million or more. The two different datasets are used to cross-check all of the data and the analysis only relies on the intersection of data that can be cross-validated. This results in a sample of 350,000 monthly observations of 3,126 funds. The researchers implicitly associate the skill with the fund - not the manager running the fund. For example, there is a certain skill associated with Fidelity’s Magellan fund - independent of whether it was being managed by Peter Lynch, Morris Smith or Jeff Vinik.

Using cleaner data and more robust techniques than previous researchers, Pastor finds at the industry level there is strong evidence of decreasing returns to scale. This evidence is stronger for high-turnover, high-volatility, and small-cap funds. At the fund level, there is mixed evidence of decreasing and insignificant returns to scale after removing econometric biases. As for skill, it appears that active funds have become more skilled over time, although their performance has not improved due to the increase in the size of all actively managed money. In addition there is a negative age-performance relationship: a fund’s performance decreases over its lifetime, and younger, newly entering funds seem to be more skilled and outperform older funds.

Pastor says that their conclusions are robust when:
1. Controlling for business cycle variables and family size.
2. Trimming extreme outliers in FundSize.
3. Different functional forms for FundSize.

Pastor has advice for practitioners and investors.

1. Practitioners: Be aware that you are more skilled than you predecessors, but so are your competitors. While it is harder for an active manager to outperform in a larger industry, especially if they manage high-turnover, high-volatility, and small-cap funds, staying away from crowded trades/strategies/industries provides opportunity for better performance.
2. Investors: Invest in young funds since fund performance deteriorates over time due to competition and they are relatively more skilled.

10. Time-Varying Fund Manager Skill (Fall 2013)

Kacperczyk says that much has been written about whether investment managers add value for their clients. Kacperczyk posits that managers have limited attention and resources and must make an optimal decision about how to allocate time and resources. He believes that business cycle variation causes the optimal allocation to change (theory) and looks for evidence of that in his empirical work. To understand this better, and consider its source, he decomposes investment performance into stock picking and market timing and finds evidence, conditioning on the state of the economy, that skilled managers can successfully pick stocks in times when the economy is expanding and are able to market time in during recessions. To measure this he proposes a new measure of fund-manager skill that gives more weight to a fund’s market timing in recessions and its stock picking during expansions.

For his study, Kacperczyk uses data on 3,477 actively managed open-ended U.S. equity mutual funds from the CRSP survivorship bias-free mutual fund database (1/1980-12/2005), and merges it with holdings data from Thomson Reuters and fundamental data from the CRSP / Compustat stock-level database. Kacperczyk follows the
approach used by previous researchers to decompose investment performance:

1. Stock picking skill is measured as the product of a fund’s portfolio weights in deviation from market weights multiplied by the firm-specific component of returns of each stock in the portfolio.
2. Market timing skill is measured as the product of a fund’s portfolio weights in deviation from market weights multiplied by the systematic component of stock returns.

The major novelty in his work is the use of dummy variables to look at both stock-picking and market-timing measures of skill in each of two different periods -- expansion and recession. He holds constant a number of control variables related to such things as fund size, manager age, expenses, turnover, loads, and style.

The results suggest that managers do a better job of stock picking in periods of expansion and a better job of market timing during recessions. Specifically, managers’ market timing ability is a monthly 14 bp higher in recessionary periods and their stock picking ability is 14.4bp lower in periods of recession. He uses NBER’s method of dating recessions, though similar results hold when recession are determined ex-ante. The results also hold at both the fund and at the manager levels.

Kacperczyk wonders whether the same managers have timing and stock picking ability. In the table that follows he shows the ability of the 25% of the funds that have the highest stock picking ability.

The same managers that exhibit stock-picking ability also exhibit market-timing skill, and at the right times.

When looking at the performance of the median, 75th and 95th percentile, funds during recessions, he finds the positive timing effect for the most successful managers is almost four times that for the median manager. Interestingly, the negative effect of a recession on the stock-picking of the most successful managers is almost twice the size of that for the median manager. In fact, these managers also show market timing ability during recessions.

These managers can time the market, but how do they do it successfully? They have, on average, more cash in recessions (40 bp more actual cash and 300 bp more implied cash), lower betas during recessions (1.00 versus 1.11 in expansion periods), and tend to engage in successful sector rotation by allocating more to defensive sectors during recessions and more cyclical industries in expansions.

As to the success, the top funds tend to be smaller and trade more actively than their less successful counterparts. In addition, the fees charged are higher (26 bp per year), the inflows of new assets higher, and the number of stocks fewer. In addition, these funds have greater industry concentration, their betas deviate more from their peers.
11. Does Mutual Fund Size Matters: The Relationship Between Size And Performance (Fall 2012)

In earlier work, Elton and Gruber found that mutual fund managers’ past performance was predictive of future performance. Others, such as Berk and Green (2004), argued that past performance should not predict future performance. Elton and Gruber’s research directly addresses the Berk and Green results and comes to different conclusions.

To determine whether there is predictability of performance, they use variations of the well-known Fama–French (FF) model and weekly information on all domestic common stock funds in the CRSP database from 1999–2009. They exclude funds with less than $15 million in assets, less than three years of history, or an $R^2$ that is less than 0.6. In addition, they exclude index, sector, life cycle and flexible funds and they eliminate funds backing variable annuity products.

For each fund they compute an alpha ($\alpha$) in the ranking year and use it to form deciles.

### Average Evaluation Alphas

<table>
<thead>
<tr>
<th>Decile</th>
<th>1 Year</th>
<th>2 Year</th>
<th>3 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decile (lowest)</td>
<td>-0.048</td>
<td>-0.027</td>
<td>-0.020</td>
</tr>
<tr>
<td>Decile 2</td>
<td>-0.021</td>
<td>-0.016</td>
<td>-0.015</td>
</tr>
<tr>
<td>Decile 3</td>
<td>-0.011</td>
<td>-0.003</td>
<td>0.004</td>
</tr>
<tr>
<td>Decile 4</td>
<td>0.030</td>
<td>0.988</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

They then examine the subsequent year’s $\alpha$, finding that the top decile stocks have a positive and significant alpha: the top decile outperforms the index by 1.5% per year as shown below:

Gruber noted that the probability of getting an alpha as high as this is considerably less than 1%.

Berk and Green suggested that a successful manager would capture excess return by increasing expense ratios. To test this, Elton and Gruber estimate expense ratios for each decile and find that the 10th decile has the lowest expense and turnover ratios. Further, they find that expense ratios tend to decline over time as shown below.

Elton and Gruber employ regression analysis to explain the alpha using a variety of variables including cash flows for the fund, its size, the prior year expense and turnover ratios, and the mutual fund family size. They conclude that there is a strong relationship between past and future alphas. In addition, they find the following:

1. The best performing funds produce positive future alphas.
2. Growth in fund size erodes predictability, but slowly.
3. Size is not as important as past speculation would suggest.

Gruber concluded that performance and predictability don't disappear for large funds for two reasons:

1. Expense ratios go down with size.
2. Size and particularly fund flows lead to either larger trades or more investments.
3. Large funds may gain better quality analysts (they can pay more) or command the best resources of the fund family to which they belong.
12. Conflicting Family Values In Fund Families (Spring 2011)

Utpal Bhattacharya, Associate Professor, Kelley School of Business, Indiana University, presented “Conflicting Family Values in Fund Families” co-authored with Jung Hoon Lee, PhD candidate, Kelley School of Business, Indiana University and Veronika Krepely Pool, Assistant Professor of Finance, Kelley School of Business, Indiana University.

Mutual fund families have been studied in a variety of ways. Bhattacharya and his colleagues address an interesting question: the role of a mutual fund that invests solely in other funds in the same fund family. Bhattacharya calls these funds affiliated funds of mutual funds (AFoMFs).

While there are a number of interesting issues with these funds, Section 17 of the Investment Company Act of 1940 which severely restricts trades between individual funds, is not one of them. Bhattacharya says that AFoMFs can both invest (i.e., lend) and disinvest (i.e., borrow) in funds in their own family without running afoul of the law.

Bhattacharya next describes the importance of these funds in the industry: while these funds were virtually non-existent in the 1990s, by 2007, the last year of their sample, 27 of the 30 large fun families had AFoMFs, constituting 75% of the mutual fund industry. Given that this kind of fund maximizes the interest of the whole family rather than the interest of its shareholders, he and his colleagues seek to answer two questions:

1. How do the internal capital markets of a fund family operate?
2. Do these internal capital markets conflict with some shareholder objectives?

Bhattacharya hypothesizes that AFoMFs provide liquidity to distressed family member funds and that AFoMFs inflows to funds occur when outsider outflows from the other funds in the family is high. Thus, he says the AFoMFs act like the Fed’s discount window by investing in funds in the family to offset their temporary liquidity shortfalls. This investing offsets potentially costly fire sales when the fund in family is experiencing very large redemptions.

Bhattacharya and his colleagues’ goal is to investigate the relationship between AFoMFs flows and outside investor flows, especially when the outside investor flows are large and negative (an outflow). To study this they use AFoMFs and other family funds holdings data from the Morningstar Principia and the CRSP Survivor-Bias-Free Mutual Fund databases from October 2002 to January 2008. Their data covers more than 90% of the AFoMFs universe.

To test whether AFoMFs provide an insurance pool to offset temporary liquidity shocks of member funds they document that affiliated funds-of-funds invest a disproportionately large amount of money in the distressed funds in the family and provide several subsample results to show that this behavior is consistent with liquidity provisions. From their analysis they find that the cost for industry wide AFoMFs to provide liquidity is 7.11 basis points per month or about $88 million. The benefit to the distressed fund is 2.94 basis point s per month for a family wide saving of $107 million.

The coauthors conclude that:

- AFoMFs offset severe liquidity shortfalls in other funds in the family, thus providing the fund family with an insurance pool against temporary liquidity shocks to other same family funds.
- The AFoMFs sacrifice does benefit the family by preventing other fund fire sales and thus improving other fund’s performance.
• The benefit exceeds the cost for the family, which suggests that the cross-subsidy is rational for the family.
• Although the family benefits because target funds can avoid fire-sales, the cost of this insurance is borne by the investors in the AFoMFs.

While the benefit to the family outweighs the costs, what Bhattacharya and his coauthors do not answer is why the manager, and more importantly the AFoMF fund board, sacrifice the fund’s investment performance to benefit the family, and why the SEC does not close this loophole on behalf of the AFoMFs shareholders.

Alternative Investments
13. The Investment Performance Of Art And Other Collectibles (Spring 2014)

Dimson starts by saying that collectibles have long attracted high prices and have been perceived as potentially interesting investments. Using a map below, he shows investments by high net worth investors in collectables--stamps, musical instruments and art around the world.

For each of the major collectibles, long term returns outperformed those from bills, bonds, and gold. However equity, in part because of its dividends, outperformed them all. Dimson’s interest in another collectible, wine, is more than that of a researcher. He is part of a family with a long history of being wine merchants in London.

Wine as a collectible asset, he says, provides a challenge for the following reasons. First, it ages into being a collectible, thus making its price path challenging to understand. Second, there are no studies of wine’s long-term return-generating process. Third, there is an Interaction between drinkability/collectability and financial returns. Fourth, with no puns intended, wine, as an asset is illiquid, heterogeneous, lacks transparency, has high transaction costs, and has no future cash flows beyond a potential resale. It is, Dimson says, an asset of passion, and emotional assets are under-researched.

Dimson distinguishes two types of wine: low-quality wines that decrease in quality over time; high-quality wines that improve in quality. Both the value of consuming a bottle of wine and the pleasure of owning a bottle depend on its quality, type, age, and buyer’s wealth. The fundamental value of a bottle of wine at each date is max of the benefit of immediate consumption or the present value of consumption at maturity plus the psychic dividend received until then.
To examine the returns from wine, Dimson creates a database of investment-quality wine prices since 1899. He limits the data to five Bordeaux first growths (premiers crus) collecting data from wine auctions and from a dealer. In total he has prices for 9,492 year/château/vintage/transaction combinations. The above chart shows the price per bottle in British pounds from 1899 to 2012 in real and nominal terms.

Dimson creates a model that separates the impact on price of chateau, vintage, transaction type and age as shown below.

\[
\ln(P_{i,t}) = \alpha_i + \alpha_f + \alpha_v + \alpha_t + \beta X_{i,t} + \epsilon_{i,t}
\]

However, there is multicollinearity between time, vintage and age. Thus, he replaces vintage effects with variables measuring production and weather. In addition, since the effect of age again may depend on vintage quality, he interacts the age polynomial with weather quality. He then compares the returns from wine to other assets. To do this, he first creates a deflated price index, shown below.

1. Since 1900, emotional assets beat bonds, Treasury bills, and gold.
2. Long-term returns were not as high as some enthusiasts assert.
3. Given waves in market and transaction costs, a long view is needed.
4. Higher returns in some submarkets reflect changing wealth or tastes.
5. Benefits from diversification and from inflation-hedging are still unclear.

Still, he says, there is a psychic dividend that financial assets cannot provide.


Ang’s research focus is on private equity, a major institutional asset class and a significant portion of the investments in portfolios of college endowments, foundations, pension funds, and sovereign wealth funds. He notes that there is one big problem that private equity poses for all investors -- the lack of a transactions-based rate-of-return series that can be used for performance evaluation, risk management, and asset allocation. He notes that there is some return private equity information available, however, most is constructed from non-market estimates of book value, multi-year internal rates of return, or multiples of investment. Ang says these are not sufficiently reflective of the actual returns since they are estimates.

Ang uses the experience of the Harvard University endowment during the 2008 Financial Crisis to set the scene. Harvard was an early adopter of the endowment model, a model that lauds the diversification benefits of alternative assets. Despite the supposed benefits of a broadly diversified portfolio,
Harvard’s endowment lost 27% of its value from June 2008 to June 2009. At the same time, it found that almost 2/3 of its portfolio was illiquid or semi-liquid thus making portfolio reallocations difficult and hampering the university’s ability to use endowment distributions for essential university support. In addition to the losses, the potential demands of future private equity capital calls caused further significant distress. Available data on private equity returns had been misleading and had biased risk estimates downward, until 2008.

Ang reports on the attempt to create a more accurate market-based private equity return index. He and his collaborators develop a method to estimate a time series of private equity returns based on actual cash flows accruing to limited partners. The data is the cash flow data set of Preqin, purchased as of June 2011, that contains quarterly aggregated investments, distributions, and net asset values (NAVs) made by private equity funds. Ang then estimates the returns from private equity and its various sub classes from 1993 to 2011.

To estimate private equity rates of return, Ang uses a net present value (NPV) investment framework. Ang and his fellow researchers allow the discount rate/rate of return for private equity to vary each period.

They then obtain the returns (aka discount rates) that most closely result in a NPV of all private equity cash flows in their sample that is equal to zero. So long as at least one fund in each quarter has a positive or negative cash flow, the procedure produces the quarterly time series of estimated private equity rates of return.

One of the key questions that Ang asks is, how do the returns to private equity compare to returns to liquid market investments with similar systematic risk? In order to answer this question, he posits a functional form for private equity rates of return where the private equity risk premium is sum of a:

1. Time invariant constant.
2. Premia attributable to exposure to the systematic risk of liquid market factors.
3. Private equity specific latent factor that varies overtime.

The graph below compares Ang’s estimated private equity index with the returns on small stocks (bottom line) and the S&P500 (second line from the bottom).

Over this time period, private equity outperformed both equity indices -- ignoring any differences in risk. As to the sources of return, the following chart shows the total private equity return (top line), the risk premium (the lowest line) and the active private equity premium (the lowest and flattest line).
The charts below show disaggregated risk premiums for the four classes of private equity: buy-outs, venture capital, real estate, and high yield.

The dramatic drop in premiums post 2001 was largely due to the private equity focus on real estate and/or venture capital. This is information that, Ang says, would have been useful to Harvard University when building its endowment portfolio pre the financial crisis.

In conclusion, Ang says this approach to estimating the historical time series of returns to private equity is quite general, requires only information about cash contributions and distributions accruing to limited partners, and is robust to sparse data. By decomposing the private equity returns into components due to traded factors and a time-varying private equity premium he finds strong cyclicality in the premium component that differs according to fund type. In addition, he says, this study provides support for an earlier hypothesis (Kaplan and Strömberg 2009) that capital market segmentation helps to determine the private equity premium.

15. Impact Of Hedge Funds On Asset Markets (Spring 2014)

Hedge funds have sparked enormous interest from a number of different constituencies: wealthy individuals and institutional investors interested in high returns with promised low risk; academics interested the returns and risks underlying these returns; regulators and policymakers who are wary about the industry since the collapse of Long-Term Capital Management nearly sparked a financial crisis. Collapses of other major hedge funds have perpetuated the concerns that such collapses again could impact the underlying asset markets. Patton says that these concerns are understandable. While the global hedge fund industry has about U.S. $1.5 trillion of assets, their substantial leverage and the high levels of trading means their impact may be disproportionately large. In spite of this importance, little empirical evidence connects the activity of hedge funds to returns in underlying asset markets. Patton seeks to correct this.

Patton looks at the ability of a measure of hedge fund illiquidity to predict the returns of 72 portfolios of international equities, corporate bonds, and currencies from 1994 to 2011. The illiquidity measure is based the autocorrelation in hedge fund returns. In particular, he uses an equally-weighted average of the autocorrelations from a sample of 30,000 hedge funds created by merging data from HFR, TASS, CISDM, Morningstar and Barclay Hedge. The individual fund autocorrelation coefficients used for the underlying analysis are based on simple rolling window estimates using 12 months of data. He excludes negative individual fund correlation coefficient estimates to create “trimmed” estimates. The equally weighted
average correlation Patton calls an illiquidity measure. In the chart below you see the illiquidity measure over time, annotated for hedge-fund industry events.

The chart below shows Patton’s average hedge fund illiquidity measure by hedge-fund strategy.

Patton presents evidence of the hedge fund illiquidity measure’s ability to predict aggregate returns for a variety of markets. It has, he says, statistically significant predictive ability for all the equity markets (shown below), 75% of the corporate bond indices and 2/3 of currency markets. There is significant forecasting ability to about 6 months in the future, Patton finds, and his findings are robust.

The apparent ability of hedge fund autocorrelations to predict these asset class returns raises two questions: are these autocorrelations primarily a reflection of hedge fund illiquidity; is hedge fund illiquidity causing future higher expected returns or could there be a different transmission mechanism?

Patton posits a model where hedge funds are the marginal market maker and low hedge fund liquidity leads to higher asset returns. In that model, hedge funds require a certain amount of liquidity as they face potential outflows from redemptions. The basic argument is that when hedge fund liquidity is low, hedge funds market makers will skew the bid-ask spread such that the mid-price is below fair market value. Thus, one would expect small bid-ask bounce from noise trader purchases and large bid-ask spread bounce from noise trader sales. In equilibrium, this causes expected returns to be high when autocorrelations are high. To test this, Patton examines whether the predictive power of the illiquidity measure is greater for more illiquid assets and stronger following market declines when liquidity is likely to be less. The following table shows show the predictive power is somewhat stronger following negative returns. He takes this as evidence supporting this hypothesis.

### Predictive power is greater for illiquid assets

<table>
<thead>
<tr>
<th>Country</th>
<th>$R^2$</th>
<th>$\gamma$</th>
<th>Equities</th>
<th>US corp bonds</th>
<th>Currencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>8.220</td>
<td>**</td>
<td>+</td>
<td>2.745</td>
<td>**</td>
</tr>
<tr>
<td>Austria</td>
<td>3.954</td>
<td>**</td>
<td>+</td>
<td>3.295</td>
<td>**</td>
</tr>
<tr>
<td>Belgium</td>
<td>2.608</td>
<td>**</td>
<td>+</td>
<td>4.722</td>
<td>**</td>
</tr>
<tr>
<td>Canada</td>
<td>3.057</td>
<td>**</td>
<td>+</td>
<td>4.509</td>
<td>**</td>
</tr>
<tr>
<td>Denmark</td>
<td>2.920</td>
<td>**</td>
<td>+</td>
<td>6.560</td>
<td>**</td>
</tr>
<tr>
<td>Finland</td>
<td>1.327</td>
<td>**</td>
<td>+</td>
<td>3.836</td>
<td>**</td>
</tr>
<tr>
<td>France</td>
<td>2.148</td>
<td>**</td>
<td>+</td>
<td>4.022</td>
<td>**</td>
</tr>
<tr>
<td>Germany</td>
<td>1.611</td>
<td>**</td>
<td>+</td>
<td>1.730</td>
<td>**</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>4.638</td>
<td>**</td>
<td>+</td>
<td>4.025</td>
<td>**</td>
</tr>
<tr>
<td>Ireland</td>
<td>2.741</td>
<td>**</td>
<td>+</td>
<td>1.583</td>
<td>**</td>
</tr>
<tr>
<td>Italy</td>
<td>1.632</td>
<td>**</td>
<td>+</td>
<td>1.583</td>
<td>**</td>
</tr>
</tbody>
</table>

Across 21 countries: 3.422 (21/0)

Patton concludes by saying that he believes these results are a useful addition to the literature on hedge funds: the model liquidity provides additional testable predictions, which are (mostly) borne out in the data.

### 16. Global Pricing Of Gold (Spring 2013)

The goal of Harvey’s presentations (and the associated paper “The Golden dilemma” co-authored with Claude B. Erb) is to enhance our understanding of the role of gold in asset allocation. Discussions about gold as an investment generate an almost religious fervor. To show the nature of the debate,

Harvey first quotes Warren Buffet (2012):

*What motivates most gold purchasers is their belief that the ranks of the fearful will grow. During the past decade that belief has proved correct. Beyond that, the rising price...*
has on its own generated additional buying enthusiasm, attracting purchasers who see the rise as validating an investment thesis. As “bandwagon investors join any party, they create their own truth – for a while.”

And then, Ray Dalio:

*Gold is a very under-owned asset, even though gold has become much more popular. If you ask any central bank, any sovereign wealth fund, any individual what percentage of their portfolio is in gold in relationship to financial assets, you’ll find it to be a very small percentage. It’s an imprudently small percentage, particularly at a time when we’re losing a currency regime.*

In his presentation, Harvey debunks a number of myths regarding gold as an investment. He examines six different arguments for holding gold:

1. Gold provides an inflation hedge.
2. Gold is a currency hedge.
3. Gold historically generates good returns in a low real-return world.
4. Gold is a safe haven in times of stress (such as hyperinflations).
5. Gold should be owned because the world may be returning to a de facto world gold standard.
6. Gold is under-owned and hence demand and supply dynamics are compelling.

Harvey addresses each of these reasons starting with inflation and reports the strength of each using charts and graphs to illustrate his conclusions. One such chart is shown below: a scatter plot of year-to-year changes in inflation plotted against gold price changes over the 1975-2011 period. He says that the chart shows no correlation between unexpected inflation, measured by the actual year-to-year changes in the inflation rate, and the price of gold. Harvey says that any perceived relationship is driven by a single year, 1980.

To provide a very long historic context Harvey compares present day military pay to that in Rome at the time of Emperor Augustus. He uses gold as a numeraire to compare the Roman salaries to those currently paid by the US Army.

He finds there is little or no income growth in military pay over 2,000 years, and he concludes that while gold may be a good hedge over a very long time, over shorter time periods it is not.

As to whether gold is an attractive asset when returns are low, he says the likely explanation of its attraction is that when real rates are very low there is the possibility of a tail event, and a surge in the price of gold. Perhaps gold is a “safe haven” investment used for protection in “a time of stress.” If so, Harvey says, how do we define stress?

After examining each of the reasons for holding gold, Harvey concludes that:

1. Gold does not provide a hedge against traditional unexpected inflation.
2. The argument for gold as a currency hedge is really just the inflation hedge argument.
3. Gold is useful in hyperinflation and price can be very sensitive to small probabilities (e.g. tail risk).
4. Low real asset return-gold correlation is spurious.
5. The de facto gold standard argument does little to help us understand gold.
What could make a real difference is a change in demand.

1. Given limited production, a move by developing markets to hold more gold could exert substantial upward pressure on price.
2. If all investors held gold in terms of its weight in “market portfolio,” there would be substantial upward pressure on price.

Is gold a good investment today? The exhibit below plots the real price of gold since the advent of U.S. futures trading in 1975.

The exhibit shows that the real price of gold is quite volatile over time, but tends to mean revert. This is further illustrated by the plot of ten-year returns in gold against the real gold price, that shows the significant negative correlation between the real price of gold and future 10-year real gold returns.

The current real price of gold is exceptionally high and would seem to portend lower future returns. Could this time be different? The positive arguments for gold include:

1. Given limited production, a move by developing markets to hold more gold could exert substantial upward pressure on price.
2. If all investors held gold in terms of its weight in “market portfolio,” there would be substantial upward pressure on price.

The global equity and fixed income markets have a combined market value of about $90 trillion. Institutional and individual investors own most of the outstanding supply of stocks and bonds.

However, at current gold prices investors own only about 20 percent, or less than $2 trillion, of the outstanding supply of gold. Since the new supply of gold that comes to the market each year has not substantially increased over the past decade, a move by individual investors to “market weight” gold in their portfolios would force nominal and real prices higher. Will prices rise based on demand, and should investors have a market weight target for gold in their portfolio? Campbell asks whether investors could achieve “market weight” even if they wanted to.

17. The Cost Of Capital For Alternative Investments (Spring 2013)

Hedge fund performance before fees was very strong from 1996-2010 using standard measures of performance. Over the same time period the Fund Research, Inc. (HFRI) asset-weighted index annual return was 13.6%, the S&P500 of 8.5%, with lower total and systematic risk. While the traditional linear factor models appear to do a good job explaining the variation in hedge fund returns, Stafford argues they are poor at replicating non-local and/or extreme moves in hedge fund returns during volatile times (August 1998 and September-October of 2008).

To gain some insight into hedge fund returns, Stafford creates a low cost method to replicate hedge fund returns. He uses four different naked index put writing strategies. In contrast to most attempts to create a
benchmark to replicate the risk, Stafford designs the option strategies to be mean-matching. He compares the put replication returns (to the right in the charts below) to those actual HFRI and linear model returns (shown to the left).

From the charts it is apparent that the put-writing-strategy portfolios:

1. Reliably match the mean of the hedge fund index, while linear factor models consistently produce significant mean return shortfalls.
2. Derivative based replicating portfolios produce feasible residuals that cannot be reliably distinguished from normal, while a majority of the feasible residuals from linear factor models exhibit non-normality.

Stafford discusses seven reasons, in two categories, that hedge funds might have downside exposure similar to the naked put writing strategies:

1. Economic:
   a. Long only index investor: the index is exposed to downside shocks.
   b. Merger arbitrage: the probability of deal failure increases following large market declines.
   c. Convertible arbitrage: the options embedded in convertible securities are exposed to downside shocks.
   d. Credit: implicit options of credit sensitive securities are exposed to downside shocks.
   e. Distressed investing: the margin of safety of distressed investments can be eroded by severe market downturns.
2. Institutional:
   a. Funds with outside capital: investors are likely to be liquidity constrained after downside shocks and withdraw funds.
   b. Funds using a broker’s balance sheet and short-term financing: capital funding, terms, and requirements are highly sensitive to extreme market moves as the broker’s financial condition is related to short-term downside shocks.

In the case of investments with downside exposure, the magnitude of the required returns is large relative to those implied by linear models. An accurate assessment of the cost of capital, Stafford says, is fundamental to the efficient capital allocation throughout the economy and investors in alternatives are not exempt.

Using the put-writing strategy, net of fees, investors in equity-related hedge fund strategies have essentially covered their cost of capital, as shown in the following table. He notes one caveat: in practice, many investors have realized lower returns than those in the survivorship biased indices he examined.

Stafford concludes:

1. The results show that linear factor models tend to understate the cost of capital when assets have non-linear payoffs and allocations are large.
2. The HFRI broad hedge fund index has not generated returns that have reliably exceeded the cost of capital.

3. The put writing strategies show returns above the cost of capital of 4.9% per annum for risk tolerant investors and 2.7% per annum for endowment investors.

18. Can Financial Engineering Cure Cancer? A New Approach For Funding Large-Scale Biomedical Innovation (Fall 2012)

Can financial engineering cure cancer? Lo believes it can by bringing a new approach for funding large-scale biomedical innovation to the field of cancer research.

Lo believes that biomedical research is handicapped by the existing structure which he characterized as “an expensive, lengthy, and risky process that challenges traditional funding vehicles which are limited in size, scope, and risk appetite.” Specifically, he believes the current business model for life sciences research and development is flawed, as evidenced by the following facts:

1. The productivity of big pharmaceutical companies has declined in recent years, as has their stock-price performance.
2. The aggregate research and development (R&D) budget of the pharmaceutical industry has almost doubled from 2002 to 2010 with little appreciable impact on the number of new drugs approved.
3. Life sciences venture-capital investments have not fared much better.

Given declining real prescription-drug spending, rising costs, shrinking R&D budgets, expiring blockbuster patents, post-Vioxx fallout, lower levels of funding and risk tolerance among venture capitalists, and unprecedented stock-market volatility and uncertainty, Lo said that it is not surprising that the future of this industry appears so bleak. It is bleak in spite of many promising breakthroughs: stem-cell therapies such as bone marrow transplants; powerful new computational tools for medical imaging and radiosurgery; diagnostic applications of nanotechnology; the identification of biomarkers for certain diseases; the sequencing of the human genome; and patient-specific gene-based compounds. With past breakthroughs and new needs, why does the industry appear to be so challenged for funding, he asked? Lo concluded that there is a mismatch.

Biomedical research is complex, expensive, uncertain, lengthy, and fraught with conflicting non-pecuniary motivations and public-policy implications. Potential shareholders and limited partners are not the most effective funding sources: ownership of public equities implies constant scrutiny of corporate performance from many different types of shareholders; and limited partner investments are sparse. This pushes senior management of companies in this industry toward projects with clearer and more immediate pay-offs, and away from more speculative but potentially transformative research. The combination of an uncertain economy and the real concern about the availability of future rounds of financing deters venture capitalists. There is a preference for proven and economically viable technologies. In addition, recent evidence suggests there is the existence of a “valley of death”—a funding gap between basic biomedical research and clinical development.

Lo proposed an alternative for funding biomedical innovation through the use of “financial engineering.” The approach involves the creation of large diversified portfolios of projects and structuring the financing for these portfolios through combinations of equity and securitized debt. The specific form of the special purpose vehicle (SPV) is shown below.
Lo proposed creating an initial fund of $30 billion that invests in 150 early stage projects. He demonstrated that such an investment could provide a reasonable return while gaining the risk reducing benefits of diversification. Lo was compelling in his information and analysis and persuasive in his infectious passion as he urged the Q-Group participants to become early investors in the concept.

Lo admitted that this proposed application of securitization may be untested, but argued that the techniques are not. Rather than shying away from SPVs because of their role in the financial crisis, he advocated a more measured response that builds on their strengths to solve the most pressing social priorities such as cancer research and global warming. In today’s low-interest-rate environment investors are seeking new investment opportunities that are less correlated with traditional asset classes. Instead of asking whether we can afford to invest billions more at this time, Lo said we should be asking whether we can afford to wait.

19. Institutional-Quality hedge funds (Fall 2011)

David Hsieh, Bank of America Professor, Fuqua School of Business Duke University concluded the Fall 2011 Q-Group meetings by presenting “Institutional-Quality Hedge Funds.”

Hsieh is interested in hedge funds and their returns and poses the question, “What is the experience of the average dollar invested in hedge funds?” To answer that question he says he needs a market portfolio of hedge funds: asset weighted hedge fund returns like the CRSP VW index. Since hedge funds are private that data is neither available nor is it incomplete. Even such data as assets under management are incomplete. It is the data problem that is the subject of this presentation.

Hsieh’s first task is to create a useable hedge fund database from both public and private sources. There are 2608 firms from public source firms that provide 94% of his data. Using this data base, he provides information final data set he creates. He says that there has been significant growth in the institutional use of hedge funds. Furthermore, the very largest hedge funds dominate the assets under management in the industry.

When examining the firms by assets under management (AUMs) he finds that large firms manage more than 80% of the assets, survive longer, tend to stay in the sample longer and have lower entry and exit rates.

He sorts his data by deciles and finds that:
1. Excess return, alpha and the Sharpe Ratio, have a U-shaped pattern across the deciles.
2. Large firms have less equity and more credit spread exposure.
3. Equity risk is lower in a bear market.
4. All funds have emerging markets exposure.

Hsieh then turns to what he calls an S&P-like hedge fund analog, Institutional Quality (IQ) firms: 8-10% of the sample number of firms that manage 60-75% of the AUMs. Over the past decade:
1. These IQ firms grew continuously until 2008.
2. Their AUMS outgrew those from smaller firms.

As for the data base created by Hsieh, he says that there is good and bad news:
1. The good news is that
   a. Adding the approximately 100 mega firms to the data greatly increases the industry AUMs.
   b. Reporting and non-reporting firms of similar size have similar survival/performance characteristics.
   c. An AUM weighted portfolio of IQ firms provides a good proxy for the market portfolio of hedge funds and only requires collecting data from a manageable number of non-reporting firms.
2. The bad news is that
   a. Commercial data bases contain a declining share of total industry AUMs.
   b. Survival and performance data vary across firm size, thus making any weighting scheme relevant.

Finally, the best news, an asset-weighted portfolio of IQ firms provides a good proxy for the market portfolio of hedge funds and only requires collecting data from a manageable number of non-reporting firms.

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20. The Effect Of Housing On Portfolio Choice (Spring 2011)

Raj Chetty Professor of Economics, Harvard University and National Bureau of Economic Research (NBER) presented “The Effect of Housing on Portfolio Choice” coauthored with Adam Szeidl, Associate Professor, Department of Economics, University of California at Berkeley and NBER.

Chetty starts with the question that motivates this research. How does homeownership effect household financial investment decisions? He says that the interaction between housing and financial markets has attracted attention because of its importance for understanding the link between macroeconomic fluctuations, asset pricing and, in this case, portfolio management.

Theoretical studies have shown that housing, due to its twin roles as a consumption good and as an illiquid asset, effects optimal portfolio allocations through two channels. Owning a home increases a household’s exposure to risk while adjustment costs in housing, such as moving, effectively amplify risk aversion because both force households to concentrate fluctuations in wealth away from housing. While these effects can have a large quantitative impact on portfolios, theory and evidence reach conflicting conclusions about the nature of the impact: theory predicts that housing lowers the demand for risky assets; empirical studies find no systematic relationship between housing and portfolios.

In their work Chetty and his coauthor identify two things that reconcile the theoretical predictions and the evidence:
1. Separating mortgage debt and home equity effects on a portfolio: mortgage debt reduces demand for stocks while home equity raises it.
2. Understanding that endogeneity of housing choice biases previous empirical estimates: those who buy bigger houses may face lower labor income risk. As an example of how this may happen, Chetty discusses the very different house purchase decisions of tenured and untenured faculty members.

In previewing the conclusions, Chetty says that there are large impacts of housing on portfolios of the same order of magnitude as the impacts that come from variations in income and wealth.

For their research they use a two-period Merton-style portfolio model with housing featuring both risks, the covariance between home prices and stock returns, and illiquidity, the probability that housing cannot be adjusted in second period of housing. For data they use the 1990-2004 asset modules from the Survey of Income and Program Participation. They observe asset data both before and after the purchase of a new house for 2,784 households.

To generate the information on the variation in mortgages and home equity they use several sets of information.

1. To identify housing price information they use state level repeat-sale home-price indices for property value and home equity wealth. This measure compares the average location, state, house price in year in which portfolio is observed (“current year”) and the house price in the state in year of home purchase.

2. One concern is that of the impact of labor market conditions on home prices. To incorporate fluctuations in house prices with labor market conditions, they correlate them with labor market conditions using national house price interaction with variation in land availability across states. This, Chetty says, incorporates information about land scarcity in places such as New York, Boston, and LA, versus places, such as Kansas, where land is abundant.

3. To incorporate the risk preferences of people who buy houses when local house prices are high, they use panel data that tracks changes in the portfolio for same household over time.

Using their model they find that housing purchases have both immediate and long-lasting effects on household portfolio choices.

- Increasing mortgage debt, holding wealth constant, reduces a household’s propensity to participate in the stock market and reduces the share of stocks in the portfolio conditional on participation: they estimate the elasticity of the share of liquid wealth allocated to stocks with respect to mortgage debt is -0.3.
- Increases in home equity wealth, while holding property value fixed, increases stockholding. The estimated elasticity of the stock share of liquid wealth with respect to home equity is 0.44.
- These elasticities are larger for households with larger adjustment costs, but similar across high and low-risk housing markets.

In practical terms, Chetty concludes:

- Mortgage debt/committed consumption may be a useful predictor of fluctuations in demand for risky assets and asset prices.
- Households should have more conservative portfolios when they hold a lot of housing commitments.

Clearly, home ownership plays a very important role in assessing the risk and planning the asset allocation for individual financial portfolios, and it did so in the most recent financial crisis.

21. Portfolio Choice With Illiquid Assets
(Spring 2011)

Andrew Ang, Ann F Kaplan Professor of Business, Columbia Business School and
NBER presented “Portfolio Choice with Illiquid Assets” co-authored with Dimitris Papanikolaou, Assistant Professor of Finance, Kellogg School of Management Northwestern University, and Mark M Westerfield, Assistant Professor of Finance and Business Economics, Marshall School of Business University of Southern California. Ang had previously presented papers at the Q-Group seminars in the Spring of 2004 and the Fall of 2007.

Ang looks at one of the “victims” of the Financial Crisis of 2008, the Harvard Endowment and why it lost so much value. While the endowment had a slightly positive performance relative to the S&P500 from June 2008 to June 2009, it still lost 27.3% of its value. This was a significant turnaround from past performance as its assets shrank from $36.9 billion to $26.0 billion.

Harvard University relies heavily on endowment distributions for operations. In 2008, the overall endowment contributions represented 34% of the University’s $3.5 billion revenue, and some schools within Harvard were more heavily reliant on the endowment for their operating budgets. The spending rate for the endowment is variable but smoothed over time and by June 2008 it was 4.8%. Any significant decline in assets impacts that payout. Clearly, this dichotomy between spending and earning sets up a conundrum during an endowment fund’s downturns. Ang says that the Endowment losses from the financial crisis meant that Harvard’s budget had to shrink by about 20% not including the massive cash outflows due to its swap position.

Ang says that the primary cause of the distress was the adoption an “Endowment Model” that includes a significant investment in illiquid assets, exacerbated by an illiquid asset overweighting. The Harvard’s Endowment policy model and actual portfolio in 2008 are shown below.

As a result of the decline in its endowment, Harvard found itself with four choices: liquidate Harvard; get increased donations; cut expenses; issue debt. Harvard cut expenses and was forced to raise over $2 billion in debt, half of it taxable. Ang says that this prompted him and his coauthors to think about the normal asset allocation model, a standard Merton model, in the light of potential asset illiquidity.

The Merton model has tradable assets with an agent that is only concerned with wealth. In this model, risk comes from the possible loss when total wealth goes to zero. However, since the agent can only consume out of liquid wealth, Ang says they should not be concerned with total wealth but liquid wealth going to zero. The potential loss of liquid wealth is an important source of risk.

This risk associated with illiquidity leads Ang to examine how illiquid assets affect asset allocations. His model includes riskless bonds, risky assets, and equity that is freely tradable, as well as illiquid risky assets that are tradable only at random times based on a Poisson distribution. As outputs he determines the appropriate asset allocation and spending rate given the newly incorporated risk of illiquidity.

In the model the presence of illiquidity induces time-varying, endogenous, risk aversion. The ratio of liquid to total wealth
becomes a state variable and effective risk aversion depends on liquidity solvency ratios. Ang provides a graphic illustration of effective relative risk aversion (RRA) as shown below.

Ang spells out the implications of his model:

1. Illiquidity markedly reduces optimal holdings relative to the Merton benchmark model. Furthermore, illiquid asset holdings are highly skewed.
2. In the presence of illiquidity, near-arbitrage opportunities arising from high correlations are not exploited. There is no arbitrage because illiquid and liquid assets are not close substitutes.
3. To be able to trade the illiquid asset continuously an investor requires liquidity premiums that depend upon skewness. Ang quantifies the premiums as shown below.

<table>
<thead>
<tr>
<th>Average Turnover</th>
<th>Illiquidity Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 years</td>
<td>0.1</td>
</tr>
<tr>
<td>5 years</td>
<td>0.2</td>
</tr>
<tr>
<td>2 years</td>
<td>0.5</td>
</tr>
<tr>
<td>1 year</td>
<td>1.0</td>
</tr>
<tr>
<td>½ year</td>
<td>2.0</td>
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</tbody>
</table>

Ang concludes with three observations.

1. Illiquidity risk induces time-varying risk aversion that is greater than the constant risk aversion coefficient of utility. This is because illiquid assets cannot be used to fund immediate consumption.
2. The periodic inability to trade has a large impact and creates significant outcomes for allocation and a consumption that differs from that from the standard Merton model.
3. For endowments, the endowment model and its spending regime must include the impact of illiquidity as the proportion of less liquid assets increases.

Banking and Financial Industry

22. Toward Determining Systemic Importance (Spring 2012)

Mark Kritzman, President and CEO of Windham Capital Management, LLC, and Senior Lecturer, MIT Sloan School of Management, made the final presentation on Tuesday of the Spring 2012 Q-Group Meetings, entitled “Toward Determining Systemic Importance” coauthored with William B. Kinlaw, Managing Director and Head of the Portfolio and Risk Management Group, State Street Associates and David Turkington, Vice President, State Street Global Markets.

Until the shock of the Global Financial Crisis, systematic risk (the extent to which movement of a broad market or economic factor imparts risk to a narrow entity such as an individual company or stock) had long been the focus of investors as they sought to design efficient portfolios and to avoid uncompensated risks. In the wake of the Global Financial Crisis, focus shifted to systemic risk (risk that results from a relatively narrow shock that propagates quickly and broadly throughout the financial system and the real economy) for good reason. The Global Financial Crisis made it clear that narrow events such as Lehman Brothers’ default could cause the global stock market to crash, paralyze the financial system, and cast the world economy into a deep and long recession.

Systemic risk and measuring it is important to investors who need to assess the vulnerability of a portfolio to systemic shocks and who need to develop a defensive strategy. It is equally important to policy makers to ensure that policies target the right entities before a shock and effectively engage in preventive or corrective measures when circumstances warrant intervention.
important, Kritzman says, measuring systemic risk is difficult.

Attempts have been made to gauge the degree of systemic risk within the financial system and to identify the linkages across financial institutions and other key entities. This effort has been difficult for several reasons: securitization obscures many connections among stakeholders; private transactions create opacity; deceptive accounting methods conceal financial dependencies. Moreover, the complexity and volume of derivatives contracts render it nearly impossible to disentangle the web of connections throughout the financial system. Lehman Brothers, for example, had more than 1.5 million derivatives contracts on its books when it defaulted.

Kritzman introduces his measure of systemic importance, the “absorption ratio.” The absorption ratio (AR) is measured as the fraction of the total variance of a set of asset returns explained, “absorbed”, by a fixed number of characteristic vectors (eigenvectors) (E). He says this ratio captures both an asset’s riskiness and its connectivity to other risky assets during periods of high systemic risk. When the absorption ratio is low, markets are more resilient to shocks and less likely to exhibit a system-wide response to bad news. Compact markets are more fragile.

For a market to sell off significantly, two conditions typically must prevail: the market must be fragile and it must receive a negative shock. Despite false positives Kritzman reports that the absorption ratio distinguishes relatively benign market conditions from dangerous ones and does so in advance. He provides the following chart (the dark area is the AR and the line represents the S&P 500 from 1998 to 2012).

He extends the idea to a market timing strategy. Based on the systematic risk index, he creates a dynamic switching model and compares its performance to that of a static 50/50% allocation. His encouraging results are shown in the chart below.

Kritzman next turns to a discussion of extending the absorption ratio to determining systemic importance by constructing a measure of centrality that includes:

- The asset’s vulnerability to failure.
- A measure of how broadly and deeply an asset is connected to other assets in the system.
- The riskiness of the other assets to which it is connected.

It is important to note that none of the measures is sufficient, but collectively they may offer the best observable indication of systemic importance.
To create a measure of centrality, Kritzman multiplies the asset’s weight (absolute value) in each eigenvector by the relative importance of the eigenvector (measured as the percentage of variation explained by that eigenvector divided by the sum of the percentage of variation explained by all of the eigenvectors that comprise the subset of those that are most important).

\[ \mathbf{d}_t = (\mathbf{y}_t - \mu)\Sigma^{-1}(\mathbf{y}_t - \mu)' \]

Where:
- \( \mathbf{d}_t \) = vector distance from multivariate average
- \( \mathbf{y}_t \) = return series
- \( \mu \) = mean vector of return series \( \mathbf{y}_t \)
- \( \Sigma \) = covariance matrix of return series \( \mathbf{y}_t \)

Kritzman contrasts this specification to previous measures that use the principal eigenvector alone. In this centrality measure, the uses several eigenvectors in the numerator of the absorption ratio suggesting that most of the time several factors contribute importantly to market variance. He says the centrality score measures the degree to which a particular asset or industry drives market variance. To demonstrate how the measure works, he ranks the systemic importance of industries (December 1997 - June 2011) and stocks (December 1992 - June 2011) using U.S. stock market data.

Most of the list is what would be expected, however, Kritzman notes the absence of Lehman Brothers among the top 10. He explains that Lehman was not always systemically important, but became systemically important in the period leading up to the Financial Crisis and maintained relatively high centrality throughout the crisis right up to its collapse. He then ranks the systemic importance of global financial institutions as of October 2011, and urges that the results be heeded but interpreted with circumspection.

He notes that the centrality measure is not an indication of an entity’s financial strength or weakness, nor is it a gauge of creditworthiness or a predictor of investment performance. Rather, it is a statistical representation of an entity’s vulnerability to failure and connectivity to other risky entities and is derived solely from historical returns and by ignoring current fundamental information.

Kritzman concludes that his approach to measuring systemic importance relies solely on the behavior of asset prices thus giving it two virtues: it is simple and easily updated; it captures risks and linkages that may not be otherwise observable. However, as a measure, it is limited because it fails to consider fundamental factors that may not be embedded in security prices.

23. Why Bank Equity Is Not Expensive. (Fall 2011)

Anat R. Admati, George G.C. Parker Professor of Finance and Economics, Graduate School of Business, Stanford University presented “Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is Not Expensive,” she coauthored with Peter M. DeMarzo, Mizuho Financial Group Professor of Finance Graduate School of Business,
Admati begins with the motivation for this presentation: the 2007-2008 Financial Crisis and its cause. She asks, “Was it mainly (or just) a liquidity problem, a run that affected a wonderful but inherently fragile modern banking system, or the result of excessive leverage and risk, and distorted incentives?” This basic question leads to others:

1. Can a large financial institution “fail?” Can bankruptcy or regulation be made to work? Entwined in this question is whether banks are too big/interconnected/important to fail or be allowed to fail.

2. What is systemic risk and what are systemically important financial institutions?

3. What are the costs and benefits of regulation? She points out that health and safety issues arise in other regulated industries: airlines, medicine, environment, nuclear plants. Should financial institutions be included in this group?

Admati uses a quote from a November 20, 2009, interview with Josef Ackermann, CEO of Deutsche Bank, to illustrate the crux of the bank equity tradeoff.

More equity might increase the stability of banks. At the same time, however, it would restrict their ability to provide good loans to the rest of the economy and remove significant distortions. This may reduce the growth of banks. However, it will have positive effects for all except possibly bankers.

Admati says that there is a pervasive sense in discussions of bank capital regulation that equity is expensive and that higher equity requirements, while beneficial, also entail a significant cost. The arguments she and her coauthors examine are those most often made in this context and are, what she calls, fallacious, irrelevant, or very weak. Admati continues that their analysis leads them to conclude that requiring banking institutions to be funded with significantly more equity entails large social benefits and minimal, if any, social costs. She provides the following arguments made against high equity requirements and explains why they are either incorrect or unsupported:

1. **Increased equity requirements would force banks to “set aside” or “hold in reserve” funds that can otherwise be used for lending.** To this she says there is no immediate relationship between liquidity requirements and capital requirements: capital requirements refer to the mix of debt and equity used to fund banks; liquidity or reserve requirements relate to the type of assets and asset mix banks must hold. Since they are two different sides of the balance sheet, there is no immediate relationship between them.

2. **Increased equity requirements would increase banks’ funding costs because equity requires a higher return than debt.** This, Admati says, is a fallacious argument. Instead, she says, required return on equity, which includes a risk premium, must decline when more equity...
is used. Any argument or analysis that holds fixed the required return on equity when evaluating changes in equity capital requirements is fundamentally flawed.

3. **Increased equity requirements would lower the banks’ return on equity (ROE) and result in a loss in value.** Fallacious, she says. The expected ROE of a bank increases with leverage and would thus indeed decline if leverage is reduced. One exception is when increased leverage brings more government subsidies.

4. **Increased equity requirements would increase banks’ funding costs because banks would not be able to borrow at the favorable rates created by tax shields and other subsidies.** It is true, Admati says. Through taxes and underpriced explicit or implicit guarantees, debt financing is subsidized and equity financing is effectively penalized. Policies that encourage high leverage are distorting and paradoxical because high leverage is a source of systemic risk. The subsidies come from public funds. If some activities performed by banks are worthy of public support, subsidies should be given in ways that do not lead to excessive leverage.

5. **Increased equity requirements would be costly since debt is necessary for providing market discipline to bank managers.** In theory, Admati says, debt can sometimes play a disciplining role, but the arguments for lenders as disciplinarians are weak. Instead,
   a. High leverage actually creates many frictions including incentives for banks to take excessive risk.
   b. There is little or no evidence that banks’ debt holders provided any significant discipline during the Financial Crisis,
   c. The argument ignores the potential disciplining role that can be played by equity shareholders or through alternative governance mechanisms.
   d. The discipline provided by debt generally relies upon a fragile capital structure funded by short-term debt that must be frequently renewed.
   e. There must be less costly ways to solve governance problems.

6. **Increased equity requirements would force or cause banks to cut back on lending and/or other socially valuable activities.** Admati counters this saying that higher equity capital requirements do not mechanically limit banks’ activities. Any “debt overhang” problem can be alleviated if regulators require undercapitalized banks to recapitalize quickly by restricting equity payouts and mandating new equity issuance. Once properly capitalized, Admati points out, banks would make better lending and investment decisions and issuance costs would be reduced.

7. **The fact that banks tend to fund themselves primarily with debt and have high levels of leverage implies that this is the optimal way to fund bank activities.** There is no logic to this argument, Admati says. Just because financial institutions choose high leverage does not mean this form of financing is optimal. Rather, it means that the observed behavior is the result of factors unrelated to social concerns, (e.g. tax incentives and other subsidies), and to frictions associated with conflicts of interests and to an inability to commit in advance to certain investment and financing decisions.

8. **High equity requirements will drive banking activities from regulated to unregulated sectors and would thus be ineffective or even harmful.** First, in the run-up to the crisis, many activities and entities in the so-called “shadow banking system” relied on credit backstops and other commitments made by regulated
entities. Thus, these activities and entities were, and continue to be, within regulators’ reach. Second, defining the entities and activities that should be regulated will always be a challenge. It is far from clear that, given the tools already and potentially available to lawmakers and regulators, the challenge of effective capital regulation cannot be met.

Admati provides the following recommendations:

1. Since bank equity is not expensive, regulators should use equity requirements as a powerful, effective, and flexible tool with which to maintain the health and stability of the financial system.
2. Regulators should use restrictions on equity payouts and mandate equity issuance to help banks. This will assure that they maintain adequate and high equity capitalization.
3. If certain activities of the banking sector are deemed to require subsidies, then subsidies should be given in ways that alleviate market frictions and not through a system that encourages high leverage.
4. Better resolution procedures for distressed financial institutions, while necessary, should not be viewed as alternatives to having significantly better capitalized banks.
5. Higher equity requirements are superior to attempts to fund bailouts through a “bailout fund” supported by bank taxes.
6. Approaches based on equity are superior to those that rely on non-equity securities such as long term debt.

To conclude Admati says after the Financial Crisis, the burden of providing a compelling argument for why high leverage of banks is justified must be on those making the claim. Policy should not be made on the basis of fallacious claims and must be based on social costs, benefits and solid reasoning. Finally, she asks, “Why do investors/shareholders allow banks to lobby against sensible regulations using flawed claims?”

24. Neglected Risks, Financial Innovation, And Financial Fragility (Spring 2011)

Andrei Shleifer, Professor of Economics, Harvard University, presented “Neglected Risks, Financial Innovation, and Financial Fragility” coauthored with Nicola Gennaioli, Assistant Professor, Universitat Pompeu Fabra, CREI and Robert Vishny, the Myron S. Scholes Distinguished Service Professor of Finance at the University of Chicago Booth School of Business. Shleifer had previously presented a paper at the Q-Group® seminar in the Fall of 1995.

In this first presentation of the Spring 2011 Q-Group Seminar series, Shleifer and his coauthors seek to understand the financial fragility that created the chaos of the recent financial crisis. At the heart of his concern is the fact that in this crisis, as opposed to the earlier internet crisis, intermediaries concentrated the risk.

Shleifer’s and his coauthors’ perspective on the cause of this crisis is new: they do not focus on leverage and institutional structure, what he calls the plumbing. Rather, they focus on the creation of “false substitutes” that meet the demand for safe investments in a high-demand, limited-supply environment. This increase in substitute products creates private money and importantly, he says, increases risk as both investors and, to a lesser degree, intermediaries neglect risks and leverage. Shleifer says that the focus on leverage and plumbing by policy makers needs to be expanded to include the speed of innovation, a critical variable in creating a financial crisis.

In this work Shleifer adapts a standard model of financial innovation where:
• Investors demand a particular (often safe) stream of cash flows.
• Traditional securities become limited and intermediaries create new substitute securities from risky assets. These new securities are designed to offer the desired cash flow stream to risk-shy investors.
• Large numbers of these new securities, called by Shleifer “false substitutes,” are issued to meet the ensuing demand.
• At some point previously unattended to risks are revealed, surprising investors and intermediaries.
• There is a flight from the “false substitutes.”

Shleifer notes that recent events fit this innovation model: securitization; collateralized mortgage obligations; money market funds. He suggests that junk bonds, and the import of Drexel as an intermediary, may be included on the list.

To this familiar innovation model, Shleifer and his colleagues add two real world adaptations.

• Surprise when investors, and often intermediaries as well, recognize the unusual risks that accompany the new “safe cash flow” securities.
• Investors’ subsequent flight from the “false substitutes” to safe traditional securities.

Important to their model is their assumption that investors have a preferred habitat for safe assets modeled as infinite risk aversion. Shleifer says that their model suggests the following scenario as the innovation proceeds:

• Markets for new securities are fragile. When news about unattended risks catches investors by surprise, they dump the “false substitutes” and flee to the safety of traditional securities. Over-issuance then is the source of risk.
• In equilibrium intermediaries buy back many of the new securities. However, in a crisis fueled by innovation the supply is huge. Over issuance causes prices to fall sharply even without fire sales.
• Prices of new claims collapse below initial values as investors flee to safety.
• Intermediaries’ wealth provides insurance against price collapses but the glut of new securities is a crucial driver of the crisis: new claims are risky due to over-issuance and intermediaries’ wealth is insufficient for the volume.

Shleifer says that their two-agent financial market model includes the risk-adverse investor and the risk-neutral intermediary and it emphasizes the central role of neglected low probability risks. It includes both an assessment of the nature of financial innovation and of financial fragility.

After discussing the two-asset, three-period model, he turns to describing how it provides a novel perspective on the cause of the frozen asset-based commercial paper market in the summer of 2007. Shleifer does acknowledge there are two alternative explanations for the events: institutional speculation and what is called a “perfect storm.”

1. Institutional speculation. This is the leading alternative explanation of the events of 2007. Institutions speculated in AAA-rated securities using short-term finance while counting on a government bailout. The positions sustained huge losses and led to the eventual bailouts.
2. “Perfect storm.” In this view investors correctly consider the extremely low probability of a crisis and price securities accordingly. However, in this instance the very-low-likelihood event occurred.

Shleifer questions both explanations. First, as to the role of institutional speculation, he reminds us that prior to the events of the
summer of 2007, financial markets universally perceived AAA-rated MBS and CDOs to be safe, the banks’ credit default swaps traded as if banks were totally safe, and banks provided repo financing to hedge funds using MBS as collateral with very low haircuts. He argues that both the banks and the investors neglected the risks and were shocked by what subsequently happened. Second, as for the “perfect storm,” Shleifer says that this view is inconsistent with the assertion that investors actually used the wrong models rather than the correct models without adequate evaluation of low-probability extreme events.

Their model, Shleifer points out, is in agreement with the widely accepted prescription that greater capital and liquidity of financial intermediaries would lead to more stable markets. However, he says, it goes further by questioning the idea that all creation of private money by the banking system is necessarily desirable: at least in some cases such securities owe their very existence to neglected risks and have proved to be “false substitutes” for the traditional ones. “False substitutes” by themselves lead to financial instability and may reduce welfare, even without the effects of excessive leverage. He does conclude that financial fragility in their model could interact, perhaps dangerously so, with leverage when mispriced securities are used as collateral and thus can result in fire sales. Sales from unwinding levered positions and sales from disappointed expectations thus go in the same direction.

Shleifer concludes with public policy concerns. He says that recently proposed policy, while desirable in terms of its intent to control leverage and fire sales, does not go far enough. It is not just the leverage, he points out, but the scale of financial innovation and of the creation of new claims itself that require regulatory attention. Such attention might be especially warranted when investors buy securities through an intermediary that explicitly or implicitly guarantees them. Regulators may wish to require that intermediaries hold enough capital to make good on those guarantees or else refrain from making them. This might be a particularly significant issue when the safety of either securities or intermediaries is illusory.

25. Who is doing what to whom on Wall Street and why? (Spring 2011)

Leo Guzman introduced the Monday dinner speaker, Charlie Gasparino, Senior Correspondent for FOX Business Network, a Wall Street insider, book author and commentator.

His topic was “Who Is Doing What to Whom on Wall Street and Why?” However, he suggested his talk really was simpler and suggested the title, What’s Going on Inside Wall Street? He began with his sense of what those on Wall Street are talking about at present: they seemed obsessed with insider trading, although he was unsure how to define insider trading. With regard to the SEC, he said he was unsure of what action they might be planning, and which financial executives might be implicated. Further, in talking about some widely known company heads, he said that their tenure may be coming to an end and there are those who are gleeful at the prospect.

Gasparro was especially concerned about the bailouts of bankers and wondered whether some of those bankers who say their firm was not bailed out were actually bailed out, albeit indirectly. He said that he is opposed to banker bail outs and would like to have them stopped. This would significantly reduce risk taking, he said, describing hedge funds as an example of risk taking that does not depend upon the comfort of bail outs.

Finally, turning to politics he said that while Wall Street does not entirely trust
Obama, they will support him in the next election. In answer to a question about who would be the Republican candidate, he said he had no idea who it might be.

**Behavioral Finance**


Modern portfolio theory emphasizes the importance of looking at individual security trading decisions in a portfolio context. In contradiction, the behavioral finance literature has largely focused on psychological aspects of investing in a narrow framing context --- where the buy and sell decision for any individual security is looked at in isolation.

Professor Samuel M. Hartzmark, Assistant Professor of Finance at The University of Chicago Booth School of Business gave a behavioral finance focused talk that looked at whether there is joint or separate evaluation in the context of portfolio formation; that is, whether investors consider the performance of other securities in their portfolio when they make decisions about a given security. He finds strong evidence of a rank effect, which he interprets as being evidence of joint evaluation. The main empirical result is summarized in the following graph that depicts the probability of a position being sold based on the rankings of cumulative returns since purchase.

The graph on the left shows that individual investors are 20% more likely to sell a position that has had the highest cumulative return since purchase, relative to a security that has had average returns, and 15% more likely to sell a position that has had the lowest return -- all based on individual investor account data from 1991-1996. The corresponding numbers for mutual funds, depicted in the graph on the right, are 12% and 17% --- based on quarterly reporting data from 1990-2010. These numbers are significantly larger than

<table>
<thead>
<tr>
<th></th>
<th>Individual Investor</th>
<th>Mutual Fund</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best - Not Best</td>
<td>0.102 (20.77)</td>
<td>0.074 (25.45)</td>
</tr>
<tr>
<td></td>
<td>37,374</td>
<td>48,079</td>
</tr>
<tr>
<td>Worst - Not Worst</td>
<td>0.063 (16.94)</td>
<td>0.126 (30.64)</td>
</tr>
<tr>
<td></td>
<td>30,219</td>
<td>46,260</td>
</tr>
</tbody>
</table>

**The Paper in Two Pictures**

Probability of Sale with Controls
the disposition effect, which is 2.9% in the sample.

Hartzmark then proceeded to discuss a number of tests he conducted to show that the rank effect is not the result of simple rebalancing, not related to firm specific information, not correlated with the magnitude of returns, not the result of tax loss selling, and does not depend on whether every stock in the portfolio is either at a gain or a loss. The following table, for instance, depicts the difference in average sale probabilities between two investors. The first investor holds a stock that is the best performer in his portfolio, while the second investor holds the same stock, but it is not the best performer. The second row shows analogous results for a stock that is worst for one investor, but not for the second. This would seem to rule out firm- specific information as a primary driver, and shows the importance of the rank effect.

Hartzmark finds that the rank effect is present during every month of the year, and is marginally stronger in December and January.

Hartzmark views the rank effect as one aspect of a salience effect --- the propensity for investors to trade more actively attention-grabbing stocks. He presented results that show the rank effect is even stronger when combined with other salient attributes such as alphabetical ordering, extreme returns, and high volume.

He concluded by presenting evidence from Fama-MacBeth regressions suggesting that investors can earn excess risk-adjusted returns by taking advantage of the return reversals caused by price pressure from the selling attributable to the rank effect. These results suggest an alpha of 25.7 basis points per month for the best-ranked stocks, and 94.1 basis points per month for the worst-ranked stocks.

In summation, Hartzmark urged that we move beyond narrow framing in trying to understand portfolio decisions. The rank effect suggests both individual and mutual funds are more likely to sell the extreme ranked stocks, and that the evaluation of any one stock depends on its portfolio context.

27. The Success Equation: Untangling Skill And Luck In Business, Sports And Investing (Fall 2013)

Michael Mauboussin was the dinner speaker on Monday evening of the Fall 2013 Q Group Meetings. He spoke about the ideas in his most recent book, “The Success Equation: Untangling Skill and Luck in Business, Sports, and Investing.” Central to the book, and his conversation with those at dinner, was the role that skill and luck play in success and failure. Some games, like roulette and the lottery, are pure luck, while others, like chess, exist at the other end of the luck-skill spectrum. Mauboussin says that many things in life, including sports, are a combination of skill that comes from training, practice, and luck. Extreme outliers (e.g. Joe Dimaggio’s 56 game hitting streak) are always a combination of extreme skill and luck.

He gave two examples of luck or is it skill:

1. A humorous example of luck/skill was one winner of El Gordo - the Spanish Christmas, lottery, the oldest, continuously run, lottery in the world. The man who won had a number that ended with 48. Where did 48 come from, he was asked. He replied that for seven straight nights he had kept dreaming about the number seven. Since seven times seven equals 48 (so he thought) that was his lottery number.

2. Another is the strange path the Mona Lisa by Leonardo da Vinci. Originally, not in the list of the top da Vinci paintings, a well-publicized theft in 1911 created a
media sensation. Rumored to have been stolen by modernist enemies of traditional art, even by Picasso, the painting was returned in 1913 after considerable public outcry. The news sensation turned Mona Lisa into a huge attraction at the Louvre that continues today.

Mauboussin proposes that we think of outcomes as resulting from the mixture of two distributions, one associated with skill and the other with luck. He believes the skill distribution in sports has moved to the right and become more compact. He uses as an example the times between the #1 and #20 in the Olympics. In 1932 the difference was 39 minutes, or as he says, the runner coming in first had time to shower and change before #20 crossed the line. At 2012 Olympics the difference had dropped to 7 minutes. Another example in this baseball season, shows how important this change can be. In 1941 Ted Williams was hitting 0.406, 4-sigma event. Today, a 4-sigma event would result in batting average of 0.380. Moreover, Mauboussin says, the batting distribution is more compact for major league players today.

When we consider skill, Mauboussin says that skill increases when you are young and eventually begins to decline. He calls this pattern the arc of skill. Golfers, he says, peak around 35 and tennis Grand Slam winners around 24 (using data from 1968-2013). As to financial intelligence, Mauboussin cites work by David Laibson and colleagues, Harvard University that looks at financial intelligence as a combination of fluid intelligence, peaking in the early 20s, and crystalized intelligence that grows over time and is based on experience. Crystalized intelligence is used to deal with new and complicated problems. Laibson and his co-authors found that for those making financial decisions the peak comes in their mid-50s. Some of the decline comes from habit and the rest from comfort that comes with age: you are less likely to question your own work.

Luck, Mauboussin warns, is hard to understand. Given an event, whether it is a success or failure and true or not, we rapidly create a narrative about what has happened. One part of the brain, he calls “The Interpreter,” takes the facts and creates a story even when luck is the act of randomness. “The storytelling mind is allergic to uncertainty, randomness, and coincidence and is addicted to meaning. If the storytelling mind cannot find meaningful patterns in the world it will try to impose them…it is a factory that churns out true stories when it can, but will manufacture lies when it can’t.”

Mauboussin concludes by saying that most outcomes involve a combination of luck and skill that is hard to untangle. While deliberate practice is very important to improving performance, highly skilled people, like those at the Q-Group dinner, should remember that as skill increases, luck becomes more important.

28. Natural Expectations, Economic Fluctuations, And Asset Pricing (Spring 2012)

David Laibson, Robert I. Goldman Professor of Economics, Harvard University and NBER, made the first presentation of the Spring 2012 Q-Group Meetings, “Natural Expectations and Macroeconomic Fluctuations” coauthored with Andreas Fuster, Federal Reserve Bank of New York, and Brock Mendel, Ph.D. candidate in Economics, Harvard University.

Laibson starts by reminding us that in recent decades, research in economics and finance has largely focused on the rational actor model: economic agents process all available information perfectly. Because this model rules out unjustified optimism or pessimism as an amplifying force for aggregate fluctuations, it struggles to explain some of the most prominent events including large swings in asset prices and credit and
investment cycles that contribute to the length and severity of economic contractions.

He starts with two assumptions. First, he assumes that the fundamentals such as earnings momentum in the short-run and earnings mean reversion in the long-run follow a humped shape dynamic. The process starts with a pulse of news that inflates the market (he calls this a unit shock) followed by a reversal in 2-3 weeks before reaching a steady state. Laibson shows the trajectory of earnings from three different unit shocks in the chart below.

His second assumption is that agents estimate simple models that are tractable and parsimonious, the typical models used in economics literature. He goes on to discuss the reasons for parsimony.

1. Economic: A tradeoff between model flexibility and over fitting when there are numerous potential parameters.
2. Psychological reasons that limit the number of parameters:
   a. Myopia
   b. Regency bias
   c. Complexity aversion
   d. Preference for tractability

Anchoring and representatives also lead agents to underestimate the mean reversion.

The parsimony, however, comes with consequences:

1. Agents recognize the short-term momentum but miss some of the long-run mean reversion.
2. Asset returns are excessively volatile and exhibit overreaction.
3. Real economic activity has amplified cycles.
4. The equity premium is large even though long-run equity returns co-vary weakly with long-run consumption growth. This premium, he notes, nearly vanishes if agents have rational expectations.

5. Rational agents should hold high equity allocations on average and follow counter-cyclical asset allocation policy.

Laibson suggests that relaxing the assumption of perfect rationality is a potential way of explaining aggregate volatility. Unfortunately, economists lack a consensus on how to do this.

He uses a quasi-rational model which falls between the rational expectations and intuitive (naïve) expectations models. He calls this a natural expectations model.

Laibson finds that this model is sophisticated enough to capture the short-run momentum, but fails to fully reflect the more subtle long-run mean reversion. Hence, when the true dynamics are hump-shaped, natural expectations overstate the long-run persistence of economic shocks. Clearly, agents with natural expectations turn out to form beliefs that assume that good times (or bad times) last forever.

One thing is clear to Laibson: investors primarily rely on recent data in setting expectations. Thus, they over emphasize the period of the recent unit shock and neglect longer term historic data, data from well before the time of the shock. In doing so, investors fail to incorporate the past lower mean into their forecasts. The chart below shows the impulse response functions (IRFs) for cumulative excess returns caused by a unit shock to dividends: the shock quickly drives up the cumulative returns and is followed by post-shock decline. Most important to this analysis is the historic period incorporated into the forecast. Laibson
incorporates historic data of from 1 to 40 months and finds that the shorter the period of incorporated history, the more the shock impacts dividends and the more precipitous the reversion post shock levels. The model that results in the lowest shock and subsequent reversal is based on 40 months of data. Clearly an emphasis on recent history can exacerbate shocks.

For Laibson, history makes a difference and the longer the history, at least up to 10 years, the better. The precise amount of history may vary from market-to-market around the world, he says, but the effect exists in all markets.

Using this insight Laibson creates a model that combines natural expectations with a simple dynamic macroeconomic model. He finds this the model’s predictions match many observed patterns: high volatility of asset prices; predictable up- and-down cycles in equity returns; and a negative relationship between current consumption growth and future equity returns. He tests the model using annual real per-capita consumption data, excess returns and P/Es from 1929-2010 and finds a number of interesting things:

1. Low order forecasting equations miss some of the mean reversion in fundamentals, thus resulting asset prices that exhibit excess volatility and long-run mean reversion.
2. There are cycles in consumption and investment.
3. The covariance of returns and consumption growth first rises and then falls.

There are important consequences that Laibson notes:

1. Since agents do not recognize the mean reversion, equity is perceived as many times riskier than it actually is. In fact, equities are about 9 times less risky than they are perceived to be.
2. Rational investors should hold far more equity than typical investors.
3. Rational investors should follow a countercyclical investment strategy.

Since high earnings should be a bearish indicator, in the future Laibson wants to use what he has learned to build a new predictor for bear markets.

**29. New Research In Behavioral Finance (Spring 2012)**

Nicholas Barberis, Stephen & Camille Schramm Professor of Finance, Yale School of Management, presented “Testing Theories of Investor Behavior Using Neural Data,” he coauthored with Cary Frydman, PhD Candidate, Colin Camerer, Robert Kirby Professor of Behavioral Economics, Peter Bossaerts, William D. Hacker Professor of Economics and Management and Professor of Finance, and Antonio Rangel, Associate Professor of Economics, California Institute of Technology.

Barberis begins with the two major paradigms in finance:

1. The “rational agent” framework that posits sensible beliefs are updated properly when new information arrives and investors make sensible decisions in the face of risk.
2. Behavioral finance that asserts that some market participants are less than fully rational and hold less than fully rational beliefs and decision-making under risk.

For guidance on how people deviate from rationality, he draws on research in psychology about beliefs (e.g. overconfidence and representativeness) and the psychology of decision-making under risk (e.g. prospect theory and ambiguity aversion). As for testing, he says one can start with a psychological principle, derive and test the predictions or one can start with a puzzling fact propose and test a psychology-based hypothesis. He starts with a puzzling fact.

His puzzling fact is the “disposition effect” (individual investors have a greater propensity to sell stocks trading at a gain than to sell stocks trading at a loss). This effect has attracted considerable attention because it is challenging to explain using simple rational models of trading behavior. Barberis looks to four models for an explanation: one traditional (representativeness) and three others that are behavioral (probability weighting, mutual fund flows, realization utility).

Representativeness posits that people draw overly strong inferences from small samples of data and it would predict long-run mean reversion in stock returns. He cites as a practical example of this theory, the “hot hand” effect in basketball (a player has a better chance of hitting a shot after a hit than after a miss). Widely held, this theory has not been proven using the evidence from professional basketball.

An alternative to representativeness theory is probability weighting. This theory postulates that the rational decision-maker should evaluate risk by:

1. Considering the different possible future outcomes.
2. Deciding how good or how bad each outcome will make him feel.
3. Weighting each outcome by its probability creating an “expected utility” framework.

Unfortunately this process may not be a good description of how people actually think about risk. Rather, he says, the brain may weigh probabilities in a nonlinear way by overweighting low probabilities and underweighting high probabilities. This assessment process may create an outcome more like that shown in the chart below. The dotted line represents rational choice and the solid line represents how individuals might act if using probability weighting. Probability weighting is an element of prospect theory and it is a model of how people incorporate loss aversion. This sort of idea, he says, captures the odd fact that simultaneously people demand both lotteries and insurance.

Barberis notes that probability weighting predicts that a security’s own skewness will be priced: positively skewed assets will be overpriced and will earn low average returns; negatively skewed assets will be underpriced and will earn high average returns. Thus, by taking a significant position in a positively skewed asset, an investor has a small chance of making a lot of money and, based on
probability weighting, a small chance is highly valued.

He provides a number of examples of where this behavior has been identified. Stock options predicted to have more positively skewed returns have lower average returns. Stocks with high idiosyncratic volatility have low average returns while those that are positively skewed have the reverse. As for explaining the disposition effect, a model of the stock market in which investors process risk according to prospect theory, seems to do better than does representativeness. Probability weighting plays a key role.

Barberis next turns to the mutual fund flows idea. This notion suggests that we can make sense of stock price movements by thinking about mutual fund flows. He points to three facts about these flows:

1. Mutual fund returns in the current period positively predict mutual fund flows in the next period.
2. Mutual fund flows are positively serially correlated.
3. When mutual funds receive new flows, fund managers allocate a substantial fraction of them to existing positions.

Understanding these facts leads to a new interpretation of a number of phenomena: momentum; the smart money effect; fund performance persistence.

Finally Barberis turns to the third theory: realization utility. This theory suggests that investors feel a burst of pleasure (pain) when they sell an asset at a gain (loss). It is this theory he tests. He sets up an experimental market where 28 Caltech students and employees trade stocks while their brain activity is monitored using an fMRI scanner (functional Magnetic Resonance Imaging).

For this experiment, there are three stocks. At each moment the stocks are in either a “good” state or a “bad” state. In a good state, the stock goes up with a probability of 55% and in a bad state it goes down with a 45% probability. The subjects are not told the states of the three stocks but can try to infer them from the price updates they observe. Each subject starts with $350 and can, at each decision point over the experiment, buy a share (if not currently owned) or sell shares if he does own them. The stock’s price changes only when a price update is shown on the screen the subject sees. It is important to note that from a subject’s perspective, each stock price is positively auto correlated.

Realization utility says that people experience a burst of pleasure that can be seen on a brain scan when they sell an asset at a gain. A specific area of the brain, the ventral striatum (vStr) is widely believed to encode “hedonic value,” subjective feelings of pleasure. Thus, neural activity in the vStr should spike up around the moment where a subject issues a command to sell a stock at a gain as compared to when a subject continues to hold a stock with a similar embedded gain.

Barberis plots a time series of neural activity in the vStr when a subject issues a command to sell a stock at a gain. He then compares this activity to when the subject holds a stock with a gain. The results confirm his prediction — realization utility is the culprit in the “disposition effect.”

Economics

30. The College Earnings Premium, The Higher Ed Scorecard, And Student “Sorting”: Myths, Realities And Explanations (Fall 2015)

Eleanor Dillon, Assistant Professor of Economics at Arizona State University, led a fascinating post-appetizer dinner talk about the market for college education in the United States. Education is an investment good that you invest in during one period of your life, and which then pays dividends the remainder
of your working career. Education is a huge market with approximately 17.7 million students enrolling as undergraduates in the 2012-13 academic year. This is more than three times the number of homebuyers in 2013 (5.5 million).

The market is not only large in terms of the number of participants, but also increasing in the proportion participating. Sixty-five percent of the high school class of 2012 enrolled in college the following Fall, compared to 49% in 1980. It is a market that is also large in economic terms. Undergraduate tuition and fees in 2012-13 year were around $156 billion --- a bill paid jointly by students and the government. In addition, American households owed a total of $966 billion in student debt as of 2012. It is, thus, very important from both an annual flow and a stock perspective.

Dillon kept the Q crowd engaged addressing three primary questions:

1. How do returns to college vary across institutions?
2. What are true individual costs of investing in college?
3. How do students decide how to invest in college?

Her analysis was based on the National Longitudinal Survey of Youth 1997 Cohort, which provides detailed information on college enrollment, earnings, high school and college grades, SAT/ACT test scores, and another standardized test (ASVAB) taken by all respondents. Some of her key findings are contained in the following table:

These include: 1) enrolling is not the same as graduating: less than 50% graduate from four-year colleges, 2) two-year colleges are a particularly risky business, with less than 10% graduating with a Bachelor’s degree within five years, 3) there is an earnings premium from just starting college, and 4) there is a strong correlation between the quality of the undergraduate institution and both the graduation rate (only 25% graduate from the lowest quality 4-year colleges compared to 70% from the highest quality institutions) and earnings ten years after college ($23,500 for the lowest quartile versus $39,800 for the highest quartile).

The table above shows that the "outcomes" differ depending on the quality of the educational institutions. The table below shows that the "inputs" also differ substantially:

Dillon then discussed her estimates, from a multivariate analysis, of the gains from attending a higher quality institution, holding student ability and other characteristics constant. The following chart, for instance, shows that the quality of the institution has a strong positive effect on graduation rates --- regardless of student ability. In fact, the quality of the institution has a much larger impact on graduation rate than the ability of the student.

Institution quality similarly has a strong

<table>
<thead>
<tr>
<th>Institution Quality Quartile</th>
<th>Average SAT score</th>
<th>Average ASVAB Pctile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest quality quartile</td>
<td>935</td>
<td>37%</td>
</tr>
<tr>
<td>2nd quality quartile</td>
<td>1016</td>
<td>46%</td>
</tr>
<tr>
<td>3rd quality quartile</td>
<td>1086</td>
<td>55%</td>
</tr>
<tr>
<td>Highest quality quartile</td>
<td>1180</td>
<td>66%</td>
</tr>
</tbody>
</table>

source of household debt after credit cards, auto loans, and “other”.
positive impact on subsequent earnings --- across all levels of student ability. Professor Dillon thus concluded that: *The college rat race is correct!* Getting into a better school does pay off.

Dillon next looked at the cost side of college. We would expect that colleges with more resource-intensive instruction (and higher quality) can charge more. While this is true for the sticker price for college, it is not always true for the net price paid by students after financial aid. As the following table shows, the net price of college increases much more slowly with quality than the posted sticker price:

Finally, Professor Dillon looked at the problem of “under-matching”. This is where students attend a college substantially below the quality level they could potentially attend given their innate ability. Dillon’s results show that only 6% of the “under-matched” students applied to a well-matched college and didn’t get in. Seventy-two percent of them never apply to a well-matched college. Students from the top 25% of households by wealth are 6 percentage points less likely to under-match than students from the bottom 25% of households. Overall, 25% of students under-match. The offspring of college graduates are 5 percentage points less likely to under-match than the offspring of high school graduates. They are also 5 percentage points more likely to overmatch. Eleanor says that a large part of the under-matching is due to inadequate information. The actual cost of attending college, after financial aid, is not known until after you apply and have been accepted. Hoxby and Turner (2013) randomly target some high achieving low income students (top 10% of SAT scores) and send them detailed packages of information about net costs. They found that students who received the packages were substantially more likely to apply to and enroll at highly selective colleges. The policy implication is that the Federal Government may wish to play a greater role as an information provider for high-school students!

By the end of dinner, it was quite apparent to us that Dillon’s talk elicited lots of questions and plenty of Q buzz!

Bibliography:


31. Deflation Risk (Fall 2015)

Francis Longstaff presented a paper that estimated the market’s assessment of deflation, using inflation swaps and inflation options. The objective of the paper is to estimate the market’s view of the probability of various levels of deflation or inflation, and to estimate the market’s price of insuring against such levels. The overall results were that:

1. The market expects inflation of 2.5%/year over 10-30 year horizons
2. Over the October 2009 to October 2012 sample period, the average market
probability of deflation occurring over a two-year horizon was 11.4%, while it was 2.8% over a 30-year horizon
3. Deflation risk is priced much more highly than inflation risk (as suggested by the difference between the risk-neutral probabilities and objective probabilities in the two states of the world)

As an anecdote of a rare disaster (related to Vineer Bhansali’s talk above), consider this: In 1933, FDR devalued the U.S. dollar by 40%--this resulted in bonds issued by French and Swiss governments that yielded negative rates.

Deflation has played a central role during the worst economic meltdowns in U.S. history, including these especially salient periods:
1. Banking panic of 1837, which resulted in six years of deflation, where prices fell by 30%
2. Long Depression of 1874-1896: 40% of corporate bonds were in default, and the price level declined by 1.7%/year
3. Great Depression: prices fell by more than 40% from 1929-1933

Recent years have brought growing fears of deflation in the financial press, with quotes such as:
1. “Nightmare scenario”
2. “Looming disaster”
3. “Growing threat”

The below graph shows that deflation is a recurring theme in the U.S., with some long periods (including the 50-year period prior to 2008) with no deflation (year-over-year deflation; shaded areas are NBER recessions):

But, relatively little is known about the probability of deflation, perhaps because inflation is difficult to measure. Ang, Bekaert, and Wei (2007), for instance, show that econometric models perform poorly in estimating expected inflation. Survey data does better, but only looks at first moments (expected inflation), not tail probabilities.

Longstaff’s paper uses a new market-based approach to measure deflation risk; specifically, it uses market prices of inflation calls and puts to solve for the risk-neutral density of inflation, in combination with the term structure of inflation swaps to back out the risk-premium for inflation. Together, these two are used to come up with the market’s probability density for inflation—i.e., the probability that the market assigns to a particular level of deflation or inflation occurring in the future.

The results from Longstaff’s estimation procedure using options and swaps is shown for pric
swa
infl
wh

Figure 1. Inflation Densities. This figure plots the time series of inflation densities for horizons of one year (upper left), two years (upper right), five years (lower left), and ten years (lower right). The inflation density is a measure of the risk-premium. Longstaff’s procedure relied heavily on the prices of deep OTM options. During the Q&A session, there was a lively debate about those price quotes and whether they reflected trade prices or matrix pricing.

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in his Figure 1:

Note that the peak probability lies at positive inflation levels, but that there is a significant probability mass in the left tail, which indicates that the market assesses negative inflation (deflation) to carry a small but non-trivial probability. This is the central result of Longstaff’s paper.

Longstaff proceeds to show that the time-varying deflation risk, as estimated through his procedure, is correlated with real-world macroeconomic conditions that capture stress in the financial system. He concludes that deflation is a real risk, as assessed by the market, that it carries a risk-premium that is larger than that of inflation risk, and that deflation risk—using his procedure to extract this risk from market prices of derivatives—is related to the risk of major systemic shocks based on macroeconomic indicators.

**Bibliography**


**32. Systematic Risk And The Macroeconomy: An Empirical Evaluation (Fall 2015)**

Bryan Kelly, Associate Professor of Finance and Richard N. Rosett Faculty Fellow at the University of Chicago, returned to Q to talk about systematic risk (SR) measures that can be used to predict economic downturns. There were two particularly novel aspects of the research he presented:

1. He used predictive quantile regression, which focuses on the left tail of the distribution of a set of macroeconomic variables (rather than central tendencies), to examine the relationship between systematic risk measures and macroeconomic shocks. This is important, because extreme left-tail events are much more important to predict than less extreme macroeconomic events.

2. Building on research he presented at Q in Spring 2013, he showed how to use dimension reduction techniques (principal components quantile regression and partial quantile regression) to construct an aggregated SR measure with a higher signal content relative to the noise than a disparate set of individual systematic risk measures, which each on their own have high noise levels.

Kelly’s analysis focused on the downside quartiles of macroeconomic shocks to industrial production and the Chicago Fed National Activity Index. He and his co-authors evaluated 19 measures of systematic risk, for a sample period extending over several decades, in the United States, Europe, and the UK.

Systematic risk measures broadly fell into four categories:

a. Aggregated versions of institution-specific risk measures for the 20 largest financial institutions in each region (such as Co-VAR or marginal expected shortfall),

b. Co-movement and contagion measures (such as the Kritzman absorption ratio),

c. Credit and liquidity measures (such as the TED or term structure spreads), and

d. Volatility and instability measures (such as the average equity volatility of large financial institutions or book leverage).

Kelly presented evidence showing that all SR measures spiked during 2008/09 crisis --- not too surprising given their *a posteriori*
origins --- but that they, on average, have low pairwise correlations (averaging on the order of 0.2). One interesting result was that, in long samples, many of the measures reached “crisis levels” multiple times, even when there was no crisis (false positives). On an individual basis, the only SR measure to have significant out-of-sample $R^2$ statistics across all starting periods and in all three geographic regions was the measure of financial sector volatility, as shown in the table below (fourth row from the bottom):

Kelly then proceeded to examine whether dimension techniques could be used to improve the predictability of negative macroeconomic shocks by aggregating individual SR measures, and, hence, reducing the noise relative to the signal. He focused on principal component quantile regressions, where one (PCQR1) and two (PCQR2) principal components were extracted, and also on partial quantile regression (PQR). The results (for IP shocks) are summarized below, and show the power of aggregating the signals. Kelly shows that increases in the aggregate index are associated with a large widening in the left tail of economic activity. A one standard deviation increase in the aggregated SR index shifts the 20th percentile of the IP growth distribution down by more than 50%, from around -1.4% per quarter to -2.2% per quarter.

Interestingly, the SR predicts the lower tail of the future macroeconomic distribution, but not the center of the distribution. The individual measure that comes the closest to capturing the aggregated measure is bank volatility. There is evidence the government responds to distress, but not enough to mute all of the impact on macroeconomic activity.

Finally, Kelly’s results suggest financial market volatility is a useful predictor of the left tail of macroeconomic activity, whereas non-financial equity market volatility is not:

<table>
<thead>
<tr>
<th></th>
<th>In-Sample</th>
<th>Out-of-Sample</th>
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<tbody>
<tr>
<td></td>
<td>1950</td>
<td>1970</td>
</tr>
<tr>
<td>Financial Volatility</td>
<td>3.43***</td>
<td>2.64**</td>
</tr>
<tr>
<td>Non-financial Volatility</td>
<td>1.37</td>
<td>-0.94</td>
</tr>
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**Bibliography:**


33. Why Global Demographics Matters For Macro-Finance, Asset Pricing, Portfolios and Pensions (Fall 2014)

Dr. Amlan Roy of Credit Suisse Securities (Europe) presented a lively and iconoclastic talk covering some of the highlights of his fourteen years conducting research on demographics, and its importance for understanding financial markets and the global economy. At times, he chastised members of the financial and academic communities, leading financial publications, and global policymakers for ignoring demographically driven micro factors that impinge on asset prices,
employment, inflation, GDP growth and policy responses. He also encouraged members of the Q Group to show greater commitment to using quantitative techniques to unearth and take account of these micro foundations.

During his wide-ranging talk, he expressed deep concern that:

1. Across the globe, countries have no ability to pay for their future pension, health care and other age-related commitments,
2. Global thought leaders fail to sufficiently appreciate the importance that demographic differences should have on the appropriate policy responses, and
3. Global societies have failed to create sufficient job opportunities for young workers (15-24 years old) and young middle-age workers (25-34 years old).

Roy, for instance, cited an estimate by Kotlikoff (2012) of a $222 trillion present value gap between anticipated future U.S. spending and U.S. taxes. He also noted that Europe is basically bankrupt, in that age-related expenses (public pensions, health care, and long-term care) are about 20% of GDP compared to about 10% in the U.S. He said that Europe would need a minimum 70% tax rate to close the funding gap, and that even Europe’s richest country, Luxembourg, cannot pay for it.

To help close the funding gap, Roy recommends: Abolishing mandatory retirement ages, increasing female labor force participation, instituting a carefully considered immigration policy to ensure a suitable workforce, and effectively utilizing off-shore outsourcing to help offset inadequate immigration.

Roy argued that the global increase in the length of retirement (largely the result of increased life expectancy) makes the burden much larger. The length also makes it that much more difficult to estimate the burden because of uncertainty over: health care costs, the level of taxes that are politically feasible, inflation, the returns that can be earned on investable assets, and the geographic differentials in living costs.

He warned that there is a huge danger in lumping all people over 65 together to estimate the cost of retirement programs. In the U.S., for instance, the costs of supporting people over the age of 80 is over 100% higher per year than the cost of supporting people between 65-80. This is a particularly important problem because, between 1970 and 2013, the number of people in the world over 80 grew by 359%, compared to a growth rate of 124%, for instance, in the 15 to 64 age cohort.

In assessing the ability of younger workers to support older retirees, Roy argued that it is important to consider that some countries have expanding populations, and others have decreasing populations. For example, between 2010 and 2100, Russia is expected to shrink from almost 150MM people to 100MM people. The U.S., in contrast, is expected to grow from 310MM to 460MM. China is expected to lose 300MM people over the same period of time.

Due to all the demographic changes and differences in the world, Roy argued that the current offering of retirement programs --- that grew out of the work of Samuelson, Modigliani, Merton and Bodie --- is totally inadequate, but Roy did not offer much in terms of new suggestions.

Roy criticized Bernanke, Krugman and other policy leaders, who argue that the U.S. and other countries are still suffering from the Great Financial Recession. He believes that the problems facing the world are more structural than cyclical. He presented a
relation decomposing GDP growth into the sum of three components: (1) Working-age population growth, (2) labor productivity growth, and (3) labor utilization growth. Roy compared the average growth of GDP in Germany and Japan during 2000-2013 with growth in the 90s, and with growth in the U.S. He presented numbers showing that declining work age populations in those countries has been a significant drag on growth during the more recent period.

Roy looked at the breakdown of GDP and finds strong differences between, for instance, U.S., Germany, and Japan. Germany is much more reliant on trade than the other two countries. He said, therefore, that the WSJ and FT are wrong when they argue that the growth prescription for Germany and Japan is to become much more like the US. Roy said that he was a big bull on the US, and noted that it has the best universities in the world. He is a particular fan of the U.S.’s liberal arts system in that he believes it encourages creativity and innovation. Roy noted how people all over the world are desirous of attending any of the top 60 universities in the U.S. He presented evidence showing the strong value-added of U.S. workers across agriculture, industry and services.

One of the biggest problems facing the world is youth unemployment, declining labor force participation of young workers, and the concomitant social instability this may bring. He noted, for instance, that the labor force participation rate for 16-24 and 25-34 in the U.S. is going down while the participation rate for 65+ is going up. Roy forcefully argued that the older generations across the world have let the younger generation down by not creating sufficient employment opportunities.

References


34. “The Financial Crisis Six Years On: What Have We Learned” (Fall 2014)

Jeremy Siegel, Russell E. Palmer Professor of Finance at the Wharton School, gave an animated and well-received (5.0 rated!) retrospective keynote speech at the Banquet about Ben Bernanke, the Federal Reserve, and the greatest financial crisis since the great depression.

Siegel noted that both he and Bernanke were ardent students of the history of monetary policy, and that both had become hooked on the subject while Ph.D. students at MIT – in large part from reading Milton Friedman and Anna Schwartz’s *A Monetary History of the United States* and the chapter therein on *The Great Contraction: 1929-1933*.

Professor Siegel said that you would have to go back to the Great Depression to find an event of a similar magnitude as the collapse of Lehman Brothers on September 15, 2008. There has been much debate on whether Lehman Brothers should have been bailed out. Christine Lagarde (head of the IMF) and Professor Allan Metzler, among others, have argued “Yes” and others such as Charles Plosser (President of the Philadelphia Federal Reserve bank) argued “No”. The opponents assert that such bailouts only encourage inappropriate risk taking. Bernanke has publicly stated the Fed did not have the authority to bail out Lehman. Siegel termed this “hogwash”. His reading of Section 13(3) of the 1932 Amendments to the Federal Reserve Act of 2013 is that the Fed clearly had the ability to lend to prevent the Lehman bankruptcy.
Siegel stated his view that the reason the Fed did not bail out Lehman was entirely political. He said that there a huge backlash --- especially from the Republicans --- from “bailing out” Bear Stearns (or at least taking over some of its most toxic assets). Siegel mentioned President Bush’s directive that there would be no new bailouts. Lehman was instructed to put its house in order and was told there would be no additional public funds committed to ring-fencing toxic assets. Unfortunately, Lehman --- due to the high leverage and size of its real estate holdings --- was dead in March and there was nothing that Dick Fuld, Lehman’s CEO, could do at that point to alter the course of events. Bernanke and Paulson had hoped that the markets would be prepared for Lehman’s collapse, but this was not the case --- in part due to the huge interconnectedness of the financial system.

Lehman declared bankruptcy very early Monday morning --- many hours before markets opened. The stock market was relatively firm for the first hour of trading, and then “all hell broke loose.” Markets quickly became focused on whether Merrill Lynch or Citibank were in any better condition, whether money market funds would be able to “hold the buck” etc. Markets froze and Treasury bill rates dropped to zero. Professor Siegel recounted going to the Bloomberg terminal in his Wharton office --- seeing the T-Bill rates at zero. and thinking this was exactly the same as in 1929, 1930, and 1932.

An hour later, Professor Siegel got a call from the Dean’s office and was asked to sit on a panel to discuss the events with students. One of his colleagues on the panel, Dick Herring, asked him: “Won’t AIG be the next domino to fall?” Jeremy responded: “The Fed will bail out AIG.” Herring: “Why?” Siegel: “Today the world changed. Bernanke knows what just happened. He will pull out all stops to prevent the collapse of the financial system.”

This led to a series of actions, Siegel recounted, to stabilize and save the financial system. Ultimately, this included: $182BB of loans for AIG, the ring-fencing of over $300BB trouble loans at Citi and $90BB of toxic loans at Bank of America, backing up “the buck” at all money market funds to prevent trillions of dollars from redeeming from those funds, and backing all large corporate bank deposits over the FDIC limit. What caused Bernanke’s turnaround? The most important reason was the impact of Friedman and Schwartz’s book. As noted by Bernanke at a 90th birthday celebration for Milton Friedman in 2002: “Regarding the Great Depression. You’re right. We did it. We’re very sorry. But thanks to you, we won’t do it again.”

Siegel compared the behavior of six key macroeconomic variables during the Great Depression with the most recent Great Recession in a compelling slide in his talk. The most striking numbers involved the behavior of the monetary base and the money supply, M2. During the Great Depression, the Fed did an inadequate job increasing the monetary base, such that there was a 31% decline in M2. This led to a roughly 25% fall in prices and a 27% fall in real GDP. In contrast, during the Great Recession, the monetary base increased by 380%, there was no decline in M2 or prices, and real GDP declined by only 6%. Bernanke had clearly studied history, and was determined not to make the same mistakes.

Siegel offered some other quick thoughts about the Great Recession. Was TARP needed? Absolutely not—the the Fed could have acted on its own! It was just pursued for political cover so Congress would also have to take some of the heat. Was the government unfair to AIG? No.
AIG shareholders should be very thankful. A share that was worth $1,230 at peak is now worth $50. It could easily have been worthless.

Should AIG’s creditors been forced to take haircuts? Absolutely not! Nothing less than 100% backup of creditors would have calmed the markets. We only barely prevented a complete melt-down. Nothing less than 100% would have helped at the time. Siegel noted that Section 13(3) of the Federal Reserve Act has been repealed and superseded by the Dodd-Frank Law and that in the event of future crises, the Fed would be limited in its ability to respond. Obama bought GOP votes by restricting the Fed. Hopefully, this will not be an issue in the future. Who’s to Blame for the Crisis? Three primary culprits: 1) the CEOs of the large investment banks and other financial institutions who were over-levered to real estate, 2) the Fed, particularly Alan Greenspan, who could have prevented 50:1 leveraging of portfolios of AAA securities, and 3) the ratings agencies.

Siegel believes that if the Fed had not helped to save Bear Stearns, the dominoes would have fallen sooner and the Fed would have ended in the same position. Conversely, if the Fed has saved Lehman, within days (if not hours) it would have had to save AIG, and then Citi, then Merrill Lynch, then Bank of America etc. Politically this would have been impossible to do. It was politically necessary to show the public and the politicians the dark side of the crisis. Otherwise, they would have voted the Fed out. Bernanke threaded it --- just so it would work.

Siegel concluded by noting that the final chapter on whether QE has been effective has not been written. As Paul Samuelson has frequently said: “We have but one sample of history.”

35. The Economics of Big Time College Sports (Spring 2014)

Roger Noll, Professor of Economics Emeritus, Stanford University gave an enthralling Monday evening Q Group dinner talk about The Economics of Big Time College Sports.

Noll began his talk by noting that college sports have seen a tremendous growth in revenue over the last 30 years. The key driver behind this growth was a landmark anti-trust decision that the NCAA lost in 1984 regarding its control of television rights. Prior to this anti-trust decision, live telecasts of NCAA sporting events could only occur with NCAA approval. NCAA limited broadcasts to two each Saturday. The reasons, they argued, if more events were televised no one would attend live events. The NCAA reasoned, falsely, that this would severely hurt member schools’ revenue: revenue from television rights were small relative to school revenues from tickets, trinkets and team apparel. Nothing could have ended up being farther from the truth.

Since the anti-trust decision in 1984, nominal college sports revenue has grown 8-9% (6-7% in real terms). The revenue boom has created great tension in colleges and universities across that country as an enormously profitable business was thrust upon them by the NCAA. One obvious question is, has this enormous growth in revenue caused big time sports to be profitable for the schools in general, or had unintended consequences?

There are currently 120 universities that play Division 1 football, 300 that play Division 1 basketball, and there are no barriers to entry. A big-time college sport is a highly competitive industry, and has continued to attract new entrants. As economists know, Noll says, a big increase in revenue does not necessarily lead to bigger
profits if competition is sufficiently high, and competition is very high.

Noll points out that this tends to be a winner-take-all industry where huge rewards flow to the winners. As a result, competition for inputs for winning, players, has grown fiercer and fiercer. The NCAA controls only one input, the players, by restricting the size and number of scholarships. As a result, input costs for players are clear and fixed, while the revenues are not. In the race to win players increasingly more has been spent on what attracts them -- coaches, athletic facilities, and administrators.

Noll asks whether this has led big time college sports to be more profitable. Except for the top twenty schools, his answer is a clear no! Compounding the problem, he notes that universities are non-profit institutions that know they must stay non-profit, and decisions are decentralized. This has led most athletic departments to spend all of their revenue increases on coaches, stadiums and training facilities. Noll uses as an example of Duke University’s basketball coach’s salary: Mike Krzyzewski earned roughly $300,000 in 2000. By 2012 it was over $5 million.

A regression of the athletic revenue of a school on a set of explanatory variables, including won-loss record and quality of the conference, the regression explains almost all of the variability but none of its depends on the school itself. Player recruitment is the key to success. The success of a team is almost entirely determined by how many 4- and 5-star rated high school athletes are recruited, and most of them go to the top 20 universities.

This is a winner-take-all industry, Noll points out. New players often choose a coach more than the school. To produce a good team, a school must hire and keep an iconic coach. Since player costs are fixed, the marginal revenue product of the players goes to the coaches, and coaches that can attract the best players are able to earn a higher salary and more benefits. Noll reports on an interview with Nick Saban, the head football coach at Alabama. He discussed the 2 main values of new facilities: it helps athletes; it protects the student athlete from the distraction of campus life.

Big time college sports have seen a dramatic rise in effective demand. In response, colleges have spent more and more on their athletic programs. Since success drives revenue, the shadow cost of going to class has gotten higher and higher. There is thus an incentive to require players to put more and more time into practice; a problem noted in the player testimony during Northwestern University’s football players’ petition to be able to be unionized. Northwestern is clearly a school with high admission standards and where the students have, what Noll calls, real majors, but practice demand are high. One former quarterback, who is behind the push to unionize, was not allowed select his preferred major, pre-med, if he wanted to play football. Clearly the balance between academics and athletics is much worse at places that take academics far less seriously.

Noll’s says that the current system is unsustainable and in the process of imploding. The NCAA must either stop being so commercial or give some to the players. One simple solution would be to raise scholarships to cover the full cost of attending school. He concludes that conferences should be allowed to compete without collusion, and set their own rules. It is clear to him that if the NCAA exists at all in 3 years, it will not be the same.

Fittingly, many participants left the talk in haste to watch Kentucky and Connecticut compete in the NCAA basketball final.
36. Housing And The Macro Economy (Spring 2013)

Karl Case was evening dinner speaker at the 2013 Spring Q-Group Meeting. His long history in real estate research and his collaboration with Robert Shiller in creating the well-known Case-Shiller Home Price Index gives him a wealth of history to share. The evidence demonstrates both reasons for optimism and continuing concern.

The precipitous decline in housing prices that began in 2007 slowed and then ended towards the end of 2009. Since then, housing prices seem to have stabilized with prices being similar to those that existed in 2003 and 2004. The following chart tracks housing prices from 1987 through 2010.

The turning point in housing price declines coincides with the improvement in Gross Domestic Product.

The following chart shows the date of the home price peak in a number of markets and the loss from that peak.

The housing bubble and bust of the past decade was not unique in history. It has happened before, most recently in the 1980s when the Greenspan Fed increased the inflow of money into the economy. That action fueled an era when house prices rose, rose, and home owners expected them to keep rising. Home ownership became an investment with little perceived downside.

Case annually surveyed homeowners from 2003 to 2012. Through 2007 most homeowners expected high returns from home ownership. The following chart captures those expectations. It is interesting to note that expectations fell dramatically in 2008 but also turned positive again in 2009. Still, the survey shows that since 2008 expectations have moderated and homeowners do not expect the same increases in value that they anticipated from 2003 through 2006.

Housing starts are on the rebound. With interest rates at record lows, and prices still at 2003 levels, affordability has increased. Combined with a decline in foreclosures and distressed sales and very low vacancies levels, the housing market is well positioned for a recovery. However, these positive indications must be balanced against a number of factors including tight credit markets, changes in the national and regional economies, possible movement in interest rates, changing demographics and potential tax law changes.
The data provided by Case sheds light and provides insight on whether we are past the debilitating decline in home prices and their impact on the overall economy and at the same time highlights the still existing concerns that might adversely impact the future of the housing market.

37. Are We Headed For A Demographic Winter? (Fall 2012)

Kotkin is a demographer who is worried about declining population growth and what that means for such things as aging, cities, and workforces. Using data from his worldwide research he provided plenty of food for thought on changing demographics.

Worldwide, birth rates are declining. Kotkin linked lower birth rates to changing views among women with respect to marriage and children. Citing survey results from 1976–2010, he said that an increasing number of women reported that they (1) never married/plan to marry and/or (2) never expected to have children. Japan is a stark example where the number of women who never married has increased from less than 20% to over 60% since 1920. Japan is not unique: by 2010 marriages in Spain had dropped to a 20-year low and there were fewer children in the country than in the 18th century. Declines in marriage rates are accompanied by new attitudes toward having children.

In another survey, Kotkin reported that when asked about the factors that are important in a good marriage, two factors — good housing and sharing chores — increased most in importance while the importance of children declined 37%. Kotkin said that lower birth rates are associated with expensive housing, ultra-competitive economies, a decline of traditional beliefs and, in advanced countries, growing pessimism about the future.

The impact on a society of declining birth rates is a declining workforce and aging population. This results in a high ratio of elderly to the, working age population and, in some countries the country’s penchant for male heirs, China’s “One Child” policy has produced an entire generation of men with few prospects of finding a wife.

As for what might mitigate this outcome, Kotkin suggested policies that foster:

- Immigration. An increase in immigration helps cushion the problem of a declining work force and an aging population. Unfortunately, the impact is population decline in other countries. He pointed to several countries where the population decline due to emigration is already is very serious.
- Lower housing prices relative to incomes.
- Increase in policies to foster shared responsibility by both parents. He likened this to policies already in place in Scandinavia.

He concluded that we need to ask ourselves four questions:

1. What is a city for?
2. What does sustainability (resilience) mean in the post-familial future?
3. How can high income societies reboot to accommodate families?
4. Is it worth it to let the current financial situation overwhelm the next generation?

Quoting Margaret Meade who said, “No matter how many communes anybody invests in, the family always creeps back,” Kotkin expresses hope for the family.

38. Hurricane Outlook for the 21st Century. (Spring 2012)

Hugh E. Willoughby, Research Professor, Department of Earth Sciences, Florida International University was the Monday evening dinner speaker. His topic was “Hurricane Outlook for the 21st Century.”
Willoughby defines hurricanes as a substantive concern due to their financial and human impact and says all we have to do to understand this is remember the effects of Hurricane Katrina in August 2005.

Hurricanes are heat engines that Willoughby compares to steam engines on a ship. The difference in energy (heat content) resulting from the warm temperatures at sea level and much colder temperatures at the top of the hurricane creates a crucial temperature differential within the storm. In the Atlantic, he points out, there is enough energy to make a Category 5 hurricane anytime during August and September, but sheer is a moderating influence. Sheer describes a change in wind speed or direction and in hurricanes is primarily vertical from the bottom to the top of the hurricane. It is the dominant limiting factor in the intensity of a hurricane.

Damage from hurricanes can be personally devastating (total economic damage is two times the insured damage) and this impacts many with homes and possessions on the East Coast of the U.S. He does note that is no visible upward trend in U.S. damage when the data is corrected for such things as increased populations and possessions in the U.S. coastal areas. However, tail forecasts from the distribution allow for $16 billion in damages per year with the possibility of up to $1 trillion per year. Furthermore, he points out, on a warmer globe it will be much easier for devastating hurricanes to develop.

This leads Willoughby to ask: How much of the apparent increase in hurricanes is due to incomplete observations from the past and how much is due to climate change? He says that over the last 1500 years the world has gone through an anthropogenic, human induced, change -- a neutral cycle. However, numerical models of this period have common problems in spite of the fact that they are the best guide we have. In looking at the data using many of the statistical tools with which those at Q are familiar, he is led to conclude that human induced, Anthropogenic Global Warming (APG), is not “a matter of belief but rather a persuasive argument.” Willoughby provides facts about the changes that have and are happening due to climate change (e.g. the world is now 40% warmer than during Thomas Jefferson’s time).

Willoughby turns to the numerical models used in hurricane analysis and prediction. He concludes that even as the number of hurricanes is likely to decline, the strongest hurricanes in the future will be stronger and have more and heavier rain than those in the past due to their increased water vapor content. The decline in number comes from increasing sheer and thermodynamics that will limit their size and intensity. According to Willoughby, there is yet another disturbing possibility. Models predict that the most destructive Atlantic hurricanes will form over the Cape Verde Islands. This means that the center of hurricane action will move over the Central Atlantic resulting in apparent bad news for New England.

He ends his discussion with a warning: these changes will challenge humanity, especially farmers, as the threat to agriculture increases. APG “is not a conjecture but is a matter of evidence” and concludes that ignoring it may result in a “civil judgment but not jail time.”

(Fall 2011)

Rear Admiral Michael Yuring, Director of Strategic Planning and Communications for Submarine Warfare was the Monday evening dinner speaker. His topic was “Investment for Effect: Design for Undersea Warfare in the 21st Century.”
Admiral Yuring began with an overview of naval resources. Submarines, he said are uniquely equipped to operate globally and unobserved. He provided a description of the resources currently in place and the Navy’s planning for an uncertain future. Two things he covered were of particular interest: personnel and equipment.

He noted that the level of skill and physical condition of those willing to serve is not uniformly satisfactory and, to make the situation more challenging -- increasing technology requires greater education. In addition to a higher level of education, greater technical skills are needed as underwater drones are developed and deployed. Given the current state of the economy, recruiting recently has been easy with yearly quotas being met in the first 6 months of the year. As the economy recovers he does not believe this will continue. The Admiral reported that the Navy now is taking a proactive role in public schools to encourage the development of talent.

The current economic conditions are favorable for recruiting new members of the Navy, but are not conducive to new investment and expenditures. This is an evolving situation and all the services are working to contain costs and do careful planning, Yuring said. This cost cutting has resulted in increased cooperation between the services. The support the Navy receives ultimately depends on political decisions.

Admiral Yuring provided a review of the submarine services resources and its plans for the future. He specifically noted that building submarines has a long lead time and the new Virginia class submarines, when built, would be in service until 2080. This led to a discussion of the long-term planning process the Navy uses to anticipate needs in a changing world.

Yuring reminded us that the US military is not just about waging war, but about avoiding war, and discussed their cooperation with the State Department.

40. Demography Changes, Financial Markets And The Economy (Fall 2011)

Robert D. Arnott, Chairman and Founder, Research Affiliates, LLC presented “Demographic Changes, Financial Markets, and the Economy,” a joint work with his colleague Denis Chaves.

Arnott starts by saying that we are about to be hit with a “Triple D Hurricane: Debt, Deficits and Demographics.” All are important, but the first two are more immediate and more the subject of headlines. However, he says, it seems natural that the shifting composition of a nation’s population ought to influence GDP growth and perhaps also capital markets returns. In this presentation he explores the role of changing demographics along the six linkages shown in the chart that follows.

As the baby boomers have aged, many people have studied past demographic data in an effort to extract indications for their future influence on many aspects of the economy. Arnott says before his work with Chavez there were some interesting results, but none with sufficient statistical significance.

To lead into the presentation he shows cohorts grouped by age over time in various countries. These charts show past and impending demographic changes and clearly demonstrate the shifting ages in a country’s population. Japan, well known to be an aging population, is only one of many countries where the population’s age distribution is changing. The current situation and the coming changes are clear, but what is important for Arnott is what these shifts do to
the country’s economy, its economic growth and its financial markets.

He analyzes the effect of demographic changes on three measures of great importance for countries all over the world: real per capital PPP adjusted GDP growth, stock market excess returns, and bond market excess returns. On the basis of this work he can confirm what others have already demonstrated: a growing roster of young adults (age 15–49) is very good for GDP growth, growth of older workers is a little bad for GDP growth and a growing roster of young children or senior citizens is very bad for GDP growth. The use of a polynomial curve-fitting technique allows them to do so with statistical significance.

He spells out the demographic, GDP and GDP growth relationships:

1. GDP per capita growth.
   b. Late teens and the younger middle-age population help GDP growth a bit.
   c. The transition period for those in the 50-55 cohort goes from helping to hurting GDP growth.
   d. Young children hurt GDP growth a little.
   e. Senior citizens hurt GDP growth a lot.

2. Stocks perform better when:
   a. There are many in the 35 - 59 age group, but worse when there are many senior citizens or children.
   b. The 45-64 group is growing faster, but worse when the young adult or the 70+ age group are growing the fastest.

3. Demography affects bonds about a 5-year age difference, but with greater statistical significance.

Two notions guide the research design:

1. PPP adjusted real GDP growth adjustment creates a fairer global comparison by focusing on the domestic purchasing power of the average citizen for the consumption basket that is more appropriate for each country than GDP.

2. Stock and bond returns are measured as excess returns relative to domestic cash returns rather than as simple annualized returns. This strips out inflation differences and allows for fair comparisons around the world.

Arnott reports that these steps lead to some simple and compelling demographic curves that conform nicely to intuition about how people behave at various stages in their lives. He presents pairs of graphs showing the relationship between demographics and demographic rate of change with GDP growth, returns from stocks and from bonds. All are intriguing. The one that relates GDP growth to demographic share is shown below. The role of the various age cohorts is clear. What he calls the “sweet spot,” near the top of the curve, shows the group that has the highest impact on GDP growth.

He then shows relationship between stock returns and bond returns and demographic composition.

Arnott takes his findings and develops three global forecasts based on demographic composition: a forecast for 2011-2020 GDP growth based on demographic composition; forecasts for bond and; for stock returns for the same period. The forecast for GDP
These forecasts for the next 10 years are what Arnott calls, sobering.

Arnott concludes that what he learned is unsurprising, except in its statistical significance and in the tacit implications for the years ahead. He says their research shows:

1. A strong link between demographic shares (or demographic changes) and:
   a. Per capita real GDP growth.
   b. Stock excess returns.
   c. Bond excess returns.
2. Polynomials are a powerful and intuitive way to understand these relationships.

**Factor Models**

**41. Cross-Sectional Asset Pricing With Individual Stocks: Betas VS. Characteristics (Fall 2015)**

Tarun Chordia, Professor of Finance at Emory University, returned to a well-worn question: is it covariance-based risk (e.g., beta) that increases stock returns, or is it the observable characteristics of stocks (e.g., the book-to-market ratio from the accounting statements). This need not be an “either-or” question, but one that attempts to estimate which “story” seems to explain a majority of stock returns (while the other may play a subordinate role).

Of course, this question has been asked numerous times. Fama and French (1992, 1993) and Davis, Fama, and French (2000) argue for covariance-based risk-factor models with multiple factors (as they see it, an improvement over the CAPM’s single risk-factor). Daniel and Titman (1997) argue for a model of returns based more strongly on observed characteristics of stocks, regardless of whether these characteristics are completely related to the risks laid out by factor models (such as the Fama-French three-factor model). One interpretation of the controversy is that Daniel and Titman argue that investors base their buy/sell decisions on (sometimes) irrational behavioral reactions to
the observed characteristics of stocks, while Fama-French argue that the “representative investor” is rational and that prices are efficient --- since (in their view) expected returns are completely explained by the factor models.

Back to Chordia’s paper. Fama and French and Daniel and Titman use portfolios of stocks to make their point. Chordia argued for using individual stock returns as the unit of analysis, as portfolios throw away a lot of information on the individual stocks that may be useful in determining what drives their returns. However, Chordia acknowledged the drawback of using individual stock returns: they introduce a big Error-In-Variables (EIV) problem. That is, the noisiness of individual stock returns means that the estimation of each stock’s covariation with a factor (for example, the market beta of the stock) is imprecise (“noisy”). When we then run a linear regression of the future stock return on its estimated beta (based on noisy past return data), the properties of linear regression techniques result in a downward-biased estimate of the impact of beta on future returns.

Chordia uses a correction developed by his coauthor, Shanken (1992), for this EIV problem. He argued that, with the correction, we can use individual stock returns to gain more precise information about the “betas vs. characteristics” debate. The basic idea is that betas measured with error will contain a greater amount of sampling variability than the unobserved “true” betas. Hence, we should adjust the estimated betas using the estimated sampling variability of the betas in order to make an adjustment for the bias created by the measurement error. More estimated beta variability, results in a bigger adjustment (upward) for beta.

Chordia then examines individual stock returns from 1963-2013, using this beta bias correction in order to run a “horse-race” between beta (and other risk-factor loadings) and stock characteristics (such as the book-to-market ratio from accounting statements) in explaining the cross-section of stock returns. He uses the following second-stage OLS regression model:

\[
R_{it} - R_{ft} = \gamma_0 + \gamma_1 \hat{\beta}_{it-1} + \gamma_2 zcs_{it-1} + u_{it}
\]

where \(\hat{\beta}\) equals the estimated beta from the first-stage regression (two-year rolling regressions, with the above-mentioned beta correction), and \(zcs\) is a vector of stock characteristics, including size, book-to-market, and six-month past-return momentum. In extended models, Chordia uses a vector of \(\hat{\beta}\) risk-loadings, including loadings on the market factor (beta) and the Fama-French small-minus-big (SMB), high-minus-low book-to-market ratio (HML), momentum (MOM), robust-minus-weak profitability (RMW), and stocks with conservative minus aggressive investment policies (CMA).
The key takeaways from this table are that (1) the EIV-corrected models produce estimates of risk loadings that are further away from zero than do the OLS (non-corrected) models. For example, using the 5-factor Fama-French risk model in conjunction with the characteristic-based versions of these risk factors, the market beta increases from 0.191 to 0.469, while the loading on the SMB factor increases (in absolute value) from 0.058 to 0.270. And, (2) the percentage of cross-sectional return variability explained by risk factors is much lower (see “% Betas”) than that explained by observable stock characteristics (see “% Chars”)—as shown by “% Diff”.

Chordia concludes that, after correcting the risk-factor loadings (e.g., beta) for measurement error, the risk-factors have better explanatory power than before correcting, but not nearly the explanatory power of stock characteristics.

### Bibliography


42. **Betting Against Beta Or Demand For Lottery? (Spring 2015)**

Scott Murray, Assistant Professor of Finance at the University of Nebraska, talked about one of the most enduring and documented anomalies in financial economics: that the empirical security market line (SML) is too flat. That is, high beta stocks generate returns that are lower than that predicted by the SML, while low beta stocks generate returns that are higher. This anomaly was documented as far back as Black, Jensen and Scholes (1972), and has puzzled researchers for more than four decades. Recently, Frazzini and Petersen (2014) have presented a model and results arguing that leverage constraints cause lower risk assets to outperform higher risk assets (on a risk-adjusted basis) across many asset classes, including equities, sovereign and corporate debt, and futures. The idea is that leveraged-constrained investors who wish to hold a portfolio that tracks the market (i.e., beta=1) must hold stocks centered around that level—reducing the demand for low-beta stocks.

In his talk, Scott Murray presented evidence of an alternative driving force for the betting against beta effect (defined as investors outperforming by holding low-beta stocks). Murray argued that, in U.S. equity markets, the demand for high-beta can be explained by the demand for stocks with lottery-like payoffs (lottery demand), proxied by the average of the five highest daily returns of a stock in a given month (henceforth, MAX). In short, high beta stocks also tend to have a high value of this lottery demand proxy.

Murray also showed that this phenomenon only exists among stocks with a low proportion of institutional ownership, consistent with lottery demand being concentrated among individual investors. Further, he showed that the lottery demand phenomenon cannot be explained by a variety of firm characteristics (market capitalization, book-to-market, momentum, illiquidity, and idiosyncratic volatility), risk measures (co-skewness, total skewness, downside beta, and tail beta) and funding liquidity measures (TED spread sensitivity, sensitivity to TED spread volatility, T-bill rate sensitivity, and financial sector leverage sensitivity).

The key table (Table 5 in the paper) is shown below. It presents evidence showing that betting against beta phenomenon is subsumed by the lottery demand effect (MAX10 consists of stocks with the highest average of their five daily highest returns during a month). That is, holding beta fixed, the lottery demand effect persists; whereas, the betting against beta phenomenon disappears after holding the lottery demand effect fixed.

The table presents the results of bivariate independent decile sorts based on both beta and the lottery demand proxy. The intersections of each of the decile groups are then used to form 100 portfolios. (As the sorts are independent, the number of stocks in each of the 100 portfolios can differ.) The last two rows of the table show that the beta effect disappears after controlling for the lottery demand proxy --- both in terms of the raw return difference between the high and
low beta portfolios (High-Low) and the Fama French 4-factor alpha for the difference between the high and low beta portfolios (FFC4); no t-statistic is larger than 1.61 in absolute value. Conversely, the right-most two columns of the table show that the negative relation between the lottery demand proxy and future stock returns persists after controlling for the effect of beta --- with t-statistics for the FFC4 alphas ranging from -2.70 to -7.43.

Murray provided insight into the channel by which lottery demand generates the betting against beta phenomenon. He showed that in a typical month, market beta and the lottery demand proxy have a high cross-sectional correlation. In months when this cross-sectional correlation is high, the betting against beta phenomenon is strong, as can be seen in the first three sets of rows in the table below (High). The first row shows the average beta (the sorting variable), while the second and third show the following-month return and four-factor alpha, respectively. However in months when the correlation is low, the betting against beta phenomenon disappears. This can be seen in the bottom three sets of rows in the table (Low). Murray’s conclusion is that the betting against beta strategy is a proxy for a much better strategy, which might be coined the betting against lottery demand!

The below graph clearly summarizes the overall idea of Murray’s paper: the empirical SML is flatter only during months when the lottery demand is strong:

Murray closes with one important point: A key difference between the betting against beta and lottery demand explanations of this empirical anomaly has to do with the role of institutional investors in generating the price pressure. Frazzini and Petersen (2014) have argued that it is the leverage constraint of institutional holders that generates the phenomenon, and, hence, the effect should be strongest for those stocks with a high degree of institutional ownership. Murray argued that if the lottery demand explanation is correct, the effect should be strongest for those stocks with low institutional ownership. The following table shows the returns for bivariate dependent portfolios, where stocks are initially sorted into ten deciles based on degree of institutional ownership, then sorted within each decile by beta. As is apparent, the betting against beta phenomenon is actually strongest for those stocks with the lowest institutional ownership (column 1: INST 1) and weakest for those stocks with the highest institutional ownership (column 10: INST 10) --- additional evidence in favor of the lottery demand explanation.

Bibliography
Bali, Turan G., Stephen Brown, Scott Murray, and Yi Tang, Betting against Beta or Demand for Lottery, 2014, available at


43. The Recognition Of One Of Our Most Valued Members (Spring 2015)

Monday Evening Dinner

Rather than the usual evening keynote, Q members were treated to a special event—the recognition of one of our most valued members—Jack Treynor!

Jack has been a valued wise elder of Q for quite some time, and Q members can easily spot him by the cap he wears. Jack has been a member of the Q Research Committee since 1975, an astounding 40 years! Jack has also served on the Q-Group Board for decades.

Joanne Hill and Marc Reinganum opened the dinner presentation with a tribute to Jack. In their remarks, they discussed just a few of Jack’s numerous contributions to the field of finance. For Q members, Jack’s research has clearly and profoundly influenced our chosen profession, quantitative asset management!

Indeed, Joanne said that Jack is one of the founders of quantitative investment management, and that he helped to align investment management practice with the best of academic research.

And, of course, Jack worked on a capital asset pricing model in the early 1960s, creating the earliest drafts of ideas of what would eventually become the CAPM. He also worked on several papers with Fischer Black, including the famous Treynor and Black (1973) paper on the information ratio that showed how to optimally construct a portfolio of risky assets, and that still wields incredible influence on the investment management world today.

Q members should note that, in his many years of participation, Jack presented papers at the Q-Group on 26 occasions—a “World Record”!

Jack Treynor then rose to talk to Q members. In a poignant and brief set of remarks, Jack recognized the influence of Operations Research—his field—on Modern Portfolio Theory. He noted that Bill Sharpe and Harry Markowitz started their careers in Operations Research. He also pointed out that Operations Research has brought the values and attitudes of the physical sciences to the social sciences. Jack closed with a clear mission for social scientists: In the physical sciences, exciting new discoveries are made each month. Jack challenged us to make exciting new discoveries in finance each month, as well!

Here are Jack’s remarks:

Are Markowitz and Sharpe so productive because of their years in operations research?

Every month there are new discoveries in the physical sciences. Every month there will be a life-saving discovery in molecular biology that will change the practice of medicine. Next month, there will be another exciting discovery about earth-like planets.

But, next month, there will be no exciting discoveries in the social sciences.

When I was young, I thought operations research was just about applying the techniques of the physical sciences to social problems. Now that I am deep into retirement, I think operations research is about applying the research philosophy of the physical sciences to social problems.

But why would research philosophy matter? The philosophy of the physical sciences changed at the beginning of the 17th
century. The discoveries that followed made the Industrial Revolution possible.

But what was the difference between the old research philosophy and the new? The old philosophy valued erudition; the new philosophy valued discovery. But why were their objectives mutually exclusive?

Because one is the Type 1 error and the other is the Type 2 error, and they are mutually exclusive: if you want to avoid Type 1 errors, commit Type 2 errors; if you want to avoid Type 2 errors, commit Type 1 errors.

Type 1 errors reject as false ideas that are true; Type 2 errors accept as true ideas that are false. Because it valued erudition, the old philosophy minimized Type 1 errors; because it valued discovery, the new philosophy minimized Type 2 errors.

The physical sciences have never forgotten the lesson of the Industrial Revolution; the social sciences are too young to remember it. And that's why they are mutually exclusive research philosophies.

Aren't these two different cultures?

Don't the cultures require their members to have the right research philosophy? If you have grown up in one culture, isn't it consequently hard to change?

If academics value erudition, are they less likely to challenge the old ideas?

Are people whose work brings them face-to-face with real-world problems going to be aware of the need for change?

Are they likely to be less impressed with erudition?

Are central bankers the kind of practitioners who would be stimulating for academic-economists?

Do they prefer problem solving to erudition?

Wouldn't a problem-solving culture be useful for professional investors?

Bibliography

44. “Risky Value” (Fall 2014)

Scott Richardson, Professor of Accounting at the London Business School, delivered a presentation that dug deeply into accounting notions of “value” for stocks. He presented strong evidence that Earnings-to-price, E/P, and Book-to-Price, B/P, capture two different economic characteristics of value, and jointly help to explain cross-sectional variation in the returns for 30 countries. In contrast to some previous work, Dividend-to-Price is not associated with country level returns, after controlling for E/P and B/P.

Richardson’s empirical work builds on the recent accounting work of Penman and Reggiani (2013) and Penman, Reggiani, Richardson and Tuna (2013), who argue that B/P differences explain cross-sectional variation in expectations of earnings growth and also reflect differences in the riskiness of future earnings growth. Richardson explains that the accounting system is “conservative”, in that it recognizes the cost of growing a firm immediately, but not the revenues until they are realized. The expensing of R&D costs, asymmetric asset impairment tests, and the expense of advertising costs are three examples of this conservatism. A consequence of this conservative accounting is that earnings are depressed during periods where risky projects are undertaken, and E/P is not a sufficient
statistic for value during these times, since earnings don’t reflect future earnings growth.

Richardson shows how this intuition is reflected through the clean surplus equation, as expected returns can be decomposed into:

While the future premium of price minus book is unknown, this formulation suggests that B/P may be a valid candidate to predict future changes in price minus book and suggests the following regression specification:

where $X_t$ reflects other variables that are expected to be related to changes in price to book.

Richardson studies 30 country-level stock indexes to test the hypothesis that B/P is important when risky investment is heavy, and less important, otherwise. A corollary is that B/P is positively correlated with both expected earnings growth (the first moment) and the risk in earnings growth (the second moment). If so, then high B/P countries are, on average, facing temporarily depressed “E” and their recovery in near-term earnings growth is both expected and uncertain; they should also exhibit greater downside sensitivity to contemporaneous global earnings growth, consistent with B/P reflecting risky future earnings growth.

This is exactly what Richardson finds for the period 1993-2011 and which is depicted in the following chart, where the blue lines represent the high B/P countries, and the black lines represent the low B/P countries.

The high BP countries have higher future growth of earnings after Year 0, and the dispersion of that growth is higher.

Richardson also finds strong evidence that countries with high levels of B/P have greater sensitivity of subsequent earning growth to downside states of the world, as shown below:

$$R_{t+1} = a + b_1 \frac{E[Earnings_{t+1}]}{P_t} + b_2 \frac{B_t}{P_t} + b_3 X_t + \epsilon_{t+1}$$

In addition to the graphical information, Richardson runs cross-sectional Fama-MacBeth as well as panel regression analysis of country level stock market returns on lagged B/P and E/P ratios. (He focuses on explaining 12-month ahead excess local currency returns.) Each country’s E/P and B/P are demeaned (using that country’s mean over the entire time period) to take care of different industry structures and/or accounting standards in different countries. First, he finds that D/P
loses significance when in the presence of B/P, and explains that this is because D/P measures paid out value, not retained value. Next, he finds that both E/P and B/P load significantly (as x-variables) when explaining following year return (as the y-variable), and that these two variables remain important even when he adds several control variables, such as size, momentum, etc.

An especially salient point made by Richardson to take home is this: Why did the famous Fama/French (1992) “beta is dead” paper find a role only for B/P, and not for E/P? Because F/F included all stocks—and the thousands of small stocks, which have risky growth, dominated their regression results. In these types of stocks, expected growth is so high that B/P plays the only role in forecasting future returns. The idea is that, and Richardson finds that if you more carefully look at large cap, E/P will matter as well as B/P. And, B/P will matter more for any stocks with higher expected (but risky) growth. Maybe we can call the Richardson paper the “E/P is alive” paper!

References

45. The Not So Well-Known Three-and-One-Half Factor Model (Spring 2014)

Asset pricing theory in financial economics has developed well beyond Sharpe’s (1964) original CAPM. There were unexpected outcomes from using this model to study equity returns: realized alphas of low (high) beta portfolios are reduced (increased) when a beta factor was included. Today’s equity researchers and others using the equity pricing models conceptualize the 3-factor Fama-French (FF) model, shown below, as a tool for studying market return and the size and value characteristics of equity.

Thorley asks, what are the three factors in the FF model? He says that some analysts will answer the market, size, and value, while others answer beta, size, and value. So is it the return that is on the capitalization-weighted market portfolio, or the return that is from the CAPM beta? Theoretically, the return to the beta factor is the market return. Empirically, it is not, and the two are not even close. Commercial providers of equity risk models typically include a market and a beta factor, along with variations of the size and/or value factors, in their models.

To understand the problems addressed by commercial providers, Thorley creates a variation of the basic market model, by splitting the middle term ($\beta_i R_M$) into a market constant and a relative beta factor, hence the name three-and-half factor model.

For his analysis of the importance of this innovation, he uses the following model:

$$R_i = A + B_1 \beta_i + B_2 \text{size}_i + B_3 \text{value}_i + B_4 \text{mom}_i + e_i$$

Where $A$, $B_1$, $B_2$, $B_3$ and $B_4$ are parameters (factor returns) estimated from cross sectional regressions, $N$ is the number of securities in each cross-section, and $\beta$, size, value, and momentum (mom) are stock-
specific factor sensitivities. These types of factor models are at the core of practitioner equity risk management models.

Under the assumptions that the CAPM is true, B2=B3=B4=0 in the above equation and the coefficient B1 in each cross-sectional regression should equal the return on the market portfolio. He standardizes the cross-sectional variations in betas to have unit variance and allows the pure beta factor return to be different from \( R_M \) to create the following model.

\[
R_i = A + RMF + B_1 (\beta_i - 1) + B_2 \text{size}_i + B_3 \text{value}_i + B_4 \text{mom}_i + e_i
\]

Thorley empirically examines whether this is true. His primary results are summarized in the following chart where the returns are, from the top right down, the market, momentum, value, small and beta at the bottom. The prefix \( z \) identifies they are standardized.

It is readily apparent that the CAPM null hypothesis: \( B2=B3=B4=0 \) seems violated. Further, the risk premium associated with the \( (\beta_i - 1) \) factor, which should equal \( RMF \), is virtually non-existent. Over the 1963-2012 period, the average annual estimated factor returns are \( RMF, 5.64\% \), \( \beta, -0.79\% \), size, 0.86\%, value, 1.88\% and momentum of 4.99\%. It is interesting that the estimated \( (\beta_i - 1) \) factor has significant factor volatility (7\% annual standard deviation) and hence is important for risk management. It just does not appear to be a significantly priced factor.

Thorley reviews how the cross-sectional regression parameters can be thought of as factor mimicking portfolios where the intercept corresponds to a portfolio whose weights sum to one and all other parameters correspond to zero net investment portfolios. In practice, these factor mimicking portfolios have a high correlation to the FFs SMB, HML, and UMD (momentum) portfolios.

Finally, Thorley uses two different specifications of equation the second equation for the purposes of portfolio performance measurement with data from a set of ETFs. One specification of the equation forces the coefficient \( B1=0 \) and allows \( RMF \) to have a slope coefficient different from 1.0. In the second specification, \( B1 \) is freely estimated and the slope coefficient on \( RMF \) is set equal to 1.0, as specified in the second formula above. He finds estimated annual alphas that can differ by as much as 3\% depending on the specification.

Thorley concludes that:

1. The market’s influence on individual security returns can be split into a capitalization-weighted market portfolio and a pure beta factor
2. The beta anomaly in the U.S. equity market over the last half century is larger than either the size or value anomalies, second only to momentum, and is more evident in larger capitalization stocks.
3. The beta anomaly presents challenges for portfolio performance measurement and opportunities in portfolio construction. In fact, returns-based performance
measurement for the MSCI Minimum Volatility Index indicates that selecting low beta stocks provides most of the value added in low volatility strategies.

4. In most cases a separate beta factor should be incorporated in portfolio performance calculations to avoid misperceptions about the source and magnitude of the alpha when the market beta is materially different from one.

It is important that much of the variation in the performance of economic sector portfolios is explained by their differential exposures to a separate beta factor. Understanding this distinction between the market and beta factors in the not-so-well-known three-and-one-half factor model should help avoid misperceptions about the sources of portfolio performance.

46. A Model of Momentum (Spring 2014)

The momentum premium, which is observable within and across most asset classes, is perhaps the most difficult of the asset pricing anomalies to explain as a rationale outcome of financial market equilibrium. Hence, the bulk of the momentum literature has adopted behavioral models to explain the momentum premium using conservatism, self-attributive overconfidence, and slow information diffusion as justifications.

Zhang uses a neoclassical investment framework, pioneered by James Tobin and utilized by John Cochrane in a similar finance context, to examine whether the cross-section of expected returns of momentum sorted portfolios are consistent with a production-based asset pricing model. Previous research has clearly shown that this cross-section of expected returns is not consistent with the Fama-French three- or four-factor models.

The intuition underlying Zhang’s model is as follows. Suppose rational investors revise upward their expectations about earnings and output in the future. Ceteris paribus, this will lead to an increase in stock prices. However if stock prices rise, firms should immediately raise their investment in capital stock since the price has risen relative to the cost of capital, resulting in a contemporaneous increase in investment growth and investment return at the same time as increased stock returns. As Cochrane notes, if there are lags in the investment process then investment will not actually rise for a period of time, but orders or investment plans should rise immediately. Further, if the production function recognizes investment lags --which Zhang does not -- the investment returns should still move at the same time as the stock return.

The relationship between stock returns and investment returns depends on a number of restrictive assumptions as well as careful timing alignment of the data for empirical purposes. Zhang, in his paper, discusses in detail the efforts they undertake to construct and align the data. Among key assumptions:

1. All firms have identical constant returns to scale production functions whereby each firm’s operating profits are a constant proportion κ of the firms’ operating revenue; where the proportionality constant κ is the same across all firms. Hence, all firms are assumed to have identical operating margins regardless of their industry or operating efficiency, and there are no winners and losers across firms in terms of operating margins.

2. Firms pay an adjustment cost to alter their capital stock through investment or disinvestment. The adjustment costs are assumed to be of a quadratic functional form and do not depend on the firm’s industry or the nature of the firm’s capital. The after-tax marginal cost of an investment is given by: \( (1 + (1 - \tau) a \frac{I_{it}}{K_{it}}) \) where \( a \) is a parameter to be
estimated in the empirical work, \( I_t \) is the investment by firm \( i \) at date \( t \), \( K_t \) is the capital stock of firm \( i \) at date \( t \), and \( \tau \) is the corporate tax rate.

3. Markets for capital are sufficiently competitive and friction free such that firms can optimally adjust their capital stock each period so that firms’ expected investment returns \( (E_t[I_{t+1}]) \) are equilibrated to the point that: \( E_t[M_{t+1}I_{t+1}] = 1 \) where \( M_{t+1} \) is the stochastic discount factor. In principle, this allows firms to short capital as well to be long capital.

4. Similarly capital markets are assumed sufficiently competitive and friction free such that expected stock returns \( (E_t[r_{S,t+1}]) \) are equilibrated to the point that \( E_t[M_{t+1}r_{S,t+1}] = 1 \).

The empirical work in the paper relies on the equilibrium relations given in the last two points above, and the resultant moment restriction:

\[
E_t[r_{S,t+1} - r_{lw,t+1}] = 0 \tag{1}
\]

On firms’ stock and investment returns where \( E_t[r_{lw,t+1}] \) is the firm’s levered investment return.

Zhang uses the moment restriction in (1) above to estimate the two unknown parameters \( a \) and \( \kappa \) on 10 price momentum and 10 earnings momentum portfolios. The key results of the paper are panels below.

<table>
<thead>
<tr>
<th>Panel A: Data, HML loadings</th>
<th>Panel B: Model, HML loadings</th>
</tr>
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<tbody>
<tr>
<td>Low</td>
<td>2</td>
</tr>
<tr>
<td>Low</td>
<td>0.28</td>
</tr>
<tr>
<td>2</td>
<td>0.58</td>
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<td>3</td>
<td>0.84</td>
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<tr>
<td>4</td>
<td>0.50</td>
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<tr>
<td>High</td>
<td>1.05</td>
</tr>
<tr>
<td>All</td>
<td>0.65</td>
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The results in Panel A show the well-known cross-sectional variability in average returns for the 10 momentum portfolios, ranging from 10.74% per year for the low momentum portfolio to 19.22% for the high momentum portfolio. The corresponding Fama-French alphas are -0.21% and 7.29%. The spread between the Fama-French alphas of the top and bottom price decile momentum portfolios is a large and significant. The next-to-bottom row of Panel A shows similar alphas for Zhang’s production-based asset pricing model. Here the alphas are dramatically reduced, with the spread between the high-momentum and low-momentum portfolios only -0.90% and not statistically significant.

The production investment model, which is fit based on the returns of the 10 momentum-decile portfolios, appears to succeed in capturing average momentum profits. In addition, the model captures the reversal of momentum in long horizons, long-run risks in momentum, and the interaction of momentum with several firm characteristics. However, the model fails to reproduce the pro-cyclicality of momentum as well as its negative interaction with book-to-market.

**47. Horizon Pricing (Spring 2013)**

Korajczyk starts his presentation with two questions: should the assessment of risk be related to horizon, and why? To provide background to the research he reviews what others have found and focuses on three potential effects that horizon can have on pricing. First, prices of certain stocks have a delayed reaction to news about systematic factors. Second, risk and risk premia estimates exhibit autocorrelation and hence seem to depend on horizon. Third, there is evidence that the investment horizon varies across investors.

Given what we know, Korajczyk says that if the investment horizon affects the measurement of systematic risk, it is sensible that it might impact risk premia. In this presentation, he examines whether short-horizon risk factors exist that explain some of
the short-term cross-sectional differences in expected returns but have no impact when measured over long horizons; and whether there are long-horizon factors whose risk measured over short horizons does not explain short-term cross-sectional differences in expected returns whereas they do over long horizons.

Korajczyk uses NYSE/AMEX/NASDAQ data from 1963–2010 to unravel this horizon question. Many of the key results of the paper are summarized in the table presented below. In this table, he shows the average monthly return spread over different horizons and between decile portfolios created on the basis of five well-known systematically-priced risk factors. His factors include market (MKT); small minus large (SMB); high minus low (HML); up minus down (UMD); liquidity (LIQ). He compares the mean return differences for horizons ranging from one-month to sixty months. From this analysis he concludes that LIQ is a short-run factor, market is a medium-run factor and HML is a long-run factor. Further he finds that neither SMB nor UMD are priced risk factors.

Further, he notes the evidence of time-varying risk premia based on variance ratio tests for the traded factors.

From this and other analysis, Korajczyk finds the following:

1. Factor risk measured at short horizons might be more relevant for more transitory factors since that may match the relevant horizon for short-horizon investors. Conversely, risk measured at longer horizons might be more relevant for other factors since that may match the relevant horizon for long-horizon investors.

2. He finds short-horizon measures of risk to be important for the pricing of liquidity. This, he says, is consistent with its more transitory nature. The premium for liquidity is significantly larger later in the sample period. This is consistent with a shift toward higher frequency trading later in the sample.

3. Long-horizon measures of risk seem to be important for the pricing of the market and value/growth risk factors.

4. The value-versus-growth factor behaves like a characteristic when risk is measured at a monthly horizon and has both risk factor and characteristic-like behavior at longer (2- to 3-year) horizons when historical OLS betas are used.

5. HML seems to be priced as a risk factor when estimating a model that conditions betas on the various characteristics.

6. The size and momentum variables exhibit characteristic-like behavior at all horizons.

Korajczyk concludes by saying that these results highlight the importance of considering investment horizon in determining whether a cross-sectional return spread is alpha, due to a firm characteristic, or a premium for systematic risk. Some factors, he says, that are risky from the perspective of short-term investors may not be from the perspective of long-term investors, and vice versa. In particular, liquidity risk may be of particular concern for short-horizon investors while HML risk is important for long-horizon investors.

48. Dynamic Conditional Beta (Spring 2013)

Engle starts by reminding those who teach that while the least squares model is the workhorse in empirical economics and finance, students often question the assumptions of exogeneity, homoscedasticity
and serial correlation. In practice, the unstable regression coefficients are the most troubling for them. No surprise, he says, since rarely is there a credible economic rationale for the assumption that the slope coefficients are time invariant.

So why do we continue to use this model when econometricians have developed a variety of ways to deal with time series regression models with time varying parameters? Many adaptations are available, and in his presentation, Engle discusses the three most common procedures used to deal with time varying betas: rolling window estimates; interactions with trends; splines or other economic variables; state-space models where the parameters are treated as an estimated state variable. He says that each of these approaches makes very specific assumptions about the path of the unknown coefficients: the first specifies how fast the parameters can evolve; the second specifies a family of deterministic paths for the coefficients; the third requires a stochastic process that is generally unmotivated and rarely based on any economic analysis. None of these approaches has become widely accepted and Engle proposes a new approach to estimating time series regressions that allows for richer time variation in the regression coefficients. He calls this model Dynamic Conditional Beta (DCB).

Using the Dynamic Conditional Beta, he begins with the assumption that a set of observable variables can be described by a multivariate distribution. The objective is to characterize the conditional distribution given the observable variables. Engle notes that econometricians have developed a wide range of approaches to estimate these matrices including dynamic conditional correlations.

Using the model, Engle reports on three streams of research:

1. Estimates and tests of dynamic conditional betas, his new approach.
2. Tests of the importance of dynamic conditional betas in the cross-section of security returns.
3. The use of dynamic conditional betas in computing the amount of capital that financial firms need to hold to survive a crisis.

Engle then examines how dynamic conditional betas can be used to assess global systemic risk. He asks, how much will the total equity value of a financial firm fall when the global equity market falls? The answer, he says, is in the beta and shows plots of his DCB for a number of banks from 2008 to 2012. Those at the most risk are those with particularly high or unstable betas.

His DCB is critical in his computation of one input, LRMES, in his SRISK model. LRMES is the expected equity loss if there is another financial crisis. SRISK, is a measure of how much additional capital a bank must raise to survive a financial crisis and is defined by:

$$\text{SRISK} = k \times \text{LIABILITIES} - (1 - k) \times \text{EQUITY} \times (1 - \text{LRMES})$$

The k represents the capital cushion the financial institution needs to function normally.

Engle demonstrates the use of SRISK model using Bank of America (BOA) as his example.

1. BOA has a market cap of $102 billion. Its accounting liabilities are $1.9 trillion for a leverage ratio of 20.
2. If there were another financial crisis with a fall of 40% in broad US equities over six months, he estimates shares in BOA fall by 66%.
3. The implied Dynamic Conditional Beta today for BOA is 2.5, the beta can change as a result of mean reversion in
volatilities and correlations or a rise with downside returns.

4. The SRISK for BOA is $122 billion and suggests that BOA is undercapitalized today. This undercapitalization would be more severe under the stress of an equity decline.

Engle provides an analysis for other financial institutions, some of which, he says could face bankruptcy if there were another finance crisis. The chart which follows shows aggregate SRISK for a large collection of global financial institutions for the 5 years following the 2008 financial crisis. While not now at an all-time high, the total SRISK has not yet retreated to pre-2008 levels.

He next shows that global systemic risk by country: Japan has the highest level of systemic risk followed by the US.

Surprising results, but he says systemic risk is more insightful and logical when measured relative to GDP: Cyprus is the most vulnerable, followed by Switzerland. Over the past 5 years, Engle shows, that the systemic risk for the US has declined and systemic risk in Asia has risen dramatically.

Engle concludes by saying that the big European banks have had rising betas since 2011 as the sovereign debt crisis has grown in strength. This, he says, is one piece of evidence that shows the serious nature of the current level of systemic risk. Engle argues that the SRISK is superior to stress testing and better shows the level of systemic risk in the financial system.

49. Momentum Crashes (Fall 2012)

Momentum strategies, a bet that past returns have predictive value, have produced high returns and strongly positive alphas. Past research has shown that momentum is pronounced and pervasive among many asset classes around the world, though it is considered by many to be an anomaly. The problem with this strategy is that returns to momentum strategies are highly skewed and sometimes result in what Daniel called “momentum crashes”—strong and persistent strings of negative returns. In this research, he asks why “momentum crashes” exist and whether they are forecastable.

Daniel said that momentum crashes tend to occur in times of market stress, specifically when the market has fallen and ex-ante measures of volatility are high. These patterns are suggestive of the possibility that the changing beta of the momentum portfolio may be partly responsible for momentum crashes. They also occur when contemporaneous market returns are high. Daniel asked, are they predictable?

To analyze this question, Daniel creates 10 momentum portfolios using monthly and daily CRSP data from 1947 through 2007. He finds a strong momentum premium over this 50-year period: the winning decile had an excess annual return averaging 15.4% and the losing decile averaged an annual loss of 1.3%. The average excess market return was 7.5%. Daniel said that from 2009–2010 momentum outperformed as they did during the period of the Great Depression.
Separating winners and losers as of March 2009, he finds that many of the firms in the loser portfolio had fallen by 90% or more. In that group were Citigroup, Bank of America, Ford, and GM. The loser companies were often extremely levered, at risk of bankruptcy and, Daniel said, their common stock was effectively an out-of-the-money option on the firm value. In contrast, the winner portfolio was composed of defensive or counter-cyclical firms. This suggests to him that there are potentially large differences in the market betas of the winner and loser portfolios. The following chart shows the cumulative gains from market, past winners and losers and the risk free asset. The lines appear in the order they are listed in the legend.

In addition, he said that there is a strong up and down market beta (β) differential between the two different momentum portfolios. The following chart shows the beta of the Loser Portfolio. It the more volatile line.

Daniel said that there are clear payoffs associated with the winner minus loser (WML) portfolio. The portfolio has short-option-like characteristics that appear to be more costly when market variance is higher. This is consistent with behavioral motivations for the premium and suggests that crashes are forecastable. Daniel investigates whether other variables associated with perceived risk, such as realized volatility, affect the payoff to momentum strategies.

Looking at a variety of time periods, bear and bull markets, and different asset classes in the United States and other countries, Daniel concluded that:

1. While past winners have generally outperformed, there are relatively long periods over which momentum strategies experience severe losses.

2. “Momentum crashes” do not occur over a single day but are spread out over the span of several days or months.

3. Because of the magnitude of the losses from these crashes, momentum strategies can experience long periods of underperformance.

4. The most severe momentum underperformance appears to occur following market downturns and when the market itself is performing well.

5. The crashes occur after severe market downturns and during a month when the market rose, often dramatically, and were clustered in July and August.

Looking at various kinds of markets, Daniel reported that in bear market states, and in particular when market volatility is high, the down-market betas of the past losers are low, but the up-market betas are very large. This optionality does not appear to be reflected in the prices of the past losers. Consequently, the expected returns of the past losers are very high, and the momentum effect is reversed.
Daniel concluded by saying that the evidence is loosely consistent with several behavioral findings. In extreme situations when individuals are fearful, they appear to focus on losses and probabilities are largely ignored. Whether this behavioral phenomenon is fully consistent with the empirical results documented here, he says, is a subject for further research.

50. Speculative Betas (Fall 2012)

When and why does the Capital Asset Pricing Model (CAPM) “fail?” Frequently, it turns out. We even have a name for these “failures”—anomalies. Hong pointed to one failure—the beta-neutral strategy of long low-beta/short high-beta stocks. This strategy should not work, he said, and yet it does. In practice it provides a positive Sharpe ratio. Regarding these anomalies Hong said he has developed both a theory and evidence for why and when these “failures” occur.

Over the past 20 years, financial economists have developed a large and impressive body of findings that reject the CAPM beta as sufficiently explaining the variation in asset returns. These results have led to a search for multiple factor models. Hong said that the debate over how to interpret these asset pricing patterns ignores the idiosyncratic behavior of the theoretical upward sloping Security Market Line (SML). There is suggestive evidence, he said, that the risk and return relationship is not strong, and is reverse of what you would expect.

Hong’s thesis is that investor disagreement about the common factor of cash flows leads to the observed behavior. He believes that high-beta assets are more sensitive to disagreement than are low-beta assets, and thus experience a greater divergence of opinion about their cash flows. Costly short-selling then results in high-beta assets coming up against binding short-sale constraints and being overpriced.

Hong created a model that incorporates the speculative motive for trading into traditional asset pricing models. It yields strikingly different results from the risk-sharing or liquidity motive model: high-beta assets are more speculative since they are more sensitive to disagreement about common cash flows. When disagreement is low, the SML is upward sloping. As opinions diverge the slope can be initially positive and then negative for high-beta assets. Thus, the empirical results should show:

1. An upward sloping SML when disagreement/uncertainty is low.
2. An inverted U-shaped SML when disagreement is high.
3. More stock-level disagreement on high β stocks, especially when there is high aggregate disagreement.
4. More shorting of high β stocks, especially when there is high aggregate disagreement.
5. More turnovers on high β stocks, particularly when there is high aggregate disagreement.

Using security analyst disagreements, Hong’s empirical tests confirm the predictions. He verifies the notion of a speculative mechanism by finding that high-beta stocks have much higher individual disagreement about cash flows, higher shorting, and higher share turnover than do low-beta stocks. He also finds that these gaps grow with aggregate disagreement. The following chart shows the outcomes for high and low levels of disagreement.

These empirical tests show that high-beta assets can be more speculative and thus yield lower expected returns than low-beta assets.
This finding, he said, cuts directly at the heart of what we teach finance students in terms of how to price risk and may have important implications for capital budgeting decisions.

51. Revisiting exotic beta (Fall 2011)

The first presentation of the Q-Group Fall 2011 meetings was made by Mark Carhart, Kepos Capital LP, who presented “Exotic Beta Revisited” coauthored with his Kepos colleagues: Ui-Wing Cheah, Giorgio De Santis, Joe DeLuca, Bob Litterman and Attilio Meucci.

This paper addresses the very focus of the Seminar, “New Challenges Ahead: Beta, Diversification, and Innovation,” by providing an analysis of and tutorial on creating portfolios using “exotic betas” rather than relying on the traditional asset-class allocation approach.

Carhart starts with the traditional CAPM: a one period, one factor model with expected returns that are linearly proportional to the market beta and with unpredictable residual returns. He provides the following to show his view of the returns’ continuum for the various models.

1. Are not the market beta. They are risk exposures that have positive risk premia uncorrelated with global market risk.
2. Reflect observable variations in risk premia over time that can be exploited to improve both the risk and return of a traditional portfolio.
3. Result from risk premia related to long-term risk factors.
4. Are
   a. A source of uncorrelated returns not created by short-term inefficiencies.
   b. Transparent, relatively well known and intuitive, and include such things as time horizon, capacity, and liquidity. Perhaps most importantly, they reflect a judgment about whether there is a real or perceived risk that justifies a premium.
   c. More transparent and liquid and have more capacity than other sources of active alpha.

What differentiates exotic betas from the market beta, Carhart says, is simply the source of the premium. A good example of an exotic beta is value investing, although most investors think of value investing as a style or a result of manager skill, not a risk factor. He argues that we can and should separate the exposure to a risk factor (created by a passive
tilt toward a value equity benchmark) from the skill needed to create the alpha that would outperform such a benchmark. He goes on to describe how this can be done.

He also lists other examples of risk factors including certain asset classes, well known factors such as HML hedge fund strategies and “insurance-like” tools including credit default swaps, catastrophe bonds and out-of-the-money put options.

Carhart offered following explanations for the value of “exotic betas:”

1. Behavioral: most investors do not behave in the perfectly rational manner. While theory suggests that investors are concerned with the risk of their portfolio, they do in fact, worry about the volatility of individual assets. In addition, they worry about assets that have declined in value.
2. The importance of liquidity.
3. The impact of leverage.

As important as it is to know the sources of value that come from “exotic betas”, it is important to recognize when the embedded premium ceases to exist.

He then discusses “exotic betas” noting that the following exist:

1. **Equity Value:** long exposure to countries with the highest fundamental value relative to price hedged by short exposure to the opposite.
2. **Bond Yields:** GDP-weighted combination of sovereign bonds.
3. **Bond Yields Value:** long the sovereign bonds in countries with the highest yields and short those in countries with the lowest yields.
4. **Term Structure:** long the sovereign term structure in countries with the steepest curves hedged by short the opposite.
5. **Commodities:** volume-weighted combination of commodity futures subject to constraints of 50% in the energy sector, tilted towards commodities with the greatest backwardation in prices.
6. **Real Assets:** market cap weighted combination of REIT securities.
7. **Currency Value:** long exposure to high interest rate and weak purchasing power parity currencies hedged by short exposure to low interest rate and strong PPP currencies.
8. **Volatility:** short equity index volatility in most market conditions except long equity index volatility when there are signs of significant financial stresses ahead.
9. **Credit:** equal-weight combination of the 6 major credit sectors: US investment grade, US high yield, European investment grade, European high yield, mortgages and asset-backed securities.
10. **Catastrophe Bonds:** market cap weighted combination of bonds linked to catastrophic reinsurance risk.

Carhart compares the “exotic beta” approach to a portfolio concept known as “risk parity,” an approach that normalizes various asset classes to constant risk and then equal-weights them in a portfolio, and to hedge fund replication. He concludes that “exotic beta” is more complex and requires more judgment to refine, but seems to generate better return and risk characteristics. He provides as evidence the chart showing the risk/return tradeoff for the various portfolios. Regardless of the approach, these liquid and transparent strategies can considerably enhance the performance and risk of a traditional portfolio.

In conclusion, Carhart says that one of the many investment themes that survived the financial crisis is that exposure to “exotic beta” is very attractive in a portfolio context. However, as he explores in this paper, an important caveat is that such exposure should not be expected to be completely static over time. In addition to being dynamic, Carhart believes it is optimal for investors to access these risk premia in relatively lower cost, more transparent and customized implementations. Based on his impression of currently available products, he concludes the industry is already headed this way.

52. **Betting against beta (Fall 2011)**

Andrea Frazzini, Assistant Professor of Finance, The University of Chicago Graduate School of Business, AQR Capital Management, LLC and NBER, presented “Betting Against Beta,” he coauthored with Lasse H. Pedersen, John A. Paulson Professor of Finance and Alternative Investments, New York University Stern School of Business and CEPR and NBER.

Frazzini starts with the basic Capital Asset Pricing Model premise: all agents invest in the portfolio with the highest expected excess return per unit of risk and lever or de-lever it to suit their risk preferences. While true in theory, in 1972, Black, Jensen and Scholes showed that the empirical risk-return slope is lower than the predicted 45 degree angle. This is an anomaly, Frazzini says, that has never been resolved; though, he points out, borrowing constraints may be the culprit.

Frazzini means to deal with the notion that investors prohibited from leverage bid-up high- beta assets while those limited only by margin requirements can trade to profit from this, at least to the limit of their margin constraints. Thus leverage constrained investors will resort to over-weighting risky, high beta, securities to increase their return. This behavior of tilting towards high-beta assets suggests that risky high-beta assets require lower risk-adjusted returns than low-beta assets – those that require leverage.

Frazzini creates a model to test whether high-beta assets require lower risk-adjusted returns than low-beta assets. They test the model’s predictions within U.S. equities, across 20 global equity markets, for Treasury bonds, corporate bonds, and futures. The data for the test are collected from several sources and result in the inclusion of 50,826 U.S. and global stocks covering 20 countries. The authors consider alphas with respect to the market and US factor returns based on size (SMB), book-to-market (HML), momentum (UMD), and liquidity risk. In addition to data on bonds, data for forwards and futures are used and detailed. They use the TED spread as a proxy for time periods where credit constraints are more likely to be binding. Frazzini reports that they find that for each asset class a betting-against-beta (BAB) factor, long a leveraged portfolio of low-beta assets and short a portfolio of high-beta assets, produces significant risk-adjusted returns. In addition, he says, when funding constraints
tighten, betas are compressed towards 1.0, and the return to the BAB factor is low.

Frazzini provides considerable detail about their analysis. The chart below shows a sample of their findings in graphic form. Here we see the plot of the annualized Sharpe Ratio of BAB factors for all the asset classes. All but one is positive.

To show the impact of credit constraints on BAB he plots the 3-year rolling average of the US equity BAB and the inverse of the TED spread shown in the chart on the next page. Frazzini uses this as further evidence of the impact on BAB on credit tightening.

On the basis of their work, Frazzini concludes that the model predicts that

1. Agents, such as hedge and private equity funds, with access to leverage buy low-beta securities and lever them up.
2. Agents restricted by leverage constraints, such as mutual funds, prefer high-beta assets.

### Fixed Income, Bonds, and Interest Rates

#### 53. The Equilibrium Real Funds Rate: Past, Present And Future (Fall 2015)

Professor Ken West, John D. MacArthur and Ragnar Frisch Professor of Economics at the University of Wisconsin (and, of Newey-West fame), led Q through a theoretical and empirical review of the relationship between real interest rates and economic growth. The relationship has been front-and-center-stage in policy discussions, where Summers (2014) has expressed concern about “secular stagnation” manifested by low equilibrium rates due to persistent low demand and a rising propensity to save; and McCulley (2003) and Clarida (2014) have stated the case for a “new neutral” where the equilibrium real funds rate is close to zero.

West finds that the secular stagnationists are overly pessimistic and that the long-run equilibrium real funds rate remains significantly positive --- although the authors themselves disagree on its exact level (with 2 of the authors believing the long-run rate is about 0.5 percent and the other 2 authors confident it will be closer to 2 percent). West said that their strongest finding is: Anyone
who speaks with confidence on the equilibrium long run rate is likely wrong!

West’s analysis was based on a long and comprehensive data set. They analyzed annual data doing back to 1800 for 17 countries, and quarterly post-WWII data for 21 countries. Their analysis of the data and theoretical contributions in the literature leads to these key lessons:

1. There is no strong relationship between the real rate and economic growth in the U.S., as depicted in the following chart:

2. The equilibrium rate is sensitive to the rate at which the future is discounted and perceptions about the riskiness of the real cash flow from government debt.

3. Judging the equilibrium rate using long-run historical averages can be misleading, as the average pre-WWI is substantially different than post-WWII.

4. The equilibrium real rate is sensitive to the degree of financial constraint imposed by regulations (e.g. deposit rate ceilings) and by the degree to which policy relies on quantity (e.g. reserve requirements) rather than price (interest rates) to manage aggregate demand.

5. Trends up or down in inflation can influence the real interest rate for prolonged periods (i.e., decades). Real rate averages that do not take this into account are poor proxies for the equilibrium rate.

6. Persistent headwinds, due to the length of some economic recoveries, can create a persistently low real rate. When headwinds abate, however, rates have tended to rise back to their historic average or higher.

7. The global saving glut probably distorted overall U.S. financial conditions (such as the slope of the term structure), but did not have a clear impact on the equilibrium real funds rate.

8. During the period of alleged secular stagnation (1982-present), the unemployment rate was below its postwar average, and inflation pressures emerged only at the end of each cycle. The argument that zero rates and/or asset bubbles are essential to achieving full employment seems weak.

   a. During the first part of the period of alleged secular stagnation (1982-2007), the real rate averaged 3%, a percentage point higher than its post-war average.

   b. The economy reached full employment in the 1980’s, despite high real interest rates and retrenchment in the real estate and S&L industry in the second half of the recovery.

   c. The NASDAQ bubble came after the economy reached full employment and therefore was not a precondition for achieving full employment.

9. Taking into account the offsetting headwind from the rising trade deficit and higher oil prices as well as the tailwinds from the housing bubble, it is not clear whether the economy suffered secular stagnation in the 2000s.

West then addressed the question: What is the equilibrium long-term real Fed Funds rate

\[
\Delta r_{US,t} = 0.4 \Delta r_{US,t-1} - 0.8 \Delta \ell_{t-1} - 0.4 (r_{US,t-1} - \ell_{t-1}) + e_{US,t} \hat{\theta}_{US=2.6},
\]

\[
\Delta \ell_t = 0.03 \Delta r_{US,t-1} - 0.3 \Delta \ell_{t-1} + 0.02 (r_{US,t-1} - \ell_{t-1}) + e_{\ell,t} \hat{\sigma}_{\ell}=0.3.
\]

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4 For annual data, they assume that expected inflation can be modeled by an AR(1) process, while, for quarterly data, by an AR(4) process.
today? He addressed this question using a reduced form vector error correction model:

where the first equation describes the change in the U.S. real interest rate, and the second equation describes the change in the median world real rate. Three primary conclusions arise from this system: i) the feedback from the U.S. to the rest of the world is small, ii) the feedback from the rest of the world to the U.S. is large (e.g., if U.S. rates are 1% point below world rates, we expect U.S. rates to move 40 basis points toward the world rate in the next year), and iii) given the high standard deviation of residuals (260 basis points), substantial divergence between U.S. and world rates is possible.

The key conclusion, which West claimed is not new to them but seems to be new to the literature, is that there is a high degree of uncertainty about the equilibrium long-run real Fed Funds rate. In light of this, the optimal policy response is to be much slower to adjust target rates.

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54. The Return On Your Money Or The Return Of Your Money: Investing When Bond Yields Are Negative (Fall 2015)

Vineer Bhansali, Managing Director and Portfolio Manager at PIMCO, gave a very provocative talk when he argued that negative nominal interest rates can be explained with fairly simple concepts.

Of course, one of the first “truisms” that we learn in finance is that nominal interest rates can never go negative, otherwise, we would simply “stuff money under our mattresses,” or, more practically, place cash in a safety deposit box at a bank. While this may work for small investors who have time to implement such a strategy, it is impractical for large-scale investors who demand immediacy. For instance, an investment fund may need a large exposure to the Swiss Franc, as a tilt toward safety, to be implemented quickly through a non-derivatives position. Such a fund may find it worthwhile to pay a slightly negative interest rate for the convenience of being able to buy a large position in Swiss Sovereign Bonds.

As an even simpler example in everyday life, Bhansali points out that we often pay a fee to maintain a checking account, and such accounts usually pay zero interest (unless large balances are maintained)—clearly, the alternative would be to pay for everything in cash, but this would prove both burdensome and unsafe, and most of us would never consider doing this. Such a fee-based checking account is equivalent to accepting a negative interest rate for convenience and safety.5

5 Yet another example cited by Bhansali is attributed to Greg Mankiw of Harvard. Suppose that the U.S. Treasury announced today that, next year, a number between 0 and 9 will be chosen at random, and all currency with serial numbers ending in that chosen number will become
Bhansali explained that this negative interest rate can also be thought of as an “insurance payment,” since negative interest rates exist in the market only for securities perceived to be the safest. Investors accept a negative interest rate on very safe securities in return for the “global catastrophe insurance” that such securities provide. The fact that Swiss bonds exhibit their most negative rates during periods of market stress reinforces this interpretation.

As a sidenote, Federal Reserve Chair, Janet Yellen, made a statement recently about the possibility of negative discount rates in the near future.6

Bhansali outlined four potential reasons that might explain negative nominal interest rates in bonds considered to be globally safe:

1. Heavy open-market purchases of “safe” sovereigns by central banks to “manage” interest rates (i.e., demand far outstripping natural supply)
2. Indexation, where some investors (or funds) insist on holding a benchmark set of bonds, no matter what the yield
3. Aging population who are (perhaps) overinvesting in safe fixed-income assets
4. Insurance against rare disasters

Bhansali points out that, even though Swiss sovereign zero-coupon bonds have negative yields out to 12 years, this is driven by negative yields out to 3-4 years, with positive implied forward interest rates beyond that maturity. This appears to be true in all markets—it is shorter-term safe bonds that are commanding a price premium, such that yields are negative. This appears to reinforce the notion that negative yields represent either a fee for the convenience and safety of holding bonds, rather than cash, or are a short-term global catastrophe premium.

Bhansali proceeds to illustrate how negative yields (or discount rates) can play out in many different sectors of the market. For example, if investors hold equities for their insurance against rare disasters, then, from the Gordon Growth model, the discount rate can be negative only if the growth rate of dividends is expected to be negative (since dividend yields can only be non-negative). Further, carry trades can be characterized as writing a straddle on the relation between the carry security and the funding security—basically, writing insurance that guarantees that the relation between the two securities does not diverge too much.

Bhansali concludes by saying that investors choose two different types of securities for their portfolios. First, they buy securities that provide a return ON investment (normal securities). Second, they buy securities that provide a return OF investment (insurance securities). The yields on these two different types of securities can be positive and negative, respectively, in equilibrium.

Bibliography

worthless. Faced with this expected return of -10% on holding dollars, the market would be happy to invest in U.S. Treasuries yielding -5%. (Relatedly, during the Vietnam War, “scrip” was issued to GIs to be used for purchases, and the scrip had to be exchanged for a new issue of scrip by a deadline or it became worthless).

55. On The Fundamental Relation Between Equity Returns And Interest Rates (Spring 2015)

Robert Whitelaw, Edward C. Johnson III Professor of Entrepreneurial Finance at NYU, and CIO of Index IQ, presented a paper on the relation of stock returns to movements in interest rates. This topic is of great interest, as the risk of interest rate increases brings uncertainty to investors about how their stock portfolios will be affected.

The surprising take-away from Whitelaw’s lecture was that some stocks can actually serve as an effective hedge against interest rate increases, and these stocks can be identified by their high level of debt in the capital structure (high leverage)!

To understand this, there are two effects of the impact of changes in interest rates to a company’s balance sheet to understand:

1. Change in interest rates \(\rightarrow\) change in asset value \(\rightarrow\) change in the value of debt and change in the value of equity (total pie gets bigger or smaller)
2. Change in interest rates \(\rightarrow\) change in the value of debt relative to the change in the value of equity (the changes are different, thus, the share of the pie taken by debt vs. equity changes)

Since the impact on the value of debt is negative from an increase in interest rates, the change in the value of equity can be positive or negative, depending on the change in asset value as well as the leverage of the firm. All else equal, higher leverage leads to a more negative duration of equity—meaning that equity can benefit from interest rate increases! This can also explain (partially) the time-varying correlation between stock and bonds (sometime they move together, and other times they don’t).

Whitelaw next takes this theory to the data. He maps out each firm’s capital structure, and then constructs returns for each security (no small feat for the bonds!). The return on the asset side of the balance sheet is computed as the value-weighted average of the returns on the liability side (equity plus debt). Whitelaw computes duration estimates (presented below) on each tranche of the capital structure for firms with different levels of leverage:

Note two effects here. First, within each leverage “bucket” (each row), duration increases with priority of the claim in the capital structure. Thus, senior debt is most adversely impacted by a rise in interest rates, followed by junior debt, and then equity. Second, firms appear to choose higher leverage when the duration of their assets is higher (i.e., when the value of the assets is more affected by changes in rates), as can be seen in the far right column above. This means that firms attempt to hedge some of the interest rate risk that could potentially be borne by their equity holders—adding more debt, which takes the brunt of the increased interest rate risk of the higher duration assets!

Whitelaw further shows that, once you control for the change in asset duration with increases in leverage, the duration of equity becomes more negative as leverage increases.

Whitelaw concludes with another insight. Bond portfolio returns are often modeled as a function of “term” and “default” factors, where the default factor is proxied by the difference in returns between a long-term corporate bond and a long-term government bond, such that the maturities are effectively matched. Whitelaw argues that this construct of the default factor is misspecified. That is, it does not properly isolate default risk, because the corporate bond duration can be very short if they are low priority (or highly leveraged) bonds in a firm’s capital structure, and, hence, the bonds underlying the default factor, while maturity matched, are not duration matched.
The takeaway for Q members: use a default factor that is corporate bond returns minus short-term government bonds to better isolate default risk!

Bibliography

56. Central Bank Policy Impacts On The Distribution Of Future Interest Rates (Fall 2013)

Breeden explores information about future short-term interest rates implicit in the state prices and risk-neutral densities obtained from the interest rate cap and floor market. He uses research from his paper with Litzenberger (1978) that showed the state prices can be estimated from portfolios of option butterfly spreads. This research is particularly timely given the non-normal nature of the low short-term interest rates that have existed since the Great Recession.

Breeden reviews what others have found and cites several current practical uses of option implied risk-neutral probabilities. In particular he notes the risk-neutral density tail risk estimates for many assets published by the Kocherlakota group at the Federal Reserve Bank of Minneapolis.

Breeden then says that the approach he takes is different from others in two ways:

1. It is wholly arbitrage based, non-parametric, and uses market prices from well-traded markets.
2. It focuses on long-dated, 3-5-year, market forecasts.

Breeden then shows how a portfolio of butterfly spreads plus left and right tail spreads produces a pay-off that is identical to a zero coupon bond. He uses this to estimate risk-neutral probabilities. The difference between risk-neutral and true probabilities, Breeden says, is that risk neutral probability is higher than the true probability of the state and the marginal utility.

Given the strong positive correlation between consumption and stock market wealth, Breeden says that risk-neutral probabilities of down-side S&P 500 moves will exceed their true probabilities. Understanding the relationship between risk-neutral and true probabilities for nominal interest rates is more complicated -- as correlations between interest rates and the stock market are time-varying. He provides the following chart to demonstrate this.

Breeden says that the ratio of risk-neutral to true probabilities should also be time-varying. For example, during the recessions of 1974-1975 and 1981-1982, higher nominal rates were brought about by supply shocks and associated with lower growth. Since the global financial crisis, higher nominal rates have been associated with higher stock prices and higher growth. Low interest rates (e.g.1% or 2%) are associated with predictions of low real growth and high conditional marginal utilities of consumption Risk-neutral probabilities for low rate states should exceed true probabilities and the reverse should be true for states with high interest rates.

The market’s risk-neutral expectations about future levels of nominal rates have
changed over the last decade, Breeden says. In the following figure, he shows the relative symmetric risk-neutral expectations of 3-month Libor rates (5 years forward) that existed prior to the global financial crisis.

Post the crisis, the risk-neutral distribution of future rates has become much more positively skewed as shown in the following chart.

Breeden then goes on to examine how the risk-neutral densities of future 3-month Libor rates have been affected by series of policy actions by U.S. Federal Reserve Bank (e.g. the May 22, 2013 tapering announcement that came as a result of the economy’s strength).

To conclude Breeden says that policy actions taken by the Federal Reserve and the European Central Bank can and do affect the entire probability distribution for future interest rates, not just the means and variances. The tools he uses are wholly arbitrage based and nonparametric, and do not rely upon assumptions about statistical estimates for the volatility process, nor on the pricing function for actual market option prices. For policy makers, Breeden says that these tools should be helpful in measuring the impact of potential policy.

57. Duration Targeting: A New Look At Bond Portfolios (Spring 2013)

Almost all bond portfolio managers control interest rate risk through a Duration Targeting (DT) process.

As bonds age and interest rates shift, managers typically maintain, either explicitly or implicitly, a specific duration target through periodic portfolio rebalancing. Not only are most bond portfolios characterized by DT, but most fixed income indices also have very narrow duration ranges and hence are effectively targeted. Despite the wide use of either explicit or implicit DT in building and managing portfolios, the full implications of this strategy generally have been underappreciated.

In previous work, Leibowitz [with Bova] found that as the portfolio’s holding period approaches its “effective maturity” the volatility of cumulative returns dramatically decreases such that the starting yield exerts a “gravitational pull” on returns. This robust convergence pattern is the result of the balance between price changes and accruals and it exists whether yields are rising or falling although it is important to note that the accrual component of returns is highly path dependent. For a bond portfolio with a five-year duration, the effective maturity is about nine years. For investors who hold a five-year duration targeted portfolio for nine years the effective duration - the annualized return of that portfolio converges to the starting yield.

To illustrate how yield changes impact returns, Leibowitz provides a simple example. You first buy a five-year pure discount bond at the beginning of the first year. At the end of the year you sell it at the fair market price
using the proceeds to buy a new five-year bond. Over the 9-year period yields on a 5-
year zero rate bonds rise 50 bp per year. The final yield is 7%. The graph below plots the
scenario over its life.

As annual rates increase the bond price declines. At the same time the annual rate of
return increases and the capital losses on the bonds are offset by the higher rates on the
new bonds and reinvestment. The excess accruals build over time and offset the series
of price losses such that the bond ends up earning its initially promised 3% yield, but
over the longer effective maturity.

Using an analytic expression for the excess return over any path, Leibowitz refers
to another paper where he showed that the effective maturity for a trend line-based DT
path is equal to twice the target duration minus one: the effective maturity depends
only on the duration and is independent of the size and direction of the yield changes.

Leibowitz said that the theoretical model developed to represent this convergence
effect has generally stood up well in a series of tests involving simulation-based yield
paths derived from Monte Carlo simulations, and with historical constant maturity
Treasury and investment grade corporate debt data.

In conclusion he says that these findings have a number of investment implications:
1. The DT process is far more widespread than generally recognized.
2. A DT bond portfolio has a much lower multi-year volatility than generally believed.
3. Over an appropriate horizon, depending only on the duration target, the annualized
mean return will converge to the starting yield, subject to a modest standard
deviation.
4. In scenario analysis, the TL formula can provide a reasonable estimate for the
return to a given terminal yield.
5. In an asset allocation framework, the overall fund level volatility contributed
by the bond component will generally be far less than that derived from a standard
mean/ variance model.
6. For DT investors who are content with the current yield levels, the convergence
properties suggests that they need not be overly worried about the impact of higher
rates on their multi-year returns.
7. DT investors committed to a fixed duration target should not count on the
prospect of higher or lower yields to augment their multi-year return above the
current level of yields.

International Finance

58. The International CAPM Redux
(Spring 2015)

Adrien Verdelhan, Associate Professor of
Finance at MIT, revisited the question of
whether foreign currency risk is priced in
global equity markets. He began his talk by
reviewing the two primary international
models of equity pricing: the World CAPM
and the International CAPM. Under the
assumptions of the World CAPM, purchasing
power parity (PPP) holds instantaneously,
and global equity market risk is the single
source of systematic risk. Sensitivity (beta) to
that risk determines all equity expected
returns, and currency risk is irrelevant from a
pricing perspective. In contrast, the
International CAPM presumes that PPP does
not hold instantaneously. As a consequence,
all bilateral exchange rates are additional
systematic risk factors that theoretically
impact all expected asset returns.

The ICAPM holds under very general
assumptions. However, it is difficult to
implement practically, as it requires the use
of all bilateral exchange rates. Verdelhan
presented a parsimonious reduced form model (the CAPM Redux) that assumes that: (i) the existence of a pricing kernel that insures that the law of one price holds across assets, and (ii) investors can form portfolios freely—going both long and short.

Given these assumptions, the expected return on any asset can be written as a time-varying function of three factors: the *average world equity market return* denominated in local currency terms, a *carry factor* that is the excess return of a portfolio that goes long high-interest currencies and short low-interest currencies, and a *dollar factor* that presumes, each period, that an investor borrows in the U.S. and invests equally in all other currencies.

Verdelhan runs a variety of horse races to compare the performance of the CAPM Redux to its three main competitors: the *World CAPM*, the *International CAPM*, and an international version of the Fama French four factor model. The most persuasive evidence is provided in four graphs (one for each model) of realized average excess returns, plotted on the y-axis, against the corresponding model predicted returns, plotted on the x-axis. The points in each graph correspond to over 200 different indices in 46 countries, where, for each country, returns are computed for five different MSCI equity indices: the aggregate stock market, growth, value, large market-capitalization, and small market-capitalization. As is readily apparent, both the *World CAPM* and the *International CAPM* generate virtually no cross-sectional variability in expected returns. While a good model would be characterized by points randomly distributed around the 45 degree line (shown in each graph), most of the data points for these two models are best described by a vertical line.

In contrast, both the Fama-French four factor model and the *CAPM Redux* do a much better job generating cross-sectional variability in expected returns. The data points for the *CAPM Redux* are the most tightly clustered around the 45 degree line, indicating that it is the best model.

Verdelhan then provided evidence on a wide variety of model robustness, performance, and relevance tests for the *CAPM Redux* model. He showed the importance of time-varying betas for all three factors in that model, the importance of the carry and dollar factors in explaining mutual fund and hedge fund returns, and the superior performance of the *CAPM Redux* model with respect to rolling mean absolute alphas—especially in the last decade (depicted in the graph below). Specifically, the below graph shows alpha estimates (in absolute value) averaged across passive country equity indexes at each point in time. Verdelhan argued that that his *Redux* model is superior because it delivers lower mean absolute alphas (in other words, it explains passive country index returns best, and does not assign high alphas to them).
In short, he was able to show that a parsimonious three-factor model can explain a significant amount of variation in the returns of a wide variety of passive developed and emerging market equity indices, and in the returns of a sample of actively managed mutual and hedge funds.

**Bibliography**


**59. PPP and Exchange Rates: Evidence from Online Data in Seven Countries (Spring 2015)**

Alberto Cavallo, Associate Professor of Applied Economics at MIT Sloan, presented research based on a unique set of data collected daily from hundreds of on-line global retailers. The initial data were obtained as part of MIT’s *Billion Prices Project* that was started in 2008 with Roberto Rigobon, an MIT colleague.

The data collection makes use of the HTML code that underlies public webpages, and it “scrapes” this information to extract price and product information for all the products the retailers sell. The dataset has many attractive features relative to other sources of purchasing power parity (PPP) data: It primarily focuses on tradable goods, is available for many countries, is comparable across time, is available for hundreds (and eventually thousands) of products, can track dozens of varieties of the same product, provides exact product matches, and is available on a daily basis. The data also has the advantage that *PPP* has precise and refutable predictions with regards to price levels, whereas price index data (such as the CPI) can only be informative about price changes.

Cavallo’s presentation focused on several different aspects of this research project. First, he reported on the research that they conduct to verify the reliability of the online price data. This involved the simultaneous random sampling of online and in-store prices using a bar scanning app and crowd-sourced workers. Table 2 below shows high degrees of similarity between the prices scraped from online websites and the actual prices charged in stores for most countries, with the notable exception of Argentina.

The main focus of the talk was on the behavior of the real exchange rate (RER) defined as:

\[
RER = \left( \frac{P_{lc} \times E_{usd/lc}}{P_{us}} \right)
\]

where \(P_{lc}\) is the price of a good in the local currency, \(P_{us}\) is the price in US dollars, and \(E_{usd/lc}\) is the exchange rate in US dollars per unit of local currency. If absolute *PPP* always holds then \(RER=1\) at all times. If, instead, relative *PPP* always holds, then \(RER=\text{fixed constant}\).

The empirical literature has found that absolute *PPP* does not hold, and that relative *PPP* only holds in the long run—with \(RER\) shocks having half-lives in the 3-5 year range. Cavallo reported on research that revisits the empirical validity of absolute and relative *PPP* using more accurate micro-level price data. Cavallo noted two primary research objectives: 1) measuring the level of the *RER*
over time, and 2) estimating how fast the RER returns to steady state after a shock.

Cavallo first presented results using Brazilian data. As can be seen in the figures below, the RER in Brazil, relative to the U.S. (light blue line), is much more stable than relative prices (red line, left axis) or the nominal exchange rate (dark blue line, right axis). This negative correlation between relative prices and nominal exchange rates was apparent in 6 of the 7 countries for which data was presented; the sole exception was China, where the currency does not freely float.

He then focused on Argentina. Over the last four years, the RER in Argentina has typically been in the 1.00 to 1.10 range. However, over the last year, the RER has risen from 1.00 to roughly 1.20—suggesting that, over time, the currency will have a significant depreciation.

Cavallo presented summary evidence for seven countries based on a vector error correction model (reproduced below), where the coefficient $\beta_0 = 0$ id absolute PPP holds, $\beta_1 = -1$ if relative PPP holds, and the ratio $\frac{\alpha_p}{\alpha_e}$ indicates how much of the adjustment comes through relative price changes compared to changes in nominal exchange rates. A ratio less (greater) than one suggests most of the adjustment comes through changes in nominal exchange rates (relative prices). The table also contains estimates of the half-lives (measured in days) of the relative price and exchange rate changes. In contrast to previous research, Cavallo finds that real exchange rate adjustments are much faster than previously estimated: largely occurring within months rather than years, as previously thought using CPI data. The adjustment mechanism and speed vary by country. Thus, the key to Cavallo’s new findings that prices and exchange rates adjust faster than previously thought is the precise cross-country pricing data for the same goods that he collects from online postings.

**Bibliography**


60. Is The World Stock Market Co-Movement Changing? (Fall 2015)

One characteristic of the 2008 Financial Crisis was the dramatic shift to high correlations between asset prices worldwide. Diversification strategies designed to shield the investor from risk did not work as all asset prices fell. This was shocking, but was it transitory? Chidambaran says that the increase in worldwide market co-movement may be more than transitory: capital market liberalization and the expansion of free trade agreements have ushered in a tremendous increase in world trade and capital flows since the mid-1990s. This leads to increased
cross-country investments and a demand for portfolio diversification beyond what is available within the home market. These forces could drive individual national stock markets, traditionally segmented by national boundaries and regional agglomeration, to increasingly co-move.

Chidambaran says there are four questions to answer about co-movement:

1. Has co-movement been changing over time?
2. If there has been an increase in co-movement, is this temporary or the new reality in global markets?
3. Do stocks in emerging countries co-move with those in developed countries?
4. Is the co-movement investor driven or firm cash flow driven?

The answers to these questions are important and can impact international investment diversification strategies. Low co-movement supports diversification and creates opportunities in international sourcing of capital. However, if co-movement is high, diversification is difficult.

Chidambaran notes that there are two essential aspects to any study of co-movement. First, measures of co-movement depend upon the model used to measure them. Second, if there is a change in levels of co-movement, there must be a way to understand its cause. In particular, if co-movement is assumed to be driven by world events, testing procedures need to allow for structural breaks in long-term relationships.

At the heart of international stock co-movement studies is the identification of the correct factor model for each country and whether there is a common world factor. Two approaches have commonly been used to examine the stock returns across countries in a segmented world: 1) an extended version of the Fama-French model; and 2) an APT style factor model with principal components as factors.

Both approaches, Chidambaran says, are biased and misstate factors that are common across all countries. This is largely due to the fact that world capitalization is skewed toward the US and Japan, leading to bias when using value-weighting and equal-weighting in estimating the common world market proxy. After showing the bias using simulation, he develops a Weighted-Generalized Canonical (W-GCC) method that identifies the factors and is free from value-weighting and equal-weighting biases. Chidambaran identifies a set of Principal Components that explain variation of returns in each country using the W-GCC to identify the “Canonical Variates” that are highly correlated across all countries. His model is shown below.

Factors that are not common, he says, are either regional or country-specific factors. He examines all countries simultaneously to identify the common drivers of returns. He uses a weighting process that improves on the efficiency of the methodology in the presence of confounding effects of regional and country factors.

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Using weekly stock returns data from 23 countries in the Morgan Stanley Index from 1981 to 2010, Chidambaran finds that stock price co-movements are stable through the mid-1990s and then increased to a high of 70% by 2010. He calculates the country specific canonical correlations as shown below:

He says that co-movement is largely driven by a common world market factor and co-movement from regional factors is small and decreased to negligible levels by 2010. There are no differences between the co-movement of small and large stocks and the bias in the model is less important in recent times when world co-movement of developing and emerging countries has soared to over 70%.

To understand the source of co-movement and co-movement change he studies the co-movement of the Chinese A (Chinese investors only) and Chinese B (open to non-Chinese investors) stock markets as they have different investor bases. The Chinese B stock market shows a dramatic increase in co-movement over the time period while the Chinese A stock market does not. This suggests to him that co-movement is more likely driven by investment cash flows.

In conclusion he says that integration, relative to the world factor is increasing in developed and emerging countries. Structural breaks are related to economic innovations, and, by 2010, world markets are well integrated, less segmented across country lines, more segmented by sub-groups of stocks and are driven by investor flows across boundaries.

61. Global Crises And Equity Market Contagion (Spring 2012)

Geert Bekaert, Leon G. Cooperman Professor of Finance and Economics, Columbia Business School and (NBER) presented, “Global Crises and Equity Market Contagion,” he coauthored with the following from the European Central Bank: Michael Ehrmann, Senior Adviser, Directorate General; Marcel Fratzscher, Head, International Policy Analysis Division; Arnaud Mehl, Principal Economist, Directorate General International.

Bekaert begins with the following all too familiar story:

1. Return correlations increase in bad times.
2. Bad shocks easily transmit across countries.
3. Such shock spillovers result in excessive comovements between asset classes and countries such as the “Tequila Crisis” (1994-95), “Asian Flu” (1998), and “Russian Virus” (1998). This often is called contagion.

While we may all agree that such a thing as contagion exists, Bekaert points out that there is no consensus on exactly what constitutes contagion or how it should be measured. In this presentation he revisits the debate on the presence, types and sources of contagion in what he calls an ideal lab: the...
Global Financial Crisis of 2007-09. Using the chart below, Bekaert reminds us of the depth of the Financial Crisis worldwide from 2007-09.

He characterizes 3 popular hypotheses regarding contagion channels as:

1. Globalization/interdependence: economies integrated with U.S./global economies were hit hardest.
2. A wake up call: the crisis initially provided new (fundamental) information to investors which led to a generalized crisis.
3. Herd behavior: a contagion without discrimination that was unrelated to fundamentals.

To examine the three hypotheses, Bekaert first defines contagion as excess correlation: correlation over and above what one would expect from economic fundamentals. Using data from 2007-2009 he analyzes the transmission of crises to country-industry using 55 country-specific equity portfolios. His model is an asset pricing framework with global and local factors designed to predict crisis returns by using explained increases in factor loadings as indicative of contagion.

Since this single factor world (w) model does not explain comovements, he creates three factor adaptations using the following orthogonalized factors:

1. U.S. factor (R_{t}^{U})
2. Global financial factor (R_{t}^{G})
3. Domestic factor (R_{t}^{D})

The domestic factor excludes the portfolio return under investigation.

His data is comprised of stock prices from 1995 to 2009 for 2000 firms, 55 countries, and 10 sectors from which he creates 415 value-weighted U.S. dollar portfolios. The crisis is identified as starting on either August 7, 2007 or September 15, 2008. Using this data he finds systematic and substantial contagion from domestic equity markets to individual domestic equity portfolios, the severity of which is inversely related to the quality of countries’ economic fundamentals and policies. In addition, he reports that U.S. and global contagion were limited and domestic contagion was stronger. This is shown in the chart on the next page.

\[ r_{i} = \beta_{i} \cdot r_{w} + \varepsilon_{i} \]

Then: \[ \rho_{i,w} = \frac{\sigma_{w}}{\sigma_{i}} \]

global risk    country-specific risk

Finally, he finds that there was no contagion evident during other recent crises. The Financial Crisis during 2007-09, he says, stands alone.

The results were not related to globalization or herd behavior. Instead, Bekaert concluded that this Financial Crisis was a kind of “wake-up call” with markets and investors focusing substantially more on idiosyncratic, country-specific characteristics during the crisis. This segmented-world finding, he says, was unexpected since the sample was made up of the largest
capitalization stocks in each market: stocks of companies that he would have expected to be global players. Looking at a number of different sectors he finds that the culprit in the crisis was the financial sector. He provides the chart below that shows three of his sectors.

Bekaert points out that this was not an indiscriminate spread of the crisis but a “wake-up call” during which investors refocused on country characteristics and punished markets with poor fundamentals. The chart below shows their predicted and actual returns for Europe.

Ironically, Bekaert concludes that domestic factors regained importance in determining equity market performance in the most global crisis of recent times. Furthermore, he concludes that it was banking policy (e.g. deposit and debt guarantees and capital injections) that helped decouple returns during the contagion. The world, he says, is still relatively segmented and domestic factors are critical.

62. The International Monetary System: Living With Asymmetry (Fall 2011)

Maurice Obstfeld, Class of 1958 Professor of Economics and Director of Center for International and Development Economic Research (CIDER) at the University of California at Berkley, NBER, and CEPR presented “The International Monetary System: Living with Asymmetry.”

Obstfeld says that the Financial Crisis laid bare global stresses related to the two classic coordination problems the IMF was originally designed to address: global liquidity needs and exchange rate imbalances. The problems are similar to those of the Bretton Woods era, pre-1973, and yet quite different. He analyzes the current stresses in the two key areas that concerned the architects of the original Bretton Woods system: international liquidity and exchange rate management. He finds that many of the coordination problems that arise stem from differences in the structures, growth rates, and cyclical positions of the mature economies and the developing world: segments of the global economy that are fast approaching equality.

The key message of Obstfeld’s work is that a diverse set of potential asymmetries among sovereign member states provides fertile ground for a variety of coordination failures. While obvious, he says, this point is a key starting place for predicting a range of tensions in any system of international monetary arrangements. The floating exchange rate, one of the Bretton Woods’ innovations, did not fix everything. The demand for international reserves is still high and the modified Triffin problem - the supply of international liquidity in settings where the demand for safe foreign exchange reserves grows faster than the supply over the long term - is still present. There is no rapid return
to nearly balanced current accounts. Distributional and allocative effects still exist, particularly for emerging market economies. Even though there have been some successes, every bilateral exchange rate continues to be shared by two countries and external adjustment imperatives remain unequal.

Compounding these problems is globalization. One of the systemic, globally interdependent, risks comes from inflated gross asset positions. Obstfeld uses the chart on the next page to show the positions for six major countries. The legend left to right mimics the graph’s lines top to bottom. Clearly Switzerland and the UK are in the strongest positions.

He then looks at net external assets to demonstrate the problems in the financially troubled countries. The graph for one country, Ireland, shows its gross external assets and liabilities at a startling 14 times GDP.

Obstfeld says that there is one overwhelming need: liquidity in the international system. However, there are two issues: heightened sovereign debt risks for richer countries and the need for lender-of-last-resort (LLR) support in multiple currencies to safeguard financial stability for all countries. Until recently, Obstfeld says, domestic LLR seemed sufficient. Now it does not. He provides an outline of the system at work and its flaws before turning to better ways to meet market liquidity needs.

Obstfeld concludes that in this world there is a connection between the extent of policy cooperation over macroeconomic policies and the need for international liquidity. The more cooperation (the more carefully coordinated national policies are in timing and nature) the lower the need for international liquidity to finance imbalances. A collateral benefit of such cooperation is that it can mitigate other coordination failures in national economic policies. Unfortunately, these continue to cause tensions between governments and there are no easy solutions in a world of sovereign nations. Reforms that enhance the IMF’s freedom from political pressures would allow it to identify and critique global coordination failures with greater impartiality and credibility.

To his extensive tutorial he summarizes the main challenges at the regional and global levels:

1. National sovereignty and self-interest as expressed through democratic political processes that frequently are not inherently friendly to globalization.
2. Globalization of governance institutions must expand to support the expanded globalization of markets.

As for the current threat, Greece, he was very pessimistic about the timing and the impact of the potential bail out.

**Investor Sentiment**

63. The Behavior Of Sentiment-Induced Share Returns: Measurement When Fundamentals Are Observable (Spring 2015)

Whose “sentiment” affects stock prices—the sentiment of professional investors, or that of retail investors? Ian Cooper, Professor of Finance, London Business School, tackles
this question though an analysis of the stocks of upstream oil companies.

In order to study sentiment, one must first clearly understand the fundamental value of a stock. Cooper argued that the relation of upstream oil company stocks to fundamentals are clearly defined, in theory, because of their simple tie to oil prices. That is, if the Hotelling (1931) Rule is correct, the value of such companies equals the current value of their reserves minus extraction costs (another way to express this is that the price of an exhaustible resource, minus extraction costs, should rise over time at the risk-free rate).

One can determine the deviation of oil and gas stocks from fundamental value by measuring the deviation of equity prices from reserves minus extraction costs (minus the value of debt). Specifically, Cooper assumes that fundamental value is a function of the month-end spot price of West Texas Intermediate oil and the spot wellhead price of West Texas natural gas (as well as the contango in oil prices).

Cooper uses these 121 U.S. Oil and Gas E&P stocks during 1983-2011 to test the effect of investor sentiment on stock returns. That is, he wished to explore whether investor sentiment pushes these upstream oil stock prices away from their fundamental values in the short-term (Barberis, et al., 2012) or whether sentiment predicts future returns because of their impact on fundamentals themselves.

Cooper measures sentiment in two different ways: the Baker and Wurgler (2006) “Sentiment Index,” and the proportion of individual investors who report that they are bullish in the regular survey conducted by the American Association of Individual Investors (“Bullishness” survey). The monthly correlation between these two sentiment metrics is only 9%, indicating that they capture different aspects of sentiment.

Accordingly, Cooper’s paper assumes that stock prices are affected by the actions of two types of traders: a professional arbitrageur, who sells when the Baker-Wurgler sentiment measure is high, and a naïve trend-follower, who buys when the AAII retail sentiment measure is bullish. Then, he allows, in separate regression equations, fundamentals and non-fundamentals, to depend on the actions of both types of traders (through the level of the two sentiment variables). That is, Cooper regresses, separately, fundamental returns and non-fundamental returns on the two lagged sentiment measures. These regression equations are combined in a vector autoregressive model, so that fundamental returns can also depend on lagged non-fundamental returns (and vice-versa).

Next, to obtain his y-variables in the above system, Cooper splits upstream oil stock returns into fundamental and non-fundamental returns by first regressing monthly returns over a 60 month period on the change in WTI prices, natural gas prices, and the contango (logged 6th minus 1st futures price) of WTI:

\[ R_{it} = a_i + b_i \Delta WTI_t + c_i \Delta Gas_t + d_i \Delta Cont_t + u_{it} \]

The fitted regression is then used to generate the fundamental returns, while the residuals from this regression are the non-fundamental portion of returns.

Cooper’s results show that fundamental returns, but not non-fundamental returns, are predicted by both of the lagged sentiment indicators. Cooper finds that this predictive role of sentiment on fundamentals is only present starting in 2000, which is roughly when investors became interested in the oil sector (and commodities, in general).

Further, Cooper finds that the Baker and Wurgler index predicts mean-reversion in
upstream oil stock prices, while the AAII index predicts momentum in stock prices.

The key takeaway from Cooper’s study of upstream oil company stock prices: sentiment seems to work mainly on fundamentals themselves, and does not appear to drive prices away from fundamental values!

Bibliography


64. Investor Sentiment Aligned: A Powerful Predictor of Stock Returns (2014 spring)

Zhou starts by saying that many, including John Maynard Keynes, have said that investor sentiment is a key factor in determining stock prices. Since sentiment is unobservable, most empirical research has focused on whether stock prices move too much to have been generated by changes in subsequent fundamentals.

Zhou looks to work by Baker and Wurgler (2006, 2007) who suggested there is a role for sentiment in explaining expected returns. BW created a sentiment index that included the following as proxies for sentiment:

1. Closed-end fund discount rate
2. Share turnover
3. Number of IPOs
4. First-day returns of IPOs
5. Dividend premium
6. Equity share in new issues

Their index tried to mitigate the measurement error in any one of the above proxies and to create a more reliable sentiment signal. However, they did not find statistical significance when using their investor sentiment index to predict the stock market.

Zhou attributes BW’s weak findings to the principal components approach they used to combine the 6 proxies. He tries a different approach, partial least squares (PLS). He uses the BW proxies and a PLS methodology to extract the combination of the 6 proxies that best explain stock market returns. Zhou says that PLS better aligns the sentiment and calls his approach *aligned investor sentiment*. Forecasts using the BW index and Zhou’s

**Table 2: In-sample Forecasts of Aggregate Stock Market**

<table>
<thead>
<tr>
<th></th>
<th>$\alpha$ (%)</th>
<th>$t$-stat</th>
<th>$\beta$ (%)</th>
<th>$t$-stat</th>
<th>$R^2$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A: Aligned Investor Sentiment, $IS^{PLS}$</td>
<td>0.31</td>
<td>1.62</td>
<td>-0.55</td>
<td>-2.53</td>
<td>1.54</td>
</tr>
<tr>
<td>Panel B: Baker and Wurgler’s Investor Sentiment, $IS^{BW}$</td>
<td>0.31</td>
<td>1.61</td>
<td>-0.24</td>
<td>-1.21</td>
<td>0.30</td>
</tr>
</tbody>
</table>

As are the predictive results for each of the two models, show in the chart below. The solid line is the *aligned investor sentiment* ($IS^{PLS}$) and the dashed line is the BW investor sentiment index ($IS^{BW}$). The predictions are different.
Although the $R^2$’s are quite modest, Zhou’s *aligned investor sentiment* and BWs investor sentiment index models show that high positive sentiment is a negative indicator of future returns. Zhou points out that the slope coefficient for the his sentiment indicator suggests that a one standard deviation increase is associated with an economically large, 0.55%, decrease in expected excess market returns over the subsequent month.

When Zhou compares the predictive strength of his model to other approaches he concludes that it outperforms multiple macroeconomic indicators as shown in the table below.

<table>
<thead>
<tr>
<th>Panel A: Univariate Regressions</th>
<th>Panel B: Bivariate Regressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{\rho}_t = \alpha + \beta Z_t^2 + \epsilon_t$</td>
<td>$\hat{\rho}_t = \alpha + \beta Z_t^2 + \phi Z_t^2 + \epsilon_t$</td>
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<td>$\hat{\rho}_t$</td>
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<td>$\hat{\rho}_t$</td>
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<tr>
<td>DP</td>
<td>0.47</td>
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<tr>
<td>DY</td>
<td>0.54</td>
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<tr>
<td>EP</td>
<td>0.21</td>
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<tr>
<td>DE</td>
<td>0.36</td>
</tr>
<tr>
<td>SWAR</td>
<td>-1.06***</td>
</tr>
<tr>
<td>BM</td>
<td>0.15</td>
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<tr>
<td>NTIS</td>
<td>-0.70</td>
</tr>
<tr>
<td>TLR</td>
<td>-0.07</td>
</tr>
<tr>
<td>LTV</td>
<td>0.00</td>
</tr>
<tr>
<td>TMS</td>
<td>0.23**</td>
</tr>
<tr>
<td>DFY</td>
<td>0.46</td>
</tr>
<tr>
<td>DFH</td>
<td>0.18</td>
</tr>
<tr>
<td>INF</td>
<td>0.18</td>
</tr>
</tbody>
</table>

$Z_t^2$ is one of the 14 macroeconomic variables from Goyal and Welch (RFS, 2008) that are popular predictors of equity premium in the literature.

Zhou concludes that the statistical significance of the *aligned sentiment indicator* is robust to the inclusion of the macroeconomic predictors and is economically valuable. It can lead to a doubling of monthly Sharpe Ratios. The forecasting power of sentiment, Zhou says, comes from the investor's under reaction to cash flow information rather than discount rate predictability.

65. Bubbling with excitement: an experiment. (Spring 2012)

Terrance Odean, Rudd Family Foundation Professor of Finance, Haas School of Business,

University of California, Berkeley presented, “Bubbling with Excitement: An Experiment,” coauthored with his Haas School of Business, University of California, Berkeley colleagues: Eduardo B. Andrade, Associate Professor of Marketing, and Shengle Lin, Searle Foundation Fellow.

Odean starts with a little history lesson pointing out that behavioral research in economics began about 20 years ago after years of researching how people should act as a rational agent, as opposed to how people make decisions. He says that we have known for a long time that there are periods when the markets do not reflect rationality from “Tulip mania” of 1637, to the “Irrational Exuberance” of the late 1990s. These popular accounts of investment bubbles emphasize the role of emotions and the role of excitement as an accelerant. During these non-rational periods, aroused emotional states distort better judgment and inflate an asset bubble until it ends in panic selling.

Experimental studies of asset pricing bubbles have focused on non-emotional factors such as liquidity, experience, transparency, novelty of the environment and speculation. Investors, however, can and do act on emotion and there are several theories about how that occurs (preferences; beliefs; overconfidence; limited attention; emotions). Bubbles themselves could result from people’s undifferentiated sensation seeking and financial trading could represent an important source of physiological arousal. As such, any highly arousing incidental experience could produce a larger bubble relative to a non-arousing experience. Odean notes that he believes that pleasantness
associated with the arousing experience (excitement) is critical for investors to inflate the bubble.

The positive affect is transmitted through changes in information processing that impacts preferences and influences beliefs and/or increases risk taking. A negative affect can decrease risk-taking. Odean and his colleagues create an experimental financial market designed to study the role of emotions in asset-pricing bubbles. In previous research by others this method has been used.

Odean creates an experimental market designed to manipulate participants’ emotional states by showing one of a number of short videos at the beginning of each trading session. The videos are chosen to arouse excitement or fear and sadness. As a control, one of the videos provides a neutral, unemotional treatment. Creating a predisposition before the experiment is a commonly used procedure that is known to impact financial and economic decision-making.

Each of Odean’s experimental markets is conducted over 15 periods. The subjects begin with several pieces of information: the starting position (a combination of cash and/or stocks) and potential dividend payments (the magnitude of which is uncertain and later revealed). The price and dividend pattern is designed to create the fundamental-value price pattern like that shown below. The subject sees this chart at each of the 15 rounds of buying and selling. Thus the fundamental value is not in question at any time during the trading.

The subject then chooses to buy or sell at market rates that are reflections of the behavior of the other subjects in the simulation. The result from one of the “exciting-video” simulations is shown below. Clearly, during this simulation a bubble develops before prices finally crash at the end of the simulation. The simulation prices (the dots in the chart below) trump the fair value until near the end when prices drop rapidly toward the fair value (the dashed lines in the chart in the next column).

This experience is not only true for the “excited video” treatment. The following chart shows the average price of the stock being traded for each of the induced emotional states. While the results are different, only the results of the excitement state are significant.

On the basis of his research, Odean concludes that larger asset pricing bubbles develop in experimental markets run subsequent to showing the exciting videos and that differences in the magnitude and amplitude of the bubbles are both economic and statistically significant. Emotion, the factor studied by behavioral economists, appears to play a very large role in bubbles.
During periods of heightened excitement, rational agents, if they exist, seem to deviate from rationality.

**Passive Asset Management**


Mutual funds have become one of the primary investment vehicles for households worldwide over the last half century. As of December 2010, there were nearly 28,000 equity funds with $10.5 trillion in assets under management (AUM). Index funds have been an increasingly important low-cost alternative to actively managed stock funds. By 2010 they accounted for 22% of AUM worldwide. Cremers reports on his study of whether increased competition from passively managed funds globally increases competition and efficiency in the mutual fund industry. In particular, he wonders whether this change pushes active funds to increase their product differentiation, lower their fees, and whether it has led to improved performance.

In the United States, the market share of index funds and ETFs has grown from 16% of AUM in 2002 to 27% in 2010. In other countries indexing is much less prevalent, but has grown from 6% in 2002 to 13% in 2010. Although the amount of explicit indexing is small outside of the U.S., Cremers finds that closet indexing is close to 30%, twice the level of closet indexing in the U.S. The 2010 breakdown is depicted below.

Cremers says that the rise of explicit and closet indexing globally raises some important questions:

1. What explains the existence and growth in market share of passive funds?
2. What could have spurred that growth: regulation; competition; market development?
3. What impacts have passively managed alternatives had on active funds?
4. Have low-cost alternatives put pressure on active funds; how has the performance impacted that of low-cost alternatives and active funds.
5. How passive are the passive funds?

Before discussing the methods he used to answer these questions, Cremers previews some findings.

1. In markets with more low-cost explicit index funds, active funds deviate more from their benchmarks, charge lower fees, and deliver higher returns.
2. Outside the most developed markets there is little explicit indexing but considerable closet indexing.

In his research, Cremers uses information from the Lipper Hindsight and Factset/Lionshares databases to create a sample of 11,776 funds with $7.9 trillion total net assets (TNA) from 32 countries. The sample contained global, regional, country and sector funds from 2002--2010. Cremers reports that only 22% of TNA were explicitly indexed worldwide in 2010, and only 13% of them were explicitly indexed outside the US. Switzerland had the highest proportion of explicitly indexed funds at 80%. While a low proportion of funds are explicitly indexed, Cremers notes that in most countries investors cannot invest in index funds with their attendant lower fees funds, however, many active fund managers are effectively closet indexers charging active fees. To
determine which funds were closet indexers, he used a measure he developed previously, Active Share: the share of portfolio holdings that differ from the benchmark index holdings.

Cremers determined that there were three things that explain indexing in a particular market:

1. More stringent standards.
2. A larger fund industry.
3. More liquid and developed stock markets.

As an illustrative example, Cremers compares the domestic funds benchmarked to the Madrid SE stock index to the domestic funds benchmarked to the S&P 500. He notes that there are about 75 domestic Spanish funds in the sample. The average Active Share of those funds is 37%. The average market cap of the stocks in those funds is about $630MM, and there are roughly 150 stocks in the Spanish universe. This contrasts with over 200 U.S. active funds in the sample with an average Active Share of 70%. There are over 9,000 stocks in the U.S. universe and average market cap is $14.6BB.

In his sample of funds, Cremers finds that the competitive pressure from indexing makes active funds:

1. Deviate more from benchmark and have a higher Active Share.
2. Charge lower fees.
3. Deliver higher returns.

Outside the most developed markets there is little explicit indexing but considerable closet indexing, as in those markets, active funds tend to charge higher fees.

The chart below depicts the difference in performance between closet indexers and truly active funds.

The chart shows that in four of the nine years, slightly more than 50% of the active funds outperformed their benchmarks whereas in all years well below 50% of the closet indexers outperformed their benchmarks - in large part due to their high fees.

Overall, he says that it is clear that explicit indexing improves the levels of competition and efficiency of the mutual fund industry in a country.

**Predictability**

67. King Of The Mountain: Finding Short-Term Efficacy In The Shiller P/E Ratio (Fall 2015)

Rob Arnott, Chairman & CEO of Research Affiliates, LLC, kicked off the Q Seminar with a new look at an old and familiar Q topic: The ability of Shiller’s Cyclically Adjusted Price-to-Earnings (CAPE) ratio to predict future stock market returns. The CAPE ratio is predicated on the idea that the ten-year average of real earnings --- averaging over a period that is longer than the typical business cycle --- provides a better proxy or instrument for the future earning potential of the stock market than, for instance, the trailing 12-month earnings.

Arnott’s talk began by revisiting six key empirical CAPE findings: (i) Over the 1881-2015 period, the CAPE ratio in the U.S. displays mean reversion at long horizons with a half-life of 8.5 years, (ii) the mean of the CAPE ratio in the US has risen over that time frame from roughly 12 to 20, (iii) high CAPE ratios are associated with lower subsequent 10-year real returns, (iv) the relationship between CAPE and future returns is also
present in emerging markets, (v) relative CAPE ratios can be used to predict relative returns, such as between the United States and Emerging Markets, and (vi) CAPE is efficacious at predicting long-run returns but does less well at predicting shorter returns.

Arnott examined whether the poor performance of CAPE at predicting returns over shorter horizons can be improved by conditioning on current macroeconomic conditions. This builds on earlier research by Leibowitz and Bova (2007), who found that moderate real interest rates are associated with higher stock market valuations. Arnott’s talk focused on the joint relationship between CAPE and two key macroeconomic variables: the real interest rate (measured as the 10-year nominal government rate minus three-year inflation) and inflation (measured on a one-year basis). The key finding is that, historically, CAPE has been it’s highest at moderate levels of real rates and inflation. CAPE tends to be depressed when rates and inflation are either too low or too high. This is depicted in the three-dimensional chart below. The chart shows that CAPE is maximized when inflation is in the 1-3% region and real rates are 3-5%.

This three-dimensional “P/E Mountain” graphically captures the main point of the paper: the non-linear relation between CAPE, real rates, and inflation. Arnott then proceeded to describe a more robust approach to capturing the relationship between these three variables by using a maximum likelihood procedure (assuming a joint Gaussian distribution) to estimate the three-dimensional surface represented above by the tops of the bars. Then, a regression framework provides a simple way to compare the forecasting ability of traditional linear models that relate CAPE to macro variables to his non-linear procedure. The main results are summarized in the two tables below. The first table shows the statistical superiority, based on R-squared, of the non-linear model in terms of its ability to explain the time series behavior of CAPE ratios.7

The second table compares the performance of two models that predict future real returns across a variety of horizons. The left panel of the table contains results where the log of CAPE is used as an explanatory variable. The panel on the right contains results where the explanatory variable is the CAPE ratio minus its conditional expected value (where this conditional expectation is based on Arnott’s non-linear model above). At horizons of a year or less, the conditional model shows superior relative performance, although the absolute performance is still weak. At longer horizons, the unconditional model works better. Arnott argues that this is

7 With the caveat that the usefulness of the R-Squared statistic is affected by the overlapping nature of the earnings data on the left hand side of the equation.
to be expected as the current value of these macro variables should not be that relevant to predicting returns over long horizons.

The last part of Arnott’s talk focused on results outside of the United States, which reinforced the conclusions arrived at above using U.S. data. As of September 30, 2105 the international analysis suggested the following over (-) and under (+) valuations: U.S. (-31%), Australia (+11%), Canada (-15%), France (+7%), Germany (-6%), Hong Kong (-15%), Italy (+55%), Japan (-39%), Spain (+52%), Sweden (-17%), Switzerland (-28%) and United Kingdom (+51%).

Bibliography:

68. Does Academic Research Destroy Stock Return Predictability? (Fall 2014)

Professor David McLean, Dianne and Irving Kipnes Chair in Finance and Development at the University of Alberta, delivered a talk on the existence and durability of stock return anomalies. The key goal of his talk was to determine whether anomalies disappear or weaken after an academic article is widely circulated that documents it.

Sorting on various stock characteristics, such as market capitalization or E/P ratio, has been a staple of academic research (and, investment practice) since at least the 1970s. Hundreds of papers have been written (and many faculty members have become tenured) based on the claim that various “anomalies” exist. McLean’s presentation explores the question: What happens to the anomaly after the paper gets published?

This question is useful for at least a few reasons:

1. Did the anomaly ever really exist, or was it a product of pure luck (“discovered” through data mining)? *If the anomaly was purely fictitious and due to data mining, this implies that there is no alpha to the anomaly after the sample period studied by the academics.*

2. If it did exist, can it be explained as a reward for systematic risk, as persistently argued by Eugene Fama (e.g., perhaps momentum is a systematic risk factor). *If true, this implies that the alpha to the anomaly will persist, and not decay, after the sample period or publication of the academic paper. *

3. If the anomaly cannot be explained as an artifact of data mining or a reward for bearing systematic risk, and it appears to be driven by behavioral biases—often argued by Robert Shiller—how quickly does it dissipate after it becomes widely known and traded on? Shiller would interpret the decay as being the elimination of inefficiencies in the market by
sophisticated investors (those who read the literature), who face some risks and costs in “arbitraging” these anomalies. *Academic studies disagree on the “durability” of predictors; Haugen and Baker (1996) find strong durability in 11 predictors, while Chordia, Subrahmanyan, and Tong (2013) find that zero of 7 predictors survive in a more recent period.*

McLean studies a wide variety of predictors from the literature--altogether, 95 predictors are harvested from papers published in 66 finance journals, 27 accounting journals, and 2 economics journals that documented, with a p-value of 5% or lower, a predictor that worked in forecasting future abnormal returns. For 15 of the predictors, McLean was unable to replicate the in-sample results. McLean then focused on the 80 predictors that he was able to replicate.

Interestingly, the average pairwise correlation between returns that accrue to anomalies is only 5%, indicating that these anomalies may be based on somewhat different underlying economic effects.

Returns on an equal-weighted long position in the “best” quintile, and short the “worst” quintile, according to each predictor, are compared over 3 periods:

1. The *original sample period* covered by the study of the anomaly (although McLean could not always obtain data for the entire sample period)
2. *Post-sample, pre-publication period*—here, the paper was either not written or presumed not widely distributed, so we can call this an “out-of-sample” period
3. *Post-peer-reviewed journal publication*--here, the paper was more widely distributed, so we can assume that it is now public knowledge (in a robustness check, they tried the first date the article was “published” on ssrn.com, with similar results as below)

In sample, the average predictor variable produces 67 bps/month of long-short return. Post-sample, pre-publication, this average drops to 50 bps/month; post-publication, this average drops to 30 bps/month. Thus, more than half of the in-sample predictive power is lost by the time of publication.

Further, those predictors that work better in-sample have a larger decay during the post-publication period. This could indicate both some level of data-mining, as well as a larger amount of capital invested by the market in the best anomalies. McLean next explores in-sample returns and decay rates by the predictor type:

1. Corporate events: e.g., sell-side analyst ratings downgrades
2. Fundamentals: e.g., accruals (variables constructed only with accounting data)
3. Market-based: only use market data, and no accounting data, such as return momentum
4. Valuation: ratios of market values to fundamentals

The below graph shows the in-sample vs. post-publication return, on average, across these four categories. Purely market-based signals have the largest in-sample returns, but also have the largest decline, indicating that these are most readily detected and arbitraged by investors (and,
maybe the easiest to be data-mined by academics as well).

Finally, McLean studies other characteristics of stocks involved in each of the signals, and finds that, after publication, there is an increase in shorting activity and trading volume. This finding indicates that, indeed, investors note the publication and increasingly trade on the anomaly.

Further, the correlation of a signal’s returns with those signals yet unpublished decreases, while the correlation with those signals already published increases, indicating a potential common pool of investors who arbitrage these.

McLean concludes that, while some data-mining likely occurred, the average signal did generate some returns post-sample. And, when the market was widely informed of the signal, post-publication, the anomaly returns almost disappear. One chief finding of his paper is that academic research appears to be profitable for investors while also making markets more efficient. Of particular interest to Q-Group members: he hopes to create a “user’s guide to the cross-section of stock returns,” where he will list the most important of the (now) over 100 signals they are studying in equity markets.

References


69. The Shiller CAPE Ratio: A New Look (Fall 2013)

In 1998, Robert Shiller and John Campbell published a path breaking article, “Valuation Ratios and the Long-Run Stock Market Outlook.” In that article they showed that long-run stock market returns were not a random walk but could be forecast by their Cyclically Adjusted Price-Earnings ratio (CAPE ratio). This ratio is created by dividing an index of stock market prices by the average of the prior ten years of aggregate real earnings. Siegel says that Shiller’s CAPE ratio “…is the single best forecaster of long-term future stock returns.” Still, Siegel is troubled by the fact that the ratio tends to be over pessimistic. He explores why it is overly pessimistic and focuses on the data behind the CAPE ratio’s forecasts.

The CAPE ratio gained attention in December 1996 when Shiller presented it to the Board of Governors of the Federal Reserve. At that time the ratio warned that 1990s stock prices were running well ahead of earnings. One week later Chairman Greenspan delivered his “Irrational Exuberance” speech in an attempt to temper the market.

At the top of the bull market in 2000 the CAPE ratio hit an all-time high of 43, more
than twice its historical average, correctly forecasting the poor equity returns over the next decade (as is shown in in the following chart).

In January 2013, the CAPE ratio reached 20.68, about 30% above its long-term average, and predicted a 10-year annual real stock return of 4.16% (2.5 percentage points below its long run average). This created concern among many stock market forecasters, and led many to consider the current stock market rally unsustainable. This concern continues into October 2013. Wisely, Siegel asks whether the CAPE ratio is now overly bearish? Is it time for patience or are we on the brink of another serious decline as the ratio forecasts? Siegel seeks to answer at least part of this question.

As background, Siegel notes there have only been nine months since 1991 when the CAPE ratio has been below its long-term mean. Further, in 380 of the 384 months from 1981 through 2012, the actual 10-year real returns in the market have exceeded the CAPE ratio’s forecasts. Seigel speculates about whether there is a problem with the CAPE ratio and whether its effectiveness as a predictor of long-term returns changed over time.

Siegel argues that the CAPE methodology is not robust to changes in:

1. Required ROE caused by changes in:
   a. Transaction costs.
   b. Real growth rates.
   c. Aging of the population.

2. Growth of earnings per share for a given return on equity, such as those caused by changes in dividend policy.

3. Methodology used to compute reported earnings.

Siegel concludes that the problem lies in the accounting treatment of capital losses that has substantially distorted firms’ reported earnings. To demonstrate the potential problem in reported earnings, he compares three different measures of after-tax earnings per share:

1. Reported earnings as published by S&P.
2. Operating earnings published by S&P since 1989 that allow firms to exclude unusual items.

The following table shows the different earnings measures during the post-1929 recessions. Note that the cyclical nature of S&P reported earnings has changed dramatically in the last 3 business cycles (from June 1990 to June 2009 and highlighted in dark grey in the following chart).

Perhaps most striking, Siegel points out, is that NIPA earnings fell 53.0% during the recent global financial crisis whereas those reported by S&P500 dropped 92.1%. Particularly puzzling is “…that the decline in S&P 500 reported earnings in the 2008-9 recession, where the maximum decline in GDP was just over 5%, was much greater than the 63.4% decline in S&P’s recorded earnings in the Great Depression, which was over 5 times as deep [in terms of GDP decline].” Siegel attributes this difference to FASB Rules 142 and 144 issued in 2001 that forced non-financial firms to mark-to-market any impairments to PPE and intangibles and to FASB Rule 115 issued in 1993 that
required financial firms to mark-to-market securities held for trading or “available for sale.” Since FASB does not allow non-financial firms to write-up assets, Siegel argues that these rules had the effect of greatly increasing the number and size of the earnings write-downs without any offsetting increases when assets recovered in value and uses.

He provides an example to show the magnitude of the problem using Time-Warner’s purchase of AOL in January 2000. The capital gain to AOL shareholders was excluded from reported earnings data, although when Time Warner subsequently was forced to write-down its investment by $99 billion following, the internet bubble, this write-down could not impact earnings.

Siegel points out that there are serious issues with how the S&P computes reported earnings for its index, what he calls the “aggregation bias.” Given its S&Ps construction methodology, it effectively assumes that the holder of the S&P500 index has one option on the aggregated earnings all 500 of the firms in the index rather than having a portfolio of 500 options on the earnings of each of the firms. This “aggregation bias” was particularly acute during the global financial crisis, Siegel says. In the fourth quarter of 2008, for example, the S&P 500 index recorded an unprecedented $23.25 loss in reported earnings. This was primarily caused by the huge write-downs of three financial firms: AIG, Bank of America, and Citigroup. AIG itself recorded a $61 billion loss that quarter that more than wiped out the total profits of the 30 most profitable firms in the S&P 500, despite it weight of less than 0.2% in the S&P 500 index. At the same time the 30 most profitable firms had an aggregate market value comprising almost half the index. Siegel wants us to know that there is one more problem that can bias the data: the post WWII change in dividend policy that impacts the predictive relationship between CAPE and future stock returns.

Siegel looks at the CAPE ratio on September 30, 2013; 23.31, 46.3% above the 140 year median CAPE ratio of 15.93. This, he says, pointed to a grossly overvalued stock market and to meager returns over the next ten years (2.94% per annum). This forecast, Siegel points out, is dependent on the use of S&Ps reported earnings. Changing from S&P to NIPA profits reduces the overvaluation as well from 46.3% to 8.9%. When further adjusted for changes in dividend policy the overvaluation declines further.

Siegel concludes by saying his observations do not reduce the CAPE ratio as a powerful predictor of long-term real stocks returns. However, substitution of NIPA profits into the CAPE model and correcting for the shift in the trend rate of growth of real per share earnings improves its predictability and eliminates most, if not all, of the overvaluation of the stock market in recent years.

70. Changing Times, Changing Values: A Historical Analysis Of Sectors Within The U.S. Stock Market 1872-2013 (Fall 2013)
Robert Shiller kept his commitment to present his paper to the Q Group Fall 2013 meeting in Scottsdale, though he did so via video link.

Shiller presents work that extends the Cyclically-Adjusted Price Earnings (CAPE) ratio research of Campbell and Shiller (1988, 1998 and 2001), and Shiller (2005) into forecasting long-term market returns. He constructs price, dividend, and earnings series for the Industrials, Utilities, and Railroads sectors from the 1870s until 2013 from primary sources and investigates the forecasting power of the Cyclically Adjusted Price-Earnings (CAPE) ratios for each sector individually.

Originally Shiller used a CAPE ratio based on the current real price divided by a ten-year average of real after-tax earnings. This measure is potentially affected by differences in corporate payout policy. He discusses a procedure for scaling real earnings based on the ratio of an asset’s total return (including dividends) to its price return (excluding dividends) and uses this to construct a more robust CAPE ratio.

As another modification to his earlier work, Shiller introduces the Relative CAPE - the current CAPE divided by its own twenty-year average. Shiller argues that this adjustment removes long-term trends and intermediate cycles, and also controls for different industries having different growth trajectories.

Robert J. Shiller - Interview

Telephone interview with Robert J. Shiller recorded immediately following the announcement of the 2013 Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel, 14 October 2013. The interviewer is Nobelpriize.org's Adam Smith.

[RS] Hello?
[AS] Hello, may I speak to Robert Shiller please?
[RS] Speaking.
[AS] Hello, my name's Adam Smith. I'm calling from Nobelpriize.org, the official website of the Nobel Prize in Stockholm.
[RS] Oh okay.
[AS] We have a tradition of recording very short interviews with new Laureates – could we just speak for a few minutes?
[RS] Yeah.
[AS] Thank you very much indeed. Well first of all, many congratulations on the Prize.
[RS] Thank you.
[AS] How did you hear the news?
[RS] I was getting ready to leave on a trip to Phoenix, Arizona, getting dressed, and I got called.

[AS] (laughs) And, what was your first reaction?
[RS] Disbelief.
[AS] Do you think the trip to Phoenix is going to go ahead?
[RS] Well, it’s at least postponed and it may be cancelled......
[AS] But, I just wanted to ask you how, just one question, because this is going to expose your field of research to a very wide audience, who won't previously have been aware of it. It's all to do with the predictability of asset pricing. How good a handle do you think we have on that? Do you think it’s very much a work-in-progress or have we got things pretty well worked out?
[RS] It's very much a work-in-progress, yeah. Well I could briefly say that it's... we've learned a lot about asset pricing, but there's a basic human element in it that is irreducible. So, predicting what asset prices will do is partly similar to trying to predict what one person will do, and so could there ever be a science in predicting what you, Adam, will be doing? No, because there's an irreducible human element. And that's part of the reason why the field of finance will never completely understand asset pricing movements.
Before presenting his findings, he discusses how the data was created beginning in the early 1870s and ending in 2012. He melded data from the 1939 Cowles Commission for Research in Economics at Yale, and various editions of Standard and Poor's Security Price Index Record and Analysts' Handbook to construct historical prices, dividends, and earnings for the three sectors. Shiller presents a series of charts and graphs showing nominal and real price indices, real total returns, 12-month trailing earnings, the CAPE ratios and Relative CAPE indicators, each plotted against long-term returns, and ten-year average returns for the CAPE and Relative CAPE indicators. The following table summarizes the correlations between subsequent 10-year real returns, and the CAPE and Relative CAPE ratios for the three sectors and for three different time periods.

Shiller says that the correlations reported in the table are negative, similar in size across sample periods and across sectors, and largely statistically significant. This reinforces Shiller’s earlier work linking the CAPE ratio’s ability to forecast long-term aggregate market returns by showing that they have forecasting ability for individual sectors as well.

Shiller next explores whether relative differences in CAPE ratios between pairs of sectors can help explain inter-sector differences in long-dated subsequent returns. The table presented below summarizes much of the information contained in these charts and graphs.

The correlations all suggest that sectors with the lowest Relative CAPE ratios tend, over a long-period, to be the sectors with highest relative returns.

As a further robustness check, Shiller looks at whether the CAPE or Relative CAPE indicator actually predicts changes in future prices or changes in future 10-year earnings averages. He concludes that they are most helpful in predicting future returns and changes in prices.

Shiller then explores a hypothetical trading strategy based on the Relative CAPE indicators by quarterly allocating long-only positions across the three sectors, based on it and momentum. He finds that $1 invested in his simple rotation strategy in Q4/1902 would have grown to approximately $1,756 by 1/2013. An investment in the S&P500 would have grown to $569; an equally-weighted portfolio of the three sectors would have grown to $856 over the same period. The rotation strategy holds promise and he is implementing it. Shiller says that the contribution of this work is threefold.

1. A long time-series of prices, dividends, and earnings from the 1870s through the present was developed from primary sources for three sectors.
2. Using this data enables the investigation of the valuation of the US stock market for almost 130 years on the more granular level of sectors, and allowed for the consideration of the relative valuation of these sectors.
3. On methodological grounds, the definition of the Cyclically Adjusted Price-Earnings ratio (CAPE) is extended to account for inflationary effects that occur because of the consideration of a long-term earnings history, and to correct for effects from changes in corporate payout policy.
And from the Q Group members present, congratulations on becoming a Nobel Laureate, Robert Shiller!

71. Is Economic Growth Good For Investors? (Fall 2013)

Economic growth is widely believed to be good for stock returns, making forecasts of growth a staple of international asset allocation decisions. But, Ritter asks, does economic growth always, or even generally, benefit stockholders? His answer, and the subject of this paper, is no on both theoretical and empirical grounds.

Ritter’s argument is not that economic growth is bad - people who live in countries with higher growth tend to have higher incomes, higher standards of living, and longer life spans. The problem is that owners of capital do not necessarily benefit from that growth. The reason is that countries can grow rapidly, and for long periods of time, by applying more labor and capital, and introducing technological improvements, even though the return on capital is not high.

Using data from 19 countries with continuously operating stock markets from 1900 - 2011, Ritter finds that the cross-sectional correlation between real per capita GDP growth and real stock returns is negative in both local currency, -39%, and in USD, -32%. These findings are similar to those in Jeremy Siegel’s Stocks for the Long Run 2nd Ed., and are similar to those from a slightly larger subset of developed countries using more recent data, 1970-2001. The negative correlation between real stock returns and real per capita GDP is also present in a sample from 15 emerging markets countries using data from 1988-2011: -0.41 in local currencies and -0.47 in USD.

The lack of positive relationship between real per capita GDP growth (light grey) and real stock market returns (dark grey) can be seen in the chart that follows.

Ritter posits three possible explanations of the negative correlation between real stock returns and real per capita GDP growth:

1. High future growth is reflected in high price-earnings ratios at the start of the periods,
2. Many of the largest publicly traded companies in each market are multinationals, and their earnings are only weakly related to domestic GDP growth.
3. Stocks returns are determined not by the growth in economy-wide earnings, but by firm-specific performance.

Ritter dismisses the first two explanations. For the first, he says that starting valuation differentials do not make a tremendous return difference over a 112-year period. For the second, he says that the multinational explanation, originally proffered by Jeremy Siegel, could explain a lack of correlation, but not a negative correlation.

The third explanation is Ritter’s favorite. He says the results reflect the amount of equity capital raised over time to generate the growth as well as the efficiency with which the capital was used. He cites as support of this explanation the case of the United States where corporate payout policy is important. He argues that the large distributions of capital to shareholders, either through dividends or stock buy-backs, have been an important contributing factor to the high returns earned by U.S. stockholders. This puts the reinvestment decision back in the hands of investors and avoids the waste that would have occurred from reinvesting in declining businesses or entering an unfamiliar one.

Higher payout policies also discipline management’s tendency to be overly optimistic and to overinvest. This argument,
Ritter believes, is supported by the higher correlation between real dividend growth per share and high stock returns. As an example of the relationship he says that Japan had a relatively poor overall stock market performance (+3.60%) over the 112-year period, but the lowest real dividend growth per share (-2.36%), the highest real GDP growth (+2.69%).

Ritter next discusses sources of economic growth. He notes that economic growth largely comes from increases in three main inputs: labor, capital and technology. Increases in labor are attributable to increases in the size of the population, the percentage of the population that is part of the labor force, and the human capital of the workforce. In support Ritter cites the work of Paul Krugman and Alywyn Young who examined the high growth rates in the Soviet Union from 1930-1970 and in many East Asian countries from 1960-1993. They explained the tremendous growth in those countries as a result of combining huge supplies of underutilized labor (e.g. moving people out of subsistence agriculture), a demographic dividend that came from lower birth rates, with capital from high savings rates and imported technology. As Ritter explains, this combination need not translate into higher per share profits for shareholders: consumers and workers may end up being the primary beneficiaries.

Ritter did not have time to address his remaining topic, predicting future returns. For this, he deferred to the research of an earlier presenter, Jeremy Siegel.

72. Market Expectations in the Cross Section of Present Values (Spring 2013)

Kelly starts by reminding us that until 30 years ago we thought of the equity premium as a constant. This has changed. Theory and data suggest returns move in subtly predictable ways. Although the debate continues about whether this is true, the dominant view is that equity returns are predictable. Kelly asks, “Why are EMH disciples OK with this?” To which he answers, predictable returns need not be a violation of the EMH.

Kelly posits that investors require compensation for assets that are risky. Investors, he says, demand high returns for assets that do poorly in bad times when the marginal utility of consumption is high: they demand low expected returns for assets that do well in bad times (such as Treasuries or OTM puts). When risks change in a predictable way, he says the compensation investors require should change as well. This sets up Kelly’s key thought, if risk is predictable, so are returns.

Kelly notes that there have been three major approaches taken in trying to predict aggregate market returns: historical analyses which assume the unconditional returns distribution in the future will look like the returns distribution in the past; theoretical calibrations based on preference-based models; what he calls leading indicator models that combine theory with historical data.

One of the primary examples of leading indicator models are those based on such aggregate valuation ratios such as book to market, price to dividend, and price to earnings.

While these models have shown modest predictive ability in-sample, Kelly finds they have negative R-squares out-of-sample. Thus, the predictive information has a negative impact.

Kelly argues that much more powerful predictive models can be constructed by exploiting the information in the cross-section of asset-specific valuation ratios. He says the intuition is that the same state variables that drive aggregate returns
expectations also govern the dynamics of thousands of asset-specific valuation ratios. He posits that the richness of the cross-section of these asset-specific valuation ratios can be exploited in a smart way to generate a super predictor of future stock market returns. Using this, Kelly proposes using market valuation ratios to predict market returns.

Kelly uses Partial Least Squares, an easily implemented OLS-based approach, to estimate the latent factor that is optimal for forecasting. Rather than one thing to make the predictions, he forms what he calls a “super predictor,” from the weighted average of all the predictors. He then creates predictions by applying PLS to the cross section of:

1. Portfolio level book to market ratios.
2. Stock level book to market ratios.

He then predicts:

1. Aggregate US market returns for 1 month and 1 year.
3. Characteristic-sorted US portfolio returns for 1 month and 1 year.

He relates the estimated returns to macroeconomic variables. The results of this analysis are shown in the following chart.

Kelly concludes that the expected returns from his model:

1. Significantly outperform previous attempts to predict market returns.
2. Possess sensible correlations with suspected macroeconomic drivers of discount rates.

### 73. Innovative Efficiency And Stock Returns (Fall 2011)

David Hirshleifer, Professor of Finance, Merage Chair in Business Growth, Paul Merage School of Business, University of California, Irvine presented “Innovative Efficiency and Stock Returns,” he coauthored with Po-Hsuan Hsu, Assistant Professor, School of Business, University of Connecticut and Dongmei Li, Assistant Professor, Rady School of Management, University of California, San Diego.

Hirshleifer points out that recent studies have provided evidence suggesting that, due to limited investor attention, prices do not fully and immediately impound the arrival of relevant public information. This is especially so when such information is less salient or arrives during a period of low investor attention. This insight into prices may be particularly relevant when looking at the link between innovative efficiency and subsequent stock returns, an important contributor to a firm’s market value.

Hirshleifer and his colleagues test whether a measure of innovative efficiency, the ratio of a firm’s patents to its R&D expenditure, predicts subsequent abnormal returns. There are several reasons why innovative efficiency should predict higher future returns:

1. **Limited Attention.** Innovations are usually officially introduced to the public in the format of approved patents that provide necessary detailed information. Firms
that are more efficient in innovations may be undervalued and firms that are less efficient in innovations may be overvalued due to investor under-reaction to information. The problem may come from the difficulty in getting, understanding and processing patent information, and in determining the economic potential of innovative efficiency.

2. **Q-Theories.** Companies with higher innovative efficiency tend to be more profitable and have higher return-on-assets. All else equal, this implies that higher profitability predicts higher returns since a high return on assets suggests that these assets were purchased at a discount.

To test their key prediction (innovative efficiency predicts stock returns) Hirshleifer defines innovative efficiency (IE) as the ratio of the number of patents granted to five-year cumulative R&D expenditures. He says that the evidence supports the basic prediction of both the limited attention and Q-theories and finds a significantly positive relationship between innovative efficiency and future stock returns that are not explained by standard risk factor models. In fact the value-weighted return of the high innovation (IE) portfolio is 38 basis points per month higher than that of the low IE portfolio and the alphas of the high- minus-low IE portfolio range from 45 to 46 basis points per month. Moreover, the high- minus-low IE portfolio loads significantly and negatively on the market and size factors. This implies that high IE firms are less risky than low IE firms from the perspective of conventional risk factor models.

For their test they use a sample of firms in the intersection of Compustat, CRSP, and the NBER patent database from 1981-2006. The IE measure is based on R&D expenditures over the preceding five years that contribute to successful patent applications. Hirshleifer notes that the lag length between R&D expenditures and patent applications is hard to identify precisely. As a result, they consider alternative measures of innovation.

To examine the return predictability of IE, they sort firms into three groups (low, middle, and high) at the end of February based on the 33rd and 66th percentiles of IE measured in the previous year. The two-month lag between the granted year end and the time of portfolio formation is imposed to ensure that patent

<table>
<thead>
<tr>
<th>Rank of patent counts/R&amp;D capital</th>
<th>Low</th>
<th>Middle</th>
<th>High</th>
<th>Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of firms</td>
<td>677</td>
<td>248</td>
<td>462</td>
<td>3323</td>
</tr>
<tr>
<td>Market capitalization ($million)</td>
<td>1294.03</td>
<td>4809.53</td>
<td>2764.99</td>
<td>798.25</td>
</tr>
<tr>
<td>% of total market capitalization</td>
<td>14.6%</td>
<td>19.9%</td>
<td>21.3%</td>
<td>44.2%</td>
</tr>
<tr>
<td>Patent counts/R&amp;D capital</td>
<td>0.00</td>
<td>0.07</td>
<td>2.54</td>
<td></td>
</tr>
<tr>
<td>Patent citations/R&amp;D capital</td>
<td>0.01</td>
<td>1.21</td>
<td>48.34</td>
<td></td>
</tr>
<tr>
<td>Citations excluding self-cites/R&amp;D capital</td>
<td>0.01</td>
<td>1.10</td>
<td>45.11</td>
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<tr>
<td>R&amp;D expenditure (million)</td>
<td>40.51</td>
<td>187.53</td>
<td>72.81</td>
<td>7.64</td>
</tr>
<tr>
<td>R&amp;D expenditure/Market capitalization</td>
<td>0.09</td>
<td>0.11</td>
<td>0.07</td>
<td>0.04</td>
</tr>
<tr>
<td>R&amp;D expenditure/Sales</td>
<td>2.78</td>
<td>2.54</td>
<td>0.60</td>
<td>1.75</td>
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<tr>
<td>Book-to-market ratio</td>
<td>0.75</td>
<td>0.70</td>
<td>0.67</td>
<td>0.85</td>
</tr>
<tr>
<td>Net stock issues</td>
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<td>0.04</td>
<td>0.04</td>
<td>0.06</td>
</tr>
<tr>
<td>ROA (%)</td>
<td>−5.46</td>
<td>−0.04</td>
<td>−0.04</td>
<td>0.59</td>
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<tr>
<td>Asset growth</td>
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<td>0.15</td>
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</tr>
<tr>
<td>CapEx/Assets</td>
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<td>0.07</td>
<td>0.07</td>
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</tr>
<tr>
<td>Momentum</td>
<td>0.02</td>
<td>0.06</td>
<td>0.05</td>
<td>0.00</td>
</tr>
<tr>
<td>Institutional ownership (IO)</td>
<td>0.29</td>
<td>0.49</td>
<td>0.43</td>
<td>0.31</td>
</tr>
</tbody>
</table>
information was known to the public. The table on the next page provides the summary statistics for their sample.

Hirshleifer then points out that the high IE group has the lowest R&D intensity, suggesting that IE is distinct from R&D intensity. The high IE group also has lower book-to-market ratio, higher ROA, lower CapEx/Assets, higher institutional ownership, and issues less equity than the low IE group. He then proceeds to describe the process they used in considerable detail.

In conclusion, Hirshleifer summarizes their findings:
1. Firms that are more efficient in innovation earn higher subsequent returns and the relationship is robust when controlling for other well-known firm characteristics. In addition, traditional empirical factor pricing models do not explain this relationship.
2. The innovative efficiency proxy (patents granted per dollar of R&D capital) is a strong positive predictor of future returns.
3. A model that combines the investment based three-factor model with the financing based mispricing factor (Undervalued Minus Overvalued) captures most of the innovative efficiency effect in the full and large firm subsample, but not in the small firm subsample.
4. Within the large firm subsample, explanatory power comes primarily from the ROA factor.
5. In the small firm subsample, explanatory power comes primarily from the misvaluation factor.
6. Proxies for investor inattention and valuation uncertainty are associated with the stronger ability of IE to predict returns. This provides support for psychological bias or constraints contributing to the IE-return relationship.

Hirshleifer concludes that these findings suggest that both risk and mispricing play a role in the IE-return relationship. More importantly, regardless of the source of the effect, the heavy weight of the EMI factor in the tangency portfolio suggests that innovative efficiency captures pricing effects above and beyond those captured by the other well-known factors.

74. The Other Side Of Value: Good Growth And The Gross Profitability Premium (Fall 2011)

Robert Novy-Marx, Assistant Professor, Simon Graduate School of Business

University of Rochester presented “The Other Side of Value: Good Growth and the Gross Profitability Premium.”

Novy-Marx starts with the proposition that that gross profitability is a powerful predictor of the cross-section of average returns and is a much stronger predictor than earnings or free cash flows. He says gross profitability,
1. Has about as much power as the book-to-market (B/M) ratio and is complementary to it.
2. Is negatively correlated with B/M and helps distinguish high return “good growth” stocks from those with ordinary growth.

He then turns to a discussion of why gross profitability matters:
1. Gross profit is the “cleanest” measure of true economic profitability: earnings are punished for growth-related activities such as R&D and the development of organizational capital.
2. Free cash flows are further “punished” for capital investment even when they are optimal.

To provide a strong test he uses stale data: end of year or fiscal year data six months after its publication. He does test high frequency data: data published most recently. Novy Marx says that that incorporating gross profits, whether lagged or high frequency, is a powerful predictor of the cross section of average returns. It appears, though, that the data is obscured by its negative correlation with book-to-market. In fact, after sorting on book-to-market it appears that profitable stocks underperform. These results and others, Novy-Marx says, are difficult to reconcile with popular explanations of the value premium. Profitable firms are less prone to distress, have longer cash flow durations, and lower levels of operating leverage. Controlling for gross profitability explains most earnings related anomalies as well as a wide range of seemingly unrelated profitable trading strategies.

75. Share Issuance And Factor Timing (Spring 2011)

Robin Greenwood, Associate Professor of Business Administration, Harvard Business School and NBER, presented “Share Issuance and Factor Timing” coauthored with Samuel Hanson, Ph.D. Candidate, Harvard University. Greenwood had previously presented a paper at the Q-Group® seminar in the Fall of 2009.

Greenwood started by noting that research has found that, relative to other firms, firms that issue stock subsequently underperform and repurchasers subsequently have high returns. He notes that there is a debate about whether these patterns should be interpreted as evidence of a corporate response to mispricing, or as fully consistent with market efficiency.

In fact, he and his coauthor suspect that what is really going on it that firms are arbitraging time-varying demand for characteristics. He says that investor sentiment revolves around “themes” or “narratives” for which characteristics serve as a proxy, and firms arbitrage this demand by issuing stock. This suggests to Greenwood that issuance may be useful for forecasting returns to characteristic-based factors. It is this idea that is the core of the research and this presentation.

The typical approach to a resolving a problem like this is to collect information about the characteristics of a company and associate these characteristics with average returns in a cross-sectional analysis. To clarify how their analysis is different, Greenwood lays out an example of the two approaches using Google as an example:

- **Usual approach:**
  - Collect data on Google’s characteristics such as beta, size, book-to-market ratio, profitability and dividend yield.
  - Associate each characteristic with some average return in a cross-sectional analysis.

- **Greenwood’s approach:**
  - Collect data on other firms that have the same characteristics as Google.
  - Use net issuance by similar firms to back-out when these characteristics are mispriced.
  - Use this to improve the forecast of Google’s returns.

Implicit in this approach is assuming that firms can act as arbitrageurs or liquidity providers relative to the time-varying characteristic return, albeit in a noisy fashion. He notes two caveats: market timing may not be the primary determinant of net issuance; there may be limitations on the ability to act opportunistically. He believes that conditioning on behavior of other firms may
provide more information than simply looking at the company’s own issuance and repurchase decisions.

In this research Greenwood and his coauthor limit themselves to characteristics that are measurable and have been recognized as important in previous research:

- **Value & Size**
  - Book-to-Market
  - Size

- **Size Related**
  - Nominal Share Price
  - Age: Years on CRSP
  - β from 24-month trailing CAPM regression
  - Σ, residual volatility from CAPM regression
  - Distress, bankruptcy hazard rate
  - Dividend policy as a binary indicator for firms that pay dividends

- **Other**
  - Sales growth (DS/S): year-over-year sales growth
  - Accruals (Acc/A)
  - Profitability (E/B)

They allow the data to tell them which characteristics are important.

One way to examine what impacts net share issuance (N/S) is to relate it to a single characteristic. Using deciles Greenwood creates Issuance Characteristic Tilt Graphs for different characteristics and for several different years. Shown below is the 2005 graph relating size and share issuance. The size of the circles in the first column varies by the number of firms in the N/S deciles. As can be seen, the relationship between issuance and company size is negative in 2005. This suggests the importance of the characteristic to share issuance in that year. The slope and level of the line varies from year to year.

Shown in a somewhat different way, Greenwood relates the issuer repurchase spread to the characteristic. The chart for the size characteristic is shown below.

Not surprisingly, the spreads correlate across characteristics. Greenwood says that:

- Share issuance forecasts characteristic-based factor returns.
- Firms issue equity prior to periods when other stocks with similar characteristics perform poorly, and repurchase prior to periods when other firms with similar characteristics perform well.
- The strongest results are for portfolios based on book-to-market, size (i.e. HML and SMB), and industry.

He takes it a step further and concludes issuer-repurchaser characteristic spreads:

- Forecast characteristic returns.
- Contain information beyond B/M and have forecasting power for non-issuing firms.
- Are consistent with the role of firms as macro liquidity providers.

Whether it is due to required returns or mispricing, he says the evidence points to mispricing.

Greenwood believes their work has implications for researchers who study the stock market performance of secondary,
initial public offerings, and recent acquisitions. Among other things, he says that those doing event studies that compare the performance of sample firms to firms matched on characteristics will omit any returns coming from event firms’ timing of those characteristics when they should not do so.

76. Hard Times (Spring 2011)

Christopher Polk, Director of the Financial Markets Group, Professor of Economics, London School of Economics, presented “Hard Times” coauthored with Stefano Giglio, Ph.D. Candidate, Department of Economics, Harvard University.

Polk begins with the question that motivates this study: where will the market go? He says that many think it is easy to forecast the market’s direction, particularly when there is a bubble. However, it is not, and, at times, has been banned. To demonstrate this Polk provides the NY State Statute 899 that explicitly forbade forecasting. Guilty transgressors faced jail time and/or a fine.

In spite of prophecy’s reputation, given that the US stock markets have had two major boom/bust cycles in the past 15 years, the ability to understand them is important and to predict them even more important. Thus, Polk asks the following questions:

• How should we interpret these dramatic fluctuations?
• Are stock prices driven by changes in discount rates or by expectations about profits?

Polk says that the answers to these questions are important because they tell us about the proximate causes of stock market fluctuations, and the answers may reveal future prospects for the stock market.

To begin, Polk focuses on the two recent downturns: the “Internet Bubble” of 2000-02, and the “Financial Crisis” of 2007-08. He says that during the first bubble stock prices fell primarily because discount rates increased. However, low discount rates were the main driver in the booms of 1990s. The Financial Crisis was, Polk says, largely expected cash flow based and cash-flow based declines are much more long lasting.

To examine the distinction between the impact of discount rate and cash flow expectations changes, Polk uses a structured econometric approach that builds on research by others but adds the estimate of the aggregate VAR. This imposes the cross-sectional restrictions of the inter-temporal capital asset pricing model (which is assumed to be correct), thus reducing uncertainty about the components of the stock market fluctuations. This methodology, Polk says, relies on specific assumptions about the data generating process, which he believes are reasonable, although their results also are consistent with a simpler and much less elegant model.

In the model, the authors include the following variables with data on French’s six portfolios:

• Excess log return on CRSP value-weighted index
• Log ratio of S&P index to 10-year smoothed earnings
• Term spread in Treasury yields (10 years to 3 months)
• Small-stock value spread (difference in log B/M for small growth and small value portfolios)
• Default spread (BAA to AAA bonds)

Their analysis shows that:

• Theoretical restrictions improve the out-of-sample forecasting power of the VAR.
• Return forecasts were much lower in the 1990’s than in the mid 2000’s and increased much more rapidly in 2000-02 than in 2007-09. The contrast is
particularly striking in their theoretically-restricted model.

- The increase in expected return mitigated the impact of the tech bust for long-term investors. However, the changes in expectations were particularly abrupt in March 2009, and a strong recovery should not have been anticipated at the time, a forecast in line with his presentation title “Hard Times.”

From their analysis, Polk comes to three concluding observations:

1. Value stocks have higher returns on average because they have lower realized returns during periods of negative cash-flow shocks.
2. Imposing this theory when estimating a time-series model for the equity premium improves out-of-sample performance.
3. In contrast to the tech boom/bust, a good portion of the recent downturn reflects expectations of significantly lower future profitability.

77. Socially Responsible Investing And Expected Stock Returns (Spring 2011)

Sudheer Chava, Associate Professor, College of Management, Georgia Institute of Technology presented “Socially Responsible Investing and Expected Stock Returns.”

The recent off-shore oil spill by British Petroleum in the Gulf of Mexico and the resulting environmental and economic damage emphasizes the need to understand how environmental externalities can be internalized by a firm. Chava points to four possible mechanisms that can impact a firm’s environmental practices:

1. Taxes, such as a carbon tax.
2. Regulation, such as institution of a cap and trade program and/or imposition of tough new regulations on the environmental performance of firms.
3. Environmentally responsible lending where lenders may impose a higher cost of borrowed capital and/or more restrictive terms on non-responsible firms.
4. Socially responsible investing (SRI) where current and potential shareholders may demand higher expected returns from firms that are not socially responsible.

Exclusionary ethical investing can lead to polluting firms being held by fewer investors, thus resulting in a lower stock price and an increased cost of capital. Socially responsible lending can lead to an increase in the cost of capital for the affected firms if a significant number of lenders adopt environmentally sensitive lending policies and firms cannot easily substitute between various sources of capital.

The import of socially responsible investing, Chava points out, is clear: in late 2010, $3.07 trillion in assets were tied to SRI in the US and SRI constituted 12.2% of total US assets under management. In addition to an impact on stock price, environmental concerns can impact lending costs. As an example he points to The Equator Principles that were initiated by World Bank and International Financial Corporation (IFC). Signatories agree to integrate social and environmental risk into their lending decisions. Current signatories represent approximately 80% of global lending volume and include Bank of America, Citibank, and J.P. Morgan Chase.

Chava asks, does SRI or environmentally restricted lending actually impact the environmental profile of a firm? To answer this question he looks at the impact on the firm’s expected stock returns and the price and terms of its bank loans. For firm level environmental data Chava uses ratings information from KLD Research & Analytics, Inc. on environmental concerns (e.g. hazardous waste, substance emission and
climate change concerns), and environmental strength (e.g. environmentally beneficial products, pollution prevention and clean energy strength). KLD, he says, has data for a larger cross-section of firms over a longer time period than any of the alternate data sources. The data covers the S&P 500 from 1991-2000 and the Russell 2000 starting 2001. This data, Chava says, does have some problems:

- Disclosure of greenhouse gas emissions is not mandatory.
- It is difficult to evaluate and quantify the risk implied by the disclosed numbers.
- KLD collects information from a number of data sources.
- KLD’s team of qualified analysts evaluates the data and makes decisions about whether the firm has a specific environment exposure or not.

From this data Chava constructs the following variables:

- **Numconcerns** measures the total number of environmental concerns for the firm recorded in the KLD database.
- **Numstrength** is the total number of environmental strengths for the firm recorded in the KLD database.
- **Netconcerns** is a net measure of environmental concerns and is constructed as numconcerns-numstrength.
- **Climscore** is constructed as the difference of climate change concerns (climchange) and clean energy strength (cleanenergy).

To determine the impact of the variables on stock price he uses as a proxy for ex-ante stock returns derived from the Implied Cost of Capital (ICC). His ICC is based on discounted cash flow model of equity valuation and his analysis controls for such things as leverage and includes a test for industry impact. ICC, Chava says, has the advantage of being a forward looking measure that does not explicitly rely on any asset pricing model and does not need long sample periods. He does point out, however, it requires assumptions about the forecasting horizon and dividend payouts.

Using implied cost of capital derived from analysts' earnings estimates, he finds investors demand significantly higher expected returns from non-SRI stocks; those that are excluded by environmental screens widely used by SRI. In addition, these stocks have lower institutional ownership and are held by fewer institutional investors.

Next Chava turns to the question of environmentally responsible lending. He asks why lenders consider the environmental profile of the firm in pricing loans. He suggests that it could be any or all of the following: potential credit risk related to regulatory uncertainty and unexpected change; uncertainty regarding borrower litigation and compliance costs; potential impact of expanded lender liability laws; possible impact of current and future environmental practices on the lender’s reputational risk. As a result of his analysis, laid out in detail in his paper, he finds:

1. The environmental profile of a firm affects the price and non-price terms of its bank loans because:
   a. Environmental concerns increase loan spreads
   b. Environmental strengths decreases loan spreads

2. Lenders consider the environmental profile of the firm in pricing loans because:
   a. The environmental profile is not simply a proxy for an omitted component of the firms default risk.
   b. Environmental strengths and concerns are priced both in short-term and long-term loans.
   c. Lower syndicate size for firms with environmental concerns and larger
syndicate size for firms with environmental strength.

While it is a challenging task to conclusively rule out the risk story, the results are consistent with reputation-risk-channel of information transmission. They suggest that socially irresponsible investing and the consequent increase in the cost of capital is one channel though which environmental externalities can be internalized by the firm. A second channel is that of the cost and availability of debt.

Regardless of channel, on the basis of this research, one can conclude that it pays for a company to be environmentally responsible. For the lenders and shareholders, it changes the environmental risk profile of the firm at the cost of potentially lower expected returns.

Recovery Theory

78. The Recovery Theorem (Spring 2013)

A central tenet of modern option pricing theory is that the value of an option can be computed without reference to the expected return of the underlying asset. This is a well-known feature of the Black-Scholes option pricing model and its extensions. Option prices can and have been used to infer estimates of the market’s view of risk (volatility), but a whole generation of academics and practitioners have grown up believing that option prices have very little to say about expected returns or the actual return distribution. Steve Ross kicks off the Spring 2013 Q-group meetings by presenting his work on this problem.

Ross begins his talk by discussing how financial data has been traditionally used. In (sovereign) fixed income markets, the full term structure of interest rates is often used - many times in conjunction with a parametric interest rate model - to back out forward rates. The forward rates are used to help predict anticipated future spot rates, to estimate term premia, and to help calibrate models of the term structure that capture the evolution of the term structure over time. In equity markets, Ross notes there has been virtually no attempt to use forward-looking data aside from implied volatility estimates. We have, he says, largely relied on long periods of historical data to estimate quantities such as expected returns, long-term risk premia, and future expected return differentials. Ross says a good example of this is the use of the dividend yield and Shiller’s CAPE ratios to predict ten-year returns.

Ross motivates the potential use of option prices by showing the surface of implied volatilities on S&P put and calls for a particular date with axes of time to maturity (tenor), moneyness (percentage of spot), and implied volatility, as shown in the chart below.

The surface of the graph displays the following familiar features: a smile with out of the money and deep in the money options having the highest implied volatilities; the curvature is greatest for short-date options. The Recovery Theorem is intended to provide a way to go from the contingent prices to the natural probabilities.

Ross develops the intuition for The Recovery Theorem using the binomial option structure. In the binomial framework the prices do not depend on the natural probabilities of the up and down states and thus there is no way to infer the market’s estimate of expected returns.

Ross notes that the contingent price is the pricing kernel - the marginal rate of substitution that captures risk aversion. Ross’ key insight is that the pricing kernel, which
determines how risky cash flows are risk adjusted, has the form of a representative agent with state independent and additively separable preferences. This allows for the recovery of the natural probabilities from a known matrix of Arrow Debreu state prices. Because the Black Scholes model’s state space is not finite, Ross needs another approach. He uses The Recovery Theorem.

Ross illustrates the use of The Recovery Theorem in a three-step process. Using:

1. Option prices to get pure security prices.
2. Pure prices to find the contingent prices.
3. The Recovery Theorem to determine the market’s risk aversion, the market’s natural probabilities for equity returns and the pricing kernel.

Ross uses data from May 1, 2009, a date not far removed from the stock market bottom in March 2009. To test this model, he uses data from the recovered natural probabilities. The results suggest a mean excess return over the next year of 7.13%; the historical mean from a bootstrapped sample suggest an excess return of only 3.06%.

In comparing the recovered natural probabilities, with the risk-neutral probabilities, Ross finds that the risk-neutral distribution has a much fatter left tail and that the natural probability density function is much more symmetric.

In addition, the recovered probability density function has significantly more mass at higher return levels than the density derived from historical returns. Thus, the recovered natural probabilities seem to show much greater upside potential in returns than one would have estimated from historical data.

Ross acknowledges that there are many implications and features of this model that he is still trying to understand. He concludes that his next steps are to:

1. Test the predictive power of the model.
2. Explore the potential benefits of The Recovery Theorem.
3. Extend the analysis to the fixed income markets.

**Risk and Return:**

**Variance/Volatility, Correlation & Equity Premium**

**79. How Do Investors Measure Risk? (Fall 2015)**

Tuesday culminated with what felt like a CAPM revival meeting led by “Evangelist” Jonathan B. Berk, A.P. Giannini Professor of Finance at Stanford Graduate School of Business. Berk presented an engaging defense of the CAPM, and compared CAPM disbelievers to earlier followers of Ptolemy, who believed the data better supported the theory that the sun and the planets rotated about the earth than the newer theory of Copernicus that the earth and other planets orbited around the sun.  

Berk’s research focuses on the comparative ability of alternative asset pricing models to predict flows into and out of mutual funds. Building on the model in Berk and Green (2004), he argued that the competition for alpha results in flows into (out of) mutual funds with positive (negative) risk-adjusted performance until the point where the net alpha is zero. The key results discussed by Berk rely on the following simple regression equation:

$$\varphi(F_{i,t+1}) = \alpha + \beta_{Fe} \varphi(\epsilon_{i,t+1}) + \nu_{t,t+1}$$

where $$\varphi(F_{i,t+1})$$ is the sign of mutual fund i’s investor flow at date t+1 (increase in assets-under-management, adjusted for investment returns, between dates t and t+1), and $$\varphi(\epsilon_{i,t+1})$$ is the sign of fund i’s

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8 Copernicus incorrectly assumed the planets made circular orbits, rather than elliptical ones.
outperformance—according to a particular model—between the same dates. Berk presented a theoretical argument that one can rank the predictive efficacy of alternative asset pricing models by the size of $\beta_{FE}$ in the above equation. The model that investors most rely on will have the highest coefficient. In contrast, if flows and contemporaneous measures of outperformance were unrelated, as with performance measured by a “bad model” that investors don’t believe in, we would expect the slope coefficient to be zero.

For ease of interpretation, Berk presented evidence on the quantity: $\frac{\beta_{FE}+1}{2}$, which will equal 50% if flows and performance are unrelated $\beta_{FE} = 0$. Berk’s results are based on a sample of 4,275 U.S.-domiciled domestic equity mutual funds over the January 1977 – March 2011 period --- a period characterized by substantial growth in mutual fund assets under management (AUM) and concomitant decline in direct investing in equities. As flow data is unavailable, the analysis is based on the change of AUM after adjusting for performance of a relevant benchmark.\(^9\) The key results, for different forecast horizons, are summarized in the table below:

![Table](image)

\(^9\) The performance adjustment is based on a mimicking set of Vanguard funds.

At the three-month forecast horizon (1\(^{st}\) column), “alpha” measured with the CAPM regression model using the CRSP value-weighted index is the top-performing model and predicts the sign of the flows correctly 63.63% of the time. This version of alpha outperforms no risk adjustment (58.55%), the return in excess of the market (62.08%), the Fama French model (63.14%), and Fama French Carhart model (63.25%). Interestingly, the CAPM model using the CRSP value-weighted index --- an index that is unavailable to most investors --- outperformed the CAPM model using the S&P 500 index across all investment horizons (comparing the 1\(^{st}\) and 2\(^{nd}\) rows of the table).

Berk next turned to discussing the statistical significance of his findings. The following table shows the t-statistics associated with the quantity $\frac{\beta_{FE}+1}{2}$ for each risk model at the three month horizon (1\(^{st}\) column of numbers) and the t-statistics for the pair-wise differences in this performance measure for each risk model (remaining columns).

As mentioned above, the CAPM, using the value-weighted CRSP index, explains 63.63% of the signs of fund flows. It beats a no risk model (63.63% vs. 58.55%) with a pair-wise t-statistic of the difference in performance measures of 4.98 (second column from right). Among the results that Berk highlighted were: people appear to be using the CAPM with the CRSP value-weighted index (to his surprise), mutual fund investors are not risk neutral (far right column: CRSP CAPM works better than returns relative to risk-free rate), the CRSP
implementation of the CAPM beats the two multi-factor models (although not statistically significantly at the three-month horizon), the CRSP CAPM does better than simply looking at returns relative to the market index. Berk noted that it remains an anomaly why the CAPM does not work in explaining the cross-section of expected returns, and that the CRSP CAPM only explains about ~64% of the fund flows. Hence, there is more to explain.

Bibliography:

80. Monetary Policy Drivers Of Bond And Equity Risks (Fall 2015)

Carolin Pflueger, Assistant Professor of Finance at the University of British Columbia, contributed to this “Macro Q conference” by helping us to better understand the linkages between the macro economy, sovereign rates (both US and international), and corporate spreads. Carolin began her talk by reminding Q that, historically, the sign of the correlation between US five-year rates and stock returns has been both positive and negative, as depicted in the chart below. The chart shows three important periods: pre-Volker (rising inflation), Volker and early Greenspan (inflation fighting), and late Greenspan and Bernanke (renewed attention to output stabilization).

In the recent period, including during the Great Financial Crisis, Treasury bonds and notes have been an effective hedge to equity market investments (as can be seen by the negative beta in the chart above). This is because a weakening economy has been associated with a fall in inflation, real interest rate declines, and an investor flight to quality. The last two factors also drove up the price of TIPS. In earlier decades, however, Treasuries had a positive correlation with stocks (as can be seen in the chart above) because when the economy weakened: inflation rose, real interest rates rose, and the flight to quality was into cash or commodities and out of both stocks and Treasuries. All three factors drove down the prices of Treasuries and would have driven down TIPS as well.

The possibility that bond and stock prices could and have been positively correlated at times in the past is particularly important for pension plans as they could be exposed to a “perfect storm” in such an environment: dramatic declines in equities (a substantial portion of their assets) and dramatic increases in the present value of their liabilities.

The correlation between bond and stock prices is also an important determinant of equilibrium credit spreads. The stronger the positive correlation between stock and bond prices, the higher the credit risk, since economic slowdowns are then associated with higher borrowing costs. The empirical link between these bond betas and credit spreads is very apparent in international data that Pflueger presented, which is reproduced
What causes the change in bond risks over time? Changes in macroeconomic shocks? Changes in monetary policy? Pfleuger and her co-authors employ a New Keynesian macro model to look at this question and find that both can contribute. The model has three key building blocks:

1. The Investment and Saving (IS) curve that links output and real interest rates in equilibrium through an Euler equation that reflects habit formation on the part of consumers/investors,
2. A description of firms’ price setting behavior that links inflation and output in equilibrium, reflects nominal rigidities, and is captured by the Phillips curve (PC), and
3. The Fed’s monetary policy rule that describes the Fed’s procedure for setting short-term nominal interest rates, which is presumed to depend on the deviation of inflation from the Central Bank’s target, the output gap, and lagged nominal interest rates.

Pfleuger presented the results for the Monetary Policy rule (top panel below). As expected, the importance of the output gap is much higher in the third sample period, and decreased slightly from the first to the second period, as the Fed focused on fighting inflation.

- The estimated volatility of PC shocks is the largest in the earliest sub-period, which comprised major global oil price shocks,
- The estimated volatility of the MP shocks was the highest during the inflation fighting years of the Volker and early Greenspan regime, and
- The estimated volatility of the Inflation Target shocks has been the highest in the last period, which has seen a dramatic decrease in long-run expected inflation.

Pfleuger showed Q that the model can help explain and understand these other known facts:

- The sign change of nominal bond betas across the three sub-periods,
- The large positive beta and high volatility of nominal bonds after 1977 is consistent with a change in monetary policy towards a more anti-inflationary stance,
- Changes in the volatility of supply shocks through the Phillips Curve can affect bond risks,
- The size and composition of shocks to Monetary Policy affect bond betas, and
- Changing fundamental risks can be amplified by time variation in risk premia leading to “flights” to quality.

Bibliography:

81. Origins Of Stock Market Fluctuations (Fall 2014)

Martin Lettau, Professor of Finance, University of California, Berkeley, asks the question: “What economic forces drive the level of the stock market at different horizons?” Lettau’s goal is to explain the variability in real stock market levels...
(which represent real aggregate financial wealth) using data since 1952. His focus is different from many past studies, which have attempted to explain stock market returns over shorter periods—such as monthly or yearly. This paper attempts to explain the stock market level, which is a cumulation of these shorter-horizon average market returns. Simply put, Lettau wishes to pin down the types of economic shocks that contribute the most to the variability of long-run stock market expected returns.

Lettau develops a model that consists of two types of agents: shareholders and workers. The representative shareholder in the model can be thought of as a large institutional investor or wealthy individual who derives all income from investments; on the other hand, the representative worker consumes his labor income every period and does not invest. This two-representative agent type model allows more realistic aspects of the economy, such as the non-participation in the stock market of a large fraction of the workforce. A result of the modeling is new insights into how redistribution of wealth between workers and investors moves the stock market.

Lettau’s vector autoregressive model (VAR) links together (1) consumption, (2) labor income, and (3) financial wealth with four quarterly lags of each as explanatory variables (to handle seasonality). As an interesting aside, Lettau notes that stock holdings are, by far, the most volatile asset on the representative household balance sheet—far more than real estate, human capital, etc. This statistic supports the use of financial wealth as a proxy for all wealth in his model. Also, Lettau confirms that the growth rate of measured consumption in the U.S. has been incredibly smooth, even though representative individual net worth fluctuates considerably. This suggests that increases in labor income must come from decreases in financial wealth in the economy.

Lettau interprets his model as containing three economic forces that create shocks to the level of the stock market:

1. Technological progress that raises the productivity of capital and labor, such as the invention of the transistor: Lettau finds that this economic force determines long-run growth trends in the stock market, but plays a small role in market fluctuations

2. Redistribution of rents between capital and labor, such as the decrease in the power of labor unions since about 1980 which shifted rents to capital: Lettau finds that this is the main economic force that has driven the long-run value of the stock market since the 1970s

3. Changes in risk aversion/sentiment that are independent of the above macroeconomic fundamentals: Lettau finds that this economic force explains high-frequency stock market movements, but not longer-term market levels

Specifically, Lettau uses his VAR model to decompose the short-run (quarterly) variance of the stock market, and measures the contribution of each of his three economic forces:

<table>
<thead>
<tr>
<th>Stock Wealth</th>
<th>Productivity</th>
<th>Redistribution</th>
<th>Risk-aversion (or sentiment)</th>
<th>Residual (unexplained)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6.2%</td>
<td>4.4%</td>
<td>75.9%</td>
<td>13.4%</td>
</tr>
</tbody>
</table>

He next turns to explaining longer-run changes in stock market wealth. As he lengthens the measurement horizon, he finds a decreasing role for sentiment, and an increasing role for redistribution. One particularly interesting period that he studies is the economy since 1982. Lettau’s model decomposes the 59% increase in the real level of the stock market since 1982.
(net of the long-run trend of the stock market). For this period, he finds the following breakdown of influences of economic forces on aggregate stock market wealth:

Lettau notes that the large negative productivity shock is mainly due to the large decrease in consumption during the Great Recession of 2007-2009.

Perhaps the biggest takeaway from Lettau’s talk is the following graph, which is an estimate from his VAR model of the influence of shocks in redistribution on labor income and the stock market. The lesson from this graph is that the level of labor income—which he interprets as a redistributive force—has had a profound (and inverse) impact on total stock market wealth. Interestingly, Lettau also noted that, without the redistribution from labor to capital that occurred since 1980 (as depicted by the solid black line), the estimated level (detrended) of the stock market (dashed red line) would be 10% lower today.

82. “The Divergence of High- and Low-Frequency Estimation: Causes and Consequences” (Fall 2014)

Almost all financial models require the estimation of sample moments before they can be implemented. The models are typically derived in simplified settings (e.g. a world with only two periods) where the parameters are presumed known, and the models, hence, provide no guidance about parameter estimation. Practitioners, in particular, are, thus, left to their own devices to choose the appropriate sample period and data frequency. Statistical theory tells us that if returns are independently and identically distributed (i.i.d.), the precision of the estimate of mean returns depends on the length of the sample period, and the precision of returns’ second moment estimates depends on the sampling frequency. It is therefore common, in practice, to use high frequency data (e.g. monthly) to estimate risk parameters --- even when longer-term investment horizons are of primary interest. One of the bedrock assumptions underlying this practice is the belief in the appropriateness of scaling high frequency (e.g. monthly) estimates of volatility to obtain longer-term volatility estimates (e.g. annual). In the case of using monthly data to obtain annual volatility estimates, the typical practice is to presume returns are (or close enough to) independently and identically distributed, and multiply the monthly standard deviation estimates by the square root of twelve to arrive at annual volatility estimates.

In his talk, Mark Kritzman of Windham Capital Management challenged this conventional wisdom and presented strong evidence that:

- The working heuristic assumption that returns are independently and identically distributed is not a good
approximation when it comes to estimating second moments,

- Volatility estimates do not scale with time,
- Volatility estimates using longer run data can be as much as 100% higher than volatility estimates using shorter run data,
- Correlation estimates also can differ dramatically depending on frequency choices,
- The sampling frequency decision can have important ramifications on the optimal asset allocation, and
- The choice of sampling frequency and period can have a dramatic impact on performance evaluation --- to the extent, at times, of flipping ordinal performance rankings.

Kritzman introduced the concept of *excess dispersion* as a measure of the distance between the actual distribution of returns and the i.i.d. returns’ distribution assumption used in most practical implementations. He defined *excess dispersion* as the fraction of the distribution of lower frequency returns that is outside the one-standard deviation tails implied by monthly returns. This is depicted in the figure below that is taken from his presentation, based on the relative returns of U.S. and emerging market equities.

Kritzman showed that *excess dispersion* could mathematically be decomposed into three components: (i) non-normality, (ii) the significance of lagged autocorrelations, and (iii) the presence of significant lagged cross-correlations. In general, Kritzman presented evidence that: a) non-normality explains very little of the *excess dispersion*, b) lagged auto-correlations explain a significant amount of the *excess dispersion* for domestic assets, and c) lagged cross-correlations have a big impact, internationally.

Kritzman discussed, in practice, how *excess dispersion* impacts portfolio construction (one can get very different optimal portfolios), the performance evaluation of hedge and mutual funds (relative rankings often significantly change), empirical estimates of the steepness of the security market line (SML appears much steeper when using longer frequency data), and the apparent attractiveness of risk parity. Risk parity, for instance, has a better Sharpe ratio than a traditional 60/40 equity/bond allocation --- using monthly data --- over the 1929-2010 period (0.42 versus 0.36). Using ten year data, however, risk parity has a dramatically lower Sharpe ratio (0.16 versus 0.23).

83. “Visualizing The Time Series Behavior Of Volatility, Serial Correlation And Investment Horizon” (Fall 2014)

Ralph Goldsticker, CFA, of the Q-Group picked up on the theme of Mark Kritzman’s talk from Tuesday afternoon regarding the empirical challenges in estimating return volatilities and correlations. The key message of his talk was that the choice of sampling period and return frequency matters, and that there is no objective quantitative metric for determining the “best choice”. Ultimately, financial researchers must make a qualitative assessment and make the choices that seem to best fit the situation.
The following chart depicts the importance of both sampling period and frequency in estimating S&P volatility:

Goldsticker introduced the concept of cumulative contribution to variance as a tool for helping to analyze the behavior of volatility over time. Assuming there are N total observations in a sample, he defined the cumulative contribution to variance up until time $t$ as:

$$
\text{Cumulative Contribution to Variance} = \sum_{i=1}^{t} \left( \sum_{j=i}^{t} (y_j - \bar{y})^2 \right)
$$

The following chart depicts the cumulative contribution to variance for the S&P over a forty-year period. It is readily apparent from the next graph that terminal variances (the ending points of each line) increase with holding period --- reflecting positive serial correlation (momentum) in 12-month returns.

The graph also shows that most of the positive serial correlation occurred from 1995 through 2008 --- as the 12-month line deviates faster during that period.

The graph below, comparing 12-, 24-, and 36-month returns, shows that there is time diversification (mean reversion) at longer horizons, as the variance based on 36-month returns is less than the variance of 12-month returns.

Goldsticker showed that the choice of sampling period and frequency is just as important for measuring correlations, and introduced the notion of cumulative contribution to correlation as a visual tool for examining correlations.

The following graph displays these contributions for the correlation between stocks and bonds over a forty-year period. The numbers at the far right of the graph show the full-sample correlations. Over the entire sample period, the short-term correlation between stocks and bonds using daily data was 0 (compared to a 0.35
estimate using 3-year data). The short-term measure peaked around 0.15 at the turn of the millennium, and has subsequently been declining. The correlations using longer-term data show a similar hump shape --- with a positive correlation between stocks and bonds through the tech stock bubble, and a negative correlation since then.

Goldsticker finished his talk by suggesting similar cumulative contribution tools could be used to visualize other types of risk such as autocorrelations, tracking error, and information ratios.

84. Panel Presentations And Discussion Of Risk Parity And “Where Will It Take Us Next Year” (Fall 2013)

Risk-Parity: An Application of Finance 101 (plus low beta investing)

In contrast to the CAPM setting, where investors hold the market portfolio and lever it according to their preference for risk, the risk parity model targets a specific level of risk and divides the risk more equally across all the portfolio assets. Its stated objective is to achieve richer portfolio diversification for an investor. This is the most basic stuff in finance, Asness says. It all starts with a version of the following chart.

The embedded belief in traditional portfolios, where equity risk dominates the portfolio, is the idea that equities have a sufficiently high ex-ante Sharpe Ratio to justify their prominent position relative to a portfolio of bonds and commodities. However, that is not reality. From 1971-2013, equities have outperformed bonds and commodities in terms of returns, they were riskier and when adjusted for risk kept pace as shown in the chart that follows.

Asness says that the goal of asset allocation and optimal portfolio construction is to maximize expected return for a given level of risk. Theoretically, this is done by combining the maximum Sharpe Ratio portfolio with risk-less borrowing or lending. If the goal is achieving high returns, leveraging a risk-diversified portfolio is superior to a portfolio containing only equities.

Asness goes on to talk about research by Black, Jensen and Scholes (1972) that showed that the security market line is too flat, relative to theory. Asness argues that low-beta assets are generally shunned, and conversely high beta assets are in high demand. This results in a flat empirical market line like that shown below.

Not only does this result hold for U.S. stocks, but low beta countries outperform high beta countries on a risk-adjusted basis. Asness argues that this phenomenon is universal and occurs for U.S. and global stocks, across the term structure of credit and government bonds, across the credit spread spectrum from distressed bonds relative to those that are AAA. Asness says that risk parity is just taking advantage of the low beta anomaly applied to asset classes. If leverage aversion, or other theories like lottery preferences or investor focus on relative returns, predicts that higher-risk portfolios
have lower risk-adjusted returns, then a portfolio that overweights low-risk assets and underweights high-risk assets can capture some of this premium. Risk parity then applies concepts from Finance 101 -- find the portfolio with the highest Sharpe Ratio (roughly an unlevered risk-parity portfolio) and use leverage to customize expected return and risk.

But this is not theory, it is all in the evidence, says Asness.

Risk Parity, Expected Returns, & Leverage Aversion

Both risk and return are important in portfolio creation, at least theoretically. Before Markowitz, Kaplan says, no one had taken risk explicitly into account. Risk parity commits the opposite error: it is explicit about risk but totally ignores expected return. Kaplan lays out what risk parity (RP) is and what it is not. In general, he says, there is no closed-form solution for the weights in the risk-parity formula; it is marketed as an intuitive approach to asset allocation.

Using the RP idea, the unlevered portfolio is heavy with low-risk asset classes: leveraged risk parity models seek to achieve higher returns by leveraging the portfolio. Kaplan says “beware: this model, like all risk-based models, is like one hand clapping” -- risk but no explicit returns in contrast total return and no risk of other models. Without expected returns, Kaplan asks, how do we know if the risk-parity model is the right one to leverage to maximize the Sharpe Ratio?

In the Markowitz model, the expected return and risk are known and the weights for each asset can be backed out. In the Black-Litterman model, implied expected returns can be backed out for any given covariance matrix and set of portfolio weights assuming those portfolio weights maximize the portfolio’s Sharpe Ratio. Kaplan then shows the differences in implied expected returns that result from using the risk-parity model (shown to the right, top) and an equal-weighted portfolio (shown to the right, below). They are quite different.

Kaplan goes on to discuss the results with equal correlation. In this case the risk parity condition is simpler: the constituent weights are inversely proportional to their standard deviations (equal to a low volatility weighting) and the implied expected returns are linear in standard deviation. Equally-weighted portfolios, in an equal-correlation environment, have Sharpe Ratios that are linear in standard deviation. The implied expected returns are quadratic in standard deviation.

Kaplan says there are a number of interesting questions that remain:

1. Are the implied expected returns of risk-parity models consistent with the expected returns predicted by leverage aversion? If not, he says, risk parity is a heuristic and there might be better ways to exploit leverage aversion.
2. Is the prediction of lower risk-adjusted returns for stocks relative to bonds strategic or tactical?
3. Is the dominance of stocks in traditional strategic asset allocation due to leverage
aversion only, or to the idea that in the long run the stock market is the source of exposure to the real economy as well?

4. With bond yields subject to central bank manipulation, are stocks preferable to bonds for long term investors averse to leveraging a bond dominated portfolio?

To conclude Kaplan says that back tests of risk parity during periods when bond yields were falling are not good predictors when rates are rising. Thus leverage aversion may not be a risk parity portfolio but a tactical strategy to offer the best returns in the current environment. At this point in time the best returns would come from low volatility stocks, not bonds.

A discussion between Asness and Kaplan ensued. In the main, they agreed with each other. No fireworks, just interesting insight.

85. The Equity Premium And Beyond (Fall 2012)

The equity premium has always engendered discussion, but never more than now when markets and investors are so unsettled. In a presentation based largely on his 2012 book, Expected Returns on Major Asset Classes, Antti Ilmanen reviewed equity premium history and projections for its future.

Ilmanen expressed concern about how managers capture the equity premium using non-traditional assumptions about the source of risk premiums, particularly in the midst of unsettled markets. To provide context he said that historically equity returns have beaten the rate of inflation and the returns on bonds and bills in every country and over the long term: the long-run world equity premium is 4.4% over cash and 3.5% over bonds.

Ilmanen decomposed returns into real growth in corporate earnings and dividends, dividend yield, inflation, and gains from re-pricing. Using the chart below he showed that the real growth of earnings per share (lowest line on right axis) and dividends (second lowest line on left axis) has lagged that of GDP (dotted line) and GDP per capita (second line from the top of right axis).

Ilmanen pointed out that over time the consensus assumptions regarding the risk premium in academic finance have changed. Thirty years ago we assumed the following:

1. A single risk factor (beta) affects the equity market.
2. Expected returns are constant over time.
3. Investors are concerned only with the mean and variance of returns.
4. Efficient markets are inhabited by rational investors.

Our present understanding of what creates premiums recognizes that:

1. Multiple risk factors affect the equity market.
2. Required returns should ultimately depend on co-variation with “bad times.”
3. Risk premiums are time varying.
4. Skewness, leverage, and liquidity preferences exist.
5. Investors’ irrationalities and market frictions can create market inefficiencies.

Times have certainly changed, and Ilmanen reminds us there are better ways to earn an equity premium: global diversification; constant volatility targeting; defensive equity, value and momentum tilting; and equity market timing based on value and momentum signals.

![Cumulative Real Growth of U.S. Output and per-share Earnings and Dividends, 1900-2009](chart.png)
He said that there are two primary reasons why most institutions still choose to depend on an outdated notion of the equity premium. First, equity risk dominates traditionally diversified portfolios, and, second, the market is highly directional, as he showed in the chart below. All this happens in a world where correlations have increased— for many global equities portfolios the correlation can exceed 0.9. Note in the chart, the lines on the right axis are in order of the legend.

Illmanen said that the exposure of portfolios to the equity risk premium is even more apparent when portfolio allocations are measured by risk rather than by dollars.

Equity domination would be justified, Illmanen said, if the equity premium offered a uniquely high Sharpe ratio. However, when it does not a better risk-balanced set of return sources would likely improve a portfolio’s risk-adjusted return. As a solution he recommended more aggressive diversification through risk parity investing and the use of alternative beta premiums. His prescription was to diversify more aggressively thus cost-effectively harvesting multiple return sources. This approach, he concluded, is the most realistic way to achieve 5% real returns in a low-return world, but it is available only to those who are willing to utilize what he calls the “three dirty words in finance”—leverage, shorting, and derivatives.

To achieve this level of returns, he said, others may have more faith in illiquid assets, discretionary manager magic or market timing. These are, in his estimation, approaches that should have a modest role in a portfolio. The core of the portfolio should be multi beta-oriented. He called this approach “wide harvesting” and that has the following possible results:

1. Global diversification may reduce portfolio volatility—especially at longer horizons—without sacrificing average returns, thereby improving risk-adjusted performance.
2. Long-run market volatility conceals shifting periods of low and high volatility. Thanks to volatility persistence, constant-volatility targeting may help keep portfolio risk more stable over time and result in slimmer tails for the distribution.
3. While most speculative assets within each asset class give disappointing long-run returns, levering up low-risk peers offers much better returns.
4. Earning the equity premium together with helpful stock selection tilts can improve a market-cap portfolio’s performance.
5. Earning the equity premium together with helpful market timing tilts can improve the performance of the buy-and-hold portfolio even though risk is concentrated.

Illmanen provided graphic support for each of his conclusions.

86. Panel Discussion: Rethinking The Equity Risk Premium (Fall 2012)

Hammond introduced the panel on the equity risk premium (ERP) noting that the session updates the ERP views and research discussed at a 2001 Research Foundation of CFA Institute forum of experts. At that time estimates of the ERP ranged from zero to 7%.
The 2001 forum produced a schematic (shown below) of what constitutes the ERP, including investment horizon, supply-demand imbalances, and the level of demand for a return to compensate the risk of equities. In addition, it dealt with whether the markets exhibit rational expectations or suffer from behavioral distortions.

One thing was widely accepted by all in attendance at the 2001 event: few institutions or individuals explicitly address these issues and even they fail to consider the size of the equity premium itself in forming policy portfolios and determining asset allocation.

Hammond said that the equity risk premium is the most important measure in all of finance. It impacts saving and spending behavior, as well as the critical riskless and risky assets allocation in investors’ portfolios. The problem posed by recent history is that we may not be confident in our understanding of equity risk and, therefore, in our forward looking decisions.

After several decades during which realized equity returns followed a welcome positive pattern, the past decade has seen a marked downturn in equities. The decade was characterized by much lower-than-average returns and higher volatility, rising cross-asset, cross-country, cross-sector, and intra-sector correlations, and two of the biggest bubbles in stock market history. This downturn prompted some investors to suggest that future expectations for equity returns versus other broad asset classes must be permanently adjusted downward. Others argue that the same evidence suggests equities are poised for outstanding future excess returns.

Hammond suggested we sort through the best thinking on the ERP and look particularly at the most important drivers of the premium. In 2011, these issues were revisited in a forum where a number of academics reported their research. From that meeting they developed a series of charts showing the different facets of the ERP. These included such things as interest rates, objective and circumstantial drivers, different levels of inflation and earnings expectations. He provided the following chart to show the relationship between the factors and three interest rate levels.

He identified a “sweet spot” associated with moderate real long-term interest rates (2–3%), and demonstrated why it is “sweet” in the chart below.

This brought Hammond to what he calls the “risk premium smile”—the relationship between real rates and the ERP (shown below).

Hammond concluded that the past 10 years have shown that the ERP is far from being a settled matter. He proposes that (1) estimates of ERP be explicit and (2) the model used to make the forecast be clearly described. Finally, Hammond said that it is
clear that circumstances and differences among investors lead to true and irreducible differences in the ERP.

Leibowitz looked at a series of hypothetical return models under the assumption of rising rates. He said that an asset’s return premiums can be viewed as incremental returns for accepting the prospective risks. Thus, higher premiums may not be a bargain but may be an indication of greater prospective risks and/or lower growth prospects.

He described models he created based on the following assumptions:

- **Bonds**: zero coupon with a duration of 5, initial yield of 2% and rate volatility of 1%.
- **Equities**: a risk premium over bonds of 3.5% and a volatility of 16%.

In these models rates were allowed to drift at various rates. The multi-year returns for bonds are shown below.

\[
\begin{array}{|c|c|c|c|c|c|}
\hline
\text{Average Rate} & \text{Average Yield} & \text{Annual Return} & \text{Annuized Return} \\
\text{Drift Per Year} & 1yr & 5yr & 10yr & 1yr & 5yr & 10yr \\
\hline
0.0% & 2.0% & 2.0% & 2.0% & 2.0% & 2.0% & 2.0% \\
0.3% & 20 & 5.5 & 3.0 & 0.9 & 1.7 \\
0.5% & 20 & 4.5 & 7.0 & -0.6 & 15 & 4.0 \\
\hline
\end{array}
\]

The following table shows the multi-year returns for equities.

\[
\begin{array}{|c|c|c|c|c|c|c|c|c|c|}
\hline
\text{Multi-Year Equity Returns} & \text{Starting Yield=7%} & \text{Standard Equity Risk Premium = 2.5%} \\
\text{Average Rate} & \text{Minimum Equity} & \text{Equity Rate} & \text{1yr Expected Return} & \text{Annuized Return} & \text{Prob. of Below} & \text{Equity Rate} & \text{Return} & \text{5yr} & \text{10yr} \\
\text{Diff Per Year} & \text{Return Expectation} & \text{Correlation} & \text{Risk} & \text{5yr} & \text{10yr} & \text{in 50 year} \\
\hline
0.0% & - & 0.0 & 5.5 & 5.7 & 5.9 & 5.0 & 40 & 38 \\
0.3 & 7.0 & 0.0 & 0.0 & 5.5 & 6.2 & 6.9 & 34 \\
0.3 & 7.0 & 0.0 & 0.0 & 5.5 & 6.2 & 6.9 & 34 \\
0.3 & 7.0 & -3.0 & 7.0 & 7.1 & 7.7 & 38 \\
0.3 & 0.0 & -3.0 & 5.5 & 5.5 & 5.5 & 5.5 & 40 \\
\hline
\end{array}
\]

From this Leibowitz constructed the following chart combining a stable risk premium and a 0.3% drift. The results, he said, are inherently overstated in accepting higher expected returns without fully addressing the greater prospective risks.

![Chart showing multi-year returns for equities.](chart)

Finally, he reminds us that these models should be viewed as strictly hypothetical illustrations and are not to be taken as market projections.

Sharpe opened his presentation with a Casey Stengel quote, “Never make a prediction, especially about the future,” a perfect prelude to a discussion of the equity risk premium. Sharpe started with a little CAPM history that assumes that market risk alone is rewarded with higher expected returns. This, he said, is an incomplete model and he then discusses a state dependent model. This model includes alternative future states of the world (though one and only one will occur) each accompanied by an estimated probability. In this model it is possible to buy and sell state claims by comparing the price of the claim with the likelihood of cashing in on it. As a cost he uses the ratio of the state price to the probability of that state price per chance (PPC). The higher the PPC, the less attractive is an investment. Rational investors, he said, take more of a thing (or investment) when it costs less, with PPC being the measure of cost.
The market portfolio using this approach is shown in the following chart. States with the same wealth will have the same PPCs, and states with more wealth will have lower PPCs. The individual makes the choice based on a personal PPC–wealth trade-off.

Sharpe then turned to communicating with investors about risk and return. He said that return/standard deviation is not a particularly useful paradigm to use when distributions are not normal. It is preferable to show the entire cumulative probability distribution using a graph where the investor’s goal is plotted on the X axis and the chance of exceeding the goal on the Y axis. In this way the client has a visual demonstration of the outcomes associated with the probability of meeting the goal.

Siegel updated a Grinold and Kroner ERP model that segregates expected equity returns into several understandable pieces (income, earnings growth, and re-pricing. The model shows that the expected equity return

\[ R = \frac{D}{P} - \Delta S + i + g + \Delta P/E. \]

Siegel used this identity as a template for a discussion on how to best estimate each variable, how to determine the accuracy of each estimate, and other issues relevant to long-term forecasting.

Siegel then defined ERP as the expected equity total return less the yield on the 10-year Treasury. He noted that, in retrospect, the Grinold and Kroner (2002) forecast was too high. The main problem in their forecast was the volatile re-pricing term: they made no serious attempt to estimate the speed with which the unusually high P/Es prevailing at the beginning of the decade would revert toward their historical mean. Siegel said that they understandably got it wrong since market re-pricing tends to happen all at once.

Siegel then turned to data that he believes are appropriate for making estimates at this time. Because now he views the market as roughly fairly priced after two bear markets and two recoveries. He uses a re-pricing rate of zero, cautioning that the re-pricing term is noisy. As a result of the forecast with revised inputs, he said he expects moderate stock market growth in the future. His paper projects an expected equity risk premium over the 10-year nominal Treasury bond of 3.6% (geometric). By the time he presented the paper at the Q Group, he said that falling interest rates caused the estimate to increase to 4% (geometric).

Siegel summarized his paper by saying that although Black Swans, fat tails, and tsunamis are the talk of the day, such large unexpected events tend to fade in importance over extended periods. It is only then that the underlying long-term trends reveal themselves once more.


Stephen Figlewski, Professor of Finance, New York University Stern School of Business, presented “What is Risk Neutral
Volatility?” This research was supported by a grant from the Q-Group.

Figlewski starts by saying that the market prices for risky assets depend on the market's assessment of the probability distribution (P) for its future payoff together with the market's risk aversion (Q). Neither Q nor P can be observed directly:

1. The form of the distribution itself is unknown, although extensive research suggests it has fatter tails and its shape changes over time.
2. The factors that go into the risk-adjustment process are unknown.
3. The risk premia for unspanned, unhedgeable factors are often treated simply as unknown constants to be estimated.
4. P and Q, when combined into the Risk Neutral Probability Density (RND), can be extracted from market prices for options.

Figlewski asks, “Should We Care?” about the RND. The answer is that indeed we should because RND measures how options are being priced. The Black Scholes (BS) model uses the principle of delta-hedging to price options. It is delta-hedging that market makers use to manage their risk. He reminds us that the BS model assumes a constant volatility log normal diffusion, an approach that he says is too simple. It does not consider such things as tail behavior that may, and should, be critical for investors and market markers. Moreover, it is important to understand the multiple risk premia embedded in option prices since they are significant components of return.

Figlewski says there are two major problems in constructing a complete RND from a set of market option prices:

1. How to smooth and interpolate option prices to limit pricing noise and produce a smooth density.
2. How to extend the distribution to the tails beyond the range of traded strike prices.

He notes that unlike implied volatility, the RND is model free, and that is a big advantage. He develops the Breeden-Litzenberger technology to extract RNDs from daily S&P 500 index option prices and computes the standard deviations. He then explores whether, and by how much, the risk neutral volatility is influenced by a broad set of exogenous factors which are expected to be related to its empirical density and to the risk neutralization process. He notes that his main objective is not to build a formal model of option risk premia, but to establish a set of stylized facts with which any model must be consistent. There are, he notes, several broad questions to be addressed:

1. What return and volatility-related factors are most important to investors in forming the forecasts of the empirical probability density that are embedded in the RND?
2. Is the market primarily forward-looking or backward-looking in gauging volatility?
3. What are the relevant time horizons on which it focuses?
4. What factors influence the process of risk neutralization?
5. Do the answers to these questions differ for long-maturity vs. short-maturity options and do they do so over different time periods?

Figlewski points out that extracting the RND from options prices in practice is nontrivial and describes his process in detail. His explanatory variables are divided into three classes:

1. Volatility-related variables that do not require looking back over past data.
2. Volatility-related variables computed from past data over a horizon that must be specified.
3. Variables related to risk attitudes that may influence risk neutralization.
After describing the outcomes of his analysis in detail, he provides the following observations regarding key questions.

1. What return and volatility-related factors are most important to investors forming forecasts of the empirical probability density that are embedded in the RND? He says that simple correlations indicating the strength of the direct univariate relationships between explanatory variables and both RND and realized volatility were largely of the expected sign.

2. Is the market primarily forward-looking or backward-looking? What are the relevant time horizons on which it focuses?
   a. Backward looking: The past trading range and some tail-related variables were statistically significant but not easy to interpret.
   b. Forward looking:
      i. One model, GARCH, had the best predictive power over all horizons. RND volatility alone or combined with historical volatility was highly significant, but contributed nothing when combined with GARCH.
      ii. All three volatility measures appear to have the greatest marginal explanatory power for future volatility over the next 5 to 10 trading days, though only GARCH is significant.
      iii. The coefficient on historical volatility was uniformly negative and insignificant.

3. What factors go into the neutralization? Here Figlewski reports mixed results, however, yesterday's RND volatility minus that of the GARCH model as extremely powerful in the RND volatility equations.

4. What risk factors go into the neutralization? He includes such things as the:

   a. Previous day volatility risk premium as measured by yesterday's RND volatility minus that of the GARCH model.
   b. Strength in the Michigan Consumer Sentiment variable.
   c. High P/E ratio for the stock market. The past error from a GARCH model is both in absolute value and to a lesser extent as a signed variable.
   d. Large past errors of either sign.
   e. Yield spread in the bond market.
   f. Day t trading range.
   g. S&P P/E ratio.
   h. Day t-1 RND volatility risk premium.

At the end of his presentation, Figlewski asked the participants for ideas on how to continue to develop the ideas from his ongoing research. There was a lively conversation. Those who did not hear the presentation will have to wait until the paper is completed to read it in its entirety.

**Securities Lending & Short Selling**

**88. A Solution To The Palm-3Com Spin-Off Puzzles (Spring 2015)**

Chester Spatt, Pamela R. and Kenneth B. Dunn Professor of Finance, Carnegie Mellon University, and former SEC Chief Economist, discussed the 15-year-old 3Com-Palm mispricing puzzle. The central question addressed was why Palm, a subsidiary of 3Com, traded at a higher price than implied by the stock price of 3Com.

The following time-line provides a summary of the events surrounding the

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Comment</th>
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<tbody>
<tr>
<td>March 2, 2000</td>
<td>3Com carve-out 5% of its Palm subsidiary, which begins trading in the open market; each 3Com share is given rights to 1.5 shares of Palm, when remainder is spun-off.</td>
<td>3Com announces expected spin-off of the other 95% by Dec. 2000—thus, there is uncertainty in the timing of this spin-off!</td>
</tr>
<tr>
<td>May 8, 2000</td>
<td>Closing price for Palm implies that 3Com shareholders hold $50 billion of Palm. Yet, 3Com shares close at a total market cap of $28 billion; thus, the “Stub Value” of 3Com equals $28.50× 5.22 billion! 3Com shares increase by about 10%, while Palm shares decrease by about 10%!</td>
<td>3Com announced that the spinoff would occur on July 27th.</td>
</tr>
<tr>
<td>July 27, 2000</td>
<td>3Com spins off remaining 95% of Palm</td>
<td></td>
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3Com-Palm puzzle:

The long-standing puzzle, of course, is why the 3Com stock price from March 2 to July 27 did not properly reflect the implied value of its Palm ownership. For example, Lamont and Thaler (2003) wondered whether the market “can add and subtract,” claimed that the above facts meant that the Law of One Price were violated, and showed additional evidence that options were mispriced such that Put-Call Parity did not hold. These phenomena have more widespread implications than simply Palm, as Mitchell, Pulvino, and Stafford (2002) identified 84 cases of negative stub values during 1985-2000.

In his talk to Q members, Spatt addressed two related questions: (1) Did Palm’s share price reflect the fundamental value that could be attributed to all future cash flows associated with owning the stock (including lending fees)? (2) Did the relationship between Palm’s and 3Com’s stock prices violate the Law of One Price? He argued that, if one takes into account the “convenience yield” that ownership of Palm shares provided to its owners through the ability to lend these shares, as well as the uncertainty of when the spin-off would actually happen, then the pricing of Palm and 3Com shares were consistent with the Law-of-One Price and rational markets.

First, some observations. The graph below shows the annualized percentage borrowing rate for Palm shares over time. Note two important things: first, that the borrowing rate was generally extremely high—from 20 to 60% per year. Second, the borrowing rate climbed substantially in early May, right at the time that 3Com resolved exactly when Palm would be spun-off.

Second, the explanation of the negative stub value. Palm shares were in short supply after the 5% spin-off—with very limited stock loan availability and a small float for potential buyers. The small float created an opportunity for those who controlled Palm shares to charge very high lending rates starting March 2, 2000. To exploit the negative stub value of 3Com, one must borrow shares of Palm to short them, in combination with a long position in 3Com. After factoring in the steep borrowing costs, Spatt showed that there was no way to arbitrage the apparent negative stub value.

**A Deeper Dive**

Spatt showed how to quantify the computation of a “rational” stub value for 3Com, and that, properly computed, it was (almost) always positive—presuming there is no wedge between what borrowers would have to pay to borrow the Palm shares and what holders of Palm shares could earn by lending the stock (e.g., there is no large capture of the borrowing cost by brokers).

A key to his approach is noting that Palm shareholders can earn the lending fees on Palm shares, while the 3Com shareholders effectively own a forward contract on the Palm shares, and cannot earn those fees. Thus, the intrinsic value of Palm stock should exceed the present value of a forward contract on the stock by the present value of expected lending fees:

\[
\tilde{s}_{Palm,t} = E[PV(lending fees)] + PV[F(T^*, t)]
\]

Another salient point is that 3Com may have cancelled the spin-off of the remaining 95% of Palm, and might have spent the cash flows from Palm on negative NPV projects due to agency problems in corporate management.
where \( s_{\text{palm}, t} \) = spot price of a Palm share today, and

\[
F(T^*, t) = \text{forward price to be paid when receiving a Palm share at time } T^*, \text{ the spin-off date.}
\]

We can compute the value of a share of 3Com prior to the 95% spinoff by adding its stub value to (1.5 times) the present value of the embedded forward:

\[
s_{\text{com}, t} = STUB_t + 1.5 * PV[F(T^*, t)]
\]

We can use this equation to determine the market’s valuation of the STUB. The only problem is that there is no forward market for Palm shares, but Spatt uses put-call parity to estimate the value of Palm forwards, since options were traded on Palm shortly after the 5% spin-off:

\[
PV[F(T^*, t)] = Xe^{-r(T^*-t)} + C(X, T^*) - P(X, T^*)
\]

Spatt solves for \( STUB \), and plots it below:

Note that it is (almost) always positive, unlike the incorrectly computed stub that ignores the value of lending fees embedded in Palm shares.

Finally, Spatt uses the relation between forward and spot prices of Palm to reverse-engineer the implied lending cost (\( \delta \)) of Palm shares,

\[
PV[F(T^*, t)] = S_{\text{palm}, t} e^{-\delta(T^*-t)}
\]

resulting in the below graph of implied vs. actual lending costs (actuals were obtained from a major broker). Note that the implied matches the actuals reasonably well!

**The Remaining Puzzle**

Spatt admitted that it remains unknown why some investors held Palm shares without lending them, since the market must, in aggregate, hold the shares long. Perhaps these investors were naïve, could not lend shares, and/or were overvaluing Palm shares. Whatever the case, the 3Com-Palm puzzle, if not fully resolved, is now focused on this simpler, new puzzle.

**Bibliography**


89. “In Short Supply: Short-sellers and Stock Returns” (Fall 2014)

Professor Charles Lee, Joseph McDonald Professor of Accounting at Stanford Business School uses a new database, *Markit Data Explorer*, to provide a comprehensive analysis on a relatively opaque market: the stock lending market. The data is collected from a consortium of over 100 institutional lenders, and covers
about 70% of all shorting activity across over 90% of all U.S. equities (measured both by count and market value). Previous research into shorting has largely had to rely on short-interest ratios (SIRs), defined as short interest divided by shares outstanding. One major limitation of this research is the inability to know whether low SIRs are the result of limited demand for short sales, or the inability to borrow stock (i.e., supply constraints). Lee finds that the richness of the Data Explorer dataset helps to separately identify the importance of demand and supply factors in stock lending markets, and their impact on future asset prices.

The Data Explorer lending data breaks the universe of stocks into ten different categories: ranging from easiest-to-borrow (DCBS score = 1) to most-difficult-to-borrow (DCBS score = 10). Lee characterizes roughly 86% of the firm-month observations as easy-to-borrow general collateral stocks --- with lending fees of less than 100 basis points on an annual basis --- and 14% of the firm month observations as special stocks (DCBS scores = 2-10). One of the more interesting results that Lee presented was that the typical stock has less than 20% of its outstanding shares in readily lendable form. Table 2, which he showed, indicated that this number ranged from 19.66% for DCBS=1 stocks to 6.28% for hard-to-borrow DCBS=10 stocks.

The utilization of the lendable supply is roughly 15% for the easiest-to-borrow stocks, and approaches 80% for the hardest-to-borrow stocks. The combination of limited supply and high utilization of the DCBS=10 stocks results in average rebate rates (cash loan interest minus stock lending fee) of ~48.86% per year for these Special stocks; compared to ~.22% for the easiest-to-borrow General Collateral stocks. Lee attributes most of the variations in borrow costs to variations in available supply --- as depicted in Figure 2 (reproduced below) of his paper. This graph shows that the demand for stock loan as a percent of shares outstanding (BOLQ) is roughly stable across DCBS scores, whereas the lendable supply of shares (BOIQ) dramatically falls as the DCBS score rises. Supply thus appears to be the binding constraint.

Lee used a recent IPO, GPRO (GoPro, Inc.), as an example of some of the problems that are inherent in using traditional SIR numbers as a measure of shorting demand. GPRO went public in June 2014. It is up over 100% since then. The borrow rate on the stock is over 100% per annum. The SIR for the stock, however, is only about 2.5%. There are hardly any shares available for borrow --- as most of the shares are still held by insiders.

Lee focused on the results in Table 4 to illustrate the importance of conditioning on whether stocks are special. The table presents the results from monthly cross-sectional Fama-MacBeth regressions of one-month ahead size-adjusted returns on a variety of variables. The first regression in Panel A shows a coefficient of -0.9% on SIR, and a t-statistic of -3.58. Panel B shows a similar regression where there are different coefficients on SIR when the stock is GC and Special. The coefficient on SIR when the stock is Special rises to -2.3% and has a t-value of 7.03. Conversely, the coefficient on SIR when the stock is GC is only -0.4% with a very marginally
significant t-value. The regression result that excited Lee the most is the following one taken from Table 4, Panel C:

It shows the importance of conditioning on whether a stock is special (indicated by the interaction variables SP*BOLQ and SP*BOIQ), and suggests that conditional on a stock being Special, higher demand to borrow (BOLQ) leads to lower future returns, and higher supply of stock to borrow (BOIQ) --- holding demand for shorts fixed --- leads to higher future returns.

Lee next turned to examining nine well-known pricing anomalies, and showed, in Table 6, that virtually all of the short-side return comes from stocks where the lendable supply constraint is binding. Finally, in analyzing what determines borrow costs, he found that borrow costs are higher for smaller, lower-priced, and more volatile firms with lower institutional ownership, higher share turnover, and more negative recent stock returns. He also found that accounting characteristics that are associated with pricing anomalies impacts the supply of lendable shares, indicating that the institutions that normally lend shares are aware of these anomalies.

90. Short Sellers And Financial Misconduct (Spring 2011)

Jonathan M. Karpoff, Washington Mutual Endowed Chair in Innovation, Finance and Business and Professor of Finance at the Michael G. Foster School of Business, University of Washington presented “Short Sellers and Financial Misconduct” he coauthored with Xiaoxia Lou, Assistant Professor of Finance, Lerner College of Business and Economics, University of Delaware. This research was supported by the Q-Group. Karpoff had previously presented a paper at the Q-Group® seminar in the Fall of 2002.

Short selling is controversial: detractors claim that short sellers undermine investors’ confidence in financial markets and decrease market liquidity; liquidity advocates argue that short selling facilitates market efficiency and the price discovery process. Either way investors who identify overpriced stocks can sell short thus incorporating unfavorable information into market prices. The issue for Karpoff is whether short selling conveys information about external costs or benefits to other investors. In this research Karpoff looks at overvalued stocks and short selling. Put plainly, he and his coauthor seek to answer two questions with this research:

1. Do short sellers anticipate financial misrepresentation?
2. How do short sales affect markets and social welfare?
Karpoff turns to the first question. To answer it he needs a sample of overpriced stocks that subsequently reverse their overpricing. For overpriced stocks he and his coauthor use companies that misrepresented their financial statements and are overpriced, at least until the misrepresentation is made public. An example of the stock prices before and after misrepresentation is revealed is shown below.

To collect their sample of misrepresenting companies, the authors use firms that had SEC/DOJ enforcement actions for financial misrepresentation initiated against them during 1988-2005. To this data they add the monthly short interest and stock price data during the violation period for the 454 firms in their sample. The focus is on the period before the misrepresentation is revealed and whether the short sellers get it right, and, when the price drops, whether the results are sensitive to the severity of the conduct.

To assess the anticipation of misconduct by short sellers they measure abnormal short interest (ABSI): raw short interest minus expected short interest. Raw short interest is measured by the number of shares that are short divided by the outstanding shares in a month. The expected short interest is short interest relative to one of three benchmarks.
based upon the firm’s characteristics. The chart below shows the three measures of abnormal short interest and the importance of each. ABSI Model 1 includes the smallest number of factors.

Karpoff plots the raw and abnormal short interest during the 20 months before and after the initial revelation of financial misconduct for each stock. All measures of ABSI rise continuously and peak about 5 days after the misrepresentation is made public. Using this information Karpoff concludes that short sellers anticipate misrepresentation.

Next, Karpoff turns to the question of the importance of the misconduct’s severity. He considers three measures of severity based on fraud charges, insider trading charges, and total accruals. He concludes, as can be seen in the chart below, each of the severity measures are economically meaningful.

Karpoff concludes that, on average, short sellers convey substantial benefits to uninformed investors, although for the median firm these benefits are negligible and slightly negative.

Finally, Karpoff turns to the question of whether short sellers affect markets and social welfare. For this he asks the question, do short sellers help uncover financial misconduct? To this he answers yes, short interest:

1. Dampens price inflation during the violation period and does not exacerbate price decline when the misconduct is revealed.
2. Decreases the time to public discovery of the misconduct.
3. Does not exacerbate price decline when the misconduct is revealed.

Social Security, Retirement & Health Care

Terrance Odean, Rudd Family Foundation Professor of Finance at the University of California, Berkeley, compared the welfare implications of Social Security (SS) and Private Retirement Accounts (PRAs). The idea of PRAs—where investment of social security taxes is self-directed by the worker—is not new, and was floated in 2001; further, President Bush made the case for PRAs to the American people during his 2004 State of the Union Address. Odean stressed that it is important to look at the cross-sectional variation (across all people) of potential outcomes of PRAs, rather than simply the average or “representative individual”. An important takeaway from his talk is that the average person is projected to have a good retirement annuity with a PRA, relative to SS, while a significant share of individuals fare quite poorly.

Odean employs simulations to illustrate the potential outcomes for PRAs. The baseline simulation has the following assumptions:

1. All workers invest in a 60/40 stock/bond index
2. Bond returns equal their post-war average
3. Stock returns are shaved from their 9%/year post-war average to 7%/year for conservatism
4. A 60/40 stock/bond index earns mean annual returns of 7.7%/year (SD 14.2%/year)

In another test case, Odean allows workers to choose their asset allocation and/or their individual stock investments (e.g., individual stocks), since all major reform proposals that have been proposed allow for investor choice. Investment theory says that unconstrained optimization beats constrained, but only if the investor properly optimizes. Ideally, a tenured professor—whose future income is more bond-like—would invest his PRA in stocks, while a stockbroker would invest more in bonds. However, if workers make poor choices in asset allocation, or in diversifying among their equity investments, then choice will worsen their retirement payouts.

To conduct this simulation, Odean creates 3,655 simulated individuals born in 1979, and bootstraps their allocations to investments by resampling from the 2010 Survey of Consumer Finances. Interestingly, 13% of individuals in this dataset place 100% of investable money in bonds, while 15% place 100% in stocks in their IRA, Keogh, or 401(k) plans, which is the first indication of trouble if SS is replaced by PRA.

The simulation has the following assumptions:

1. Individuals retire at 67
2. Price inflation is 3%
3. Wage inflation is 4%
4. A worker who uses PRA chooses an asset allocation strategy at the beginning of his working life, then does not change it until retirement
5. Wages, demographic characteristics, and mortality of the cohort are generated by CORSIM, a dynamic micro-simulation model of the United States population used by the Social Security Administration

6. Asset allocation choices are determined by randomly sampling from distributions based on the 2010 Survey of Consumer Finances
7. Stock selection choices are determined by the distribution of equity returns in individual tax-deferred accounts at a large discount brokerage

Odean finds the following results.

First, when workers have no choice of their allocation to stocks vs. bonds and are forced to use a 60/40 rule, their PRA underperforms their SS benefit much less often than when workers are allowed to choose their stock/bond allocation. At age 88 and with no allocation choice, 31% of workers would be better off with SS than with PRA. With choice, 45% would be better off with SS. In these 45% of cases, the PRA account, on average, generates only half of the income of SS due to poor investment choices. And, with equity and allocation choice, more than 9 of 10 workers have greater than a 25% probability that their age 88 PRA income falls short of promised Social Security benefits. This result is chiefly due to underinvestment in the equity class, and a failure to diversifying one’s equity investments. However, the progressive (redistributive) nature of SS payouts also plays a big role in these unequal outcomes.

Odean then looks at workers within each earnings quintile. Workers in the lowest earnings quintile are better off with SS with 67% probability, due to the redistributive aspect of SS. Unsurprisingly, the highest earnings quintile is better off with PRA. However, with more choice over asset allocation and security selection, PRA becomes less appealing to even the high earnings quintile because of their suboptimal investment choices!
Odean notes that his estimate of the potential shortfall of PRAs, relative to SS, may even be conservative, since workers may spend their PRAs too quickly, may invest in high-fee products, and that the poor and less educated may make worse investment decisions, including a lower likelihood of participating in the stock market.

The Key Takeaway of this Talk: Giving U.S. workers more choice to invest their social security withholdings is projected to lead to a greater percentage of retirees with much lower income during retirement, compared to today’s social security system due to the redistributive nature of social security and to non-optimal investment choices by individuals. Most individuals are “made poorer by choice.”


Van Derhei asks an important question and one that is becoming more and more critical as the pension crisis widens and expands in the U.S.: what is enough and are 401(k) plans markedly worse in meeting than goal of retirement relative to defined benefit plans? To gain some insight he proposes a comparative analysis of future benefits from private sector, voluntary-enrollment 401(k) plans, and stylized, final-average-pay, defined-benefit and cash-balance plans. He develops a procedure to determine the generosity parameter, the percentage of the average salary per years of service used to calculate the pension annuity, needed to produce 401(k) retirement income equivalent to that of median defined benefit plans.

Van DerHei creates the base model he will use to in determining the required generosity parameter. For the base model he assumes:

1. Historical rates of return -- stochastic variables with log normal distribution and mean arithmetic real returns of 8.6 percent for equities, 2.6 percent for bonds.
2. Fees of 0.78 percent.
3. Wage growth of 3.9 percent until 55 and 2.8 percent thereafter.
4. Participation probability equal to \((1+\text{unconditional probability before participation})/2\) once the individuals have participated.
5. Cash outs for 401(k) that follow the Vanguard 2012 experience.
6. Cash outs for defined benefit terminated based assumption that participants react similarly to 401(k) participants based on LSD, lump sum distribution.
7. Annuity purchase price of 12.34 for males at 65 years of age.

With his base case he performs sensitivity analysis using the following tests:

1. Reducing rates of return by 200 basis points.
2. Increasing annuity purchase prices to reflect low bond yields at the time.
3. #1 and #2 simultaneously.
4. Assuming real-wage growth does not drop to zero after age 55.
5. Assuming conditional-participation rates do not increase once an employee has participated in a 401(k) plan.
6. Assuming no cash outs at job change.
7. Changing the defined benefit LDP generosity parameter from median to 75th percentile.
He provides graphs of his simulations. Shown below is the simulation result for younger employees in the lowest income quartile. The subsequent chart shows the same for younger workers in the highest income quartile.

For each of the parameter changes in each simulation he provides a graph showing the impact of the change. The chart below shows the magnitude of the defined benefit generosity parameter changes needed to equal 401(k) plans for ages 25-29 when purchase prices and return assumptions are decreased by 200 bp.

Van DerHei’s study looks only at voluntary enrollment plans. With the upward trend in automatic enrollment (AE), opt out, adoption plans; Van DerHei plans to repeat this study when sufficient data is available. The charts are interesting for various groups.

These charts were prepared for the U.S. Congress as they consider the issues surrounding retirement and retirement plans. Much more could be done with the data. Van DerHei concludes with an offer. He says that Employee Benefit Research Institute has considerable data and it is available to researchers. He encourage those at Q to communicate with him about the data and/or if they with ideas for further research.

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93. Optimal Annuity With Stochastic Mortality Probabilities (Fall 2013)

Smetters starts by reporting that sales of fixed annuities in the United States totaled $54.1 billion during the first three quarters of 2012, but only a fraction will be held for life. This apparent under-annuitization by households is commonly referred to as “the annuity puzzle” and it is not, Smetters says, just a theoretical curiosity. Annuities are investment wrappers that should dominate all non-annuitized investments because of the mortality credit. Annuities are attractive because of the regular fixed payment coupled with the bet that you will live longer than others in the pool. This bet enhances that yield for those who are long lived. The mortality credit is the payout that can be very large later in a contract holder’s life. This credit comes from pool participants who die and forfeit their assets to the remaining contract holders. This return enhancing feature of fixed annuities was studied by Yaari in 1965 and led him to conclude that households without a bequest motive should fully annuitize their investments. In spite of all the attention his work has received, lifetime annuities paying a fixed amount each year until death are still fairly uncommon.

Smetters examines Yaari’s model in an attempt to rationalize its full annuitization conclusion with the fact that annuities are not widely held. He attempts to find flaws with
the model by adding numerous market frictions. None break Yaari’s sharp result. When Smetters allows a household's mortality risk itself to be stochastic, full annuitization no longer holds. Annuities still help to hedge longevity risk, but they are now subject to valuation risk, the risk that you will exit the pool early. Adding this stochastic mortality risk allows for numerous frictions to reduce annuity demand in Yaari’s model. In fact, Smetters finds that most households should not annuitize any wealth and concludes that the optimal level of aggregate net annuity holdings is likely to be negative. Give these finding, the underutilization of lifetime annuities may well not be a puzzle but rational choice.

For those that are not familiar with lifetime annuities, Smetters says they have three characteristics:

1. It is longevity insurance that protects against the risk of outliving assets.
2. In exchange for one-time premium, the holder receives a stream of payments with certainty until death.
3. Since the lifetime annuity cannot be bequeathed, the principal at death is at risk in exchange for a mortality credit for living.

Social Security and defined-benefit pension funds are life annuities, at least as they currently exist.

Smetters turns to his adaptation of the Yaari’s model assumptions. Yaari assumed that individuals have uncertain life spans, do not have bequest motives and premiums are approximately fair. Smetters adds some modifications in an attempt to break the full optimization prescription:

1. Survival probabilities are stochastic, thus introducing a rate of time preference.
2. Investor's health status evolves over time and is not a deterministic function of initial health status and subsequent age.
3. Health care shocks produce correlated reductions in income and increases in costs.
4. Health shocks impact the present value of annuity payments making the present value for short lived annuitants lower than those who survive longer. This introduces valuation risk when the annuity is acquired.

Using his modified multi period model Smetters finds that:

1. If households are sufficiently patient and mortality probabilities are the only source of uncertainty, full annuitization is still optimal.
2. If a bad mortality update is correlated with an additional loss (income or expenses), incomplete annuitization can be optimal, even without ad-hoc liquidity constraints.
3. If households are sufficiently impatient then incomplete annuitization may be optimal even without any additional loss. This can be achieved using a customized annuity that is a function of the annuitant's rate of time preference.

When Smetters’ stochastic lifecycle model is used to simulate optimal annuitization, even with no bequest motives or asset-related transaction costs, most households (63%) should not annuitize any wealth. Indeed annuitization is mostly found with wealthier households where the costs correlated with health shocks are small relative to assets, and older and sicker households where the expected mortality credit is large relative to the valuation risk.

To summarize, Smetters lays out the details of his three-period model and how it compares to that created by Yaari. He shows that the original Yaari prediction of 100% annuitization of wealth is very hard to break when survival probabilities are assumed to be deterministic, as is standard in the model. However, when the survival probabilities
themselves are stochastic, the full annuitization does not hold. These stochastic survival probabilities become a gateway mechanism for various market frictions to matter.

Smetters concludes by saying that the simulation evidence is this work suggests that, even under conservative assumptions, it is indeed not optimal for most households to annuitize any wealth; many younger households should actually short annuities by buying life insurance. In the future, Smetters plans to examine how the results impact the optimal construction of tax and social insurance policies.

94. Health And Mortality Delta: Assessing The Welfare Cost Of Household Insurance Choice (Fall 2012)

Retail financial advisors and insurance companies offer a wide variety of what Yogo called health and longevity products including such things as life insurance, annuities, supplementary health insurance, and long-term care insurance. His research attempted to address two questions related to the household insurance choice: (1) What is the optimal demand for health and longevity products and (2) how close is the observed demand to being optimal?

To choose among products and create an investor-appropriate optimal portfolio requires a way to measure risk. For equity and fixed-income investment products there are two widely used measures of risk -- beta and duration. No similar risk measures for assessing the risk of health and longevity products exist. To rectify this, Yogo developed two risk measures: the health delta and the mortality delta. The health delta measures the differential pay-off that a policy delivers when the insured is in poor health; the mortality delta measures what a policy delivers at death.

Three forces explain the optimal health and mortality deltas. There is relatively more wealth in the health states in which:

1. The marginal utility of consumption is high as determined by the relative weights ascribed to poor and good health;
2. The average propensity to consume is low; and
3. Lifetime disposable income is low.

Yogo said that an individual should combine health and longevity products to reflect the optimal health and mortality delta in their portfolio. The optimal exposure to the health and mortality deltas depends on the individual’s, and bequest motive) and personal characteristics preferences (e.g., risk aversion, consumption (e.g., birth cohort, age, health, and wealth). The objective function is shown in below.

Yogo then reported on the health and mortality risk of a representative sample of U.S. men who were 51 and older. Those in the sample were interviewed every two years beginning in 1992. For each cohort the key inputs for the model were:

- Health transition probabilities
- Out-of-pocket health expenses (after employer-provided insurance and Medicare)
- Income including Social Security (excluding annuities and private pensions)
- Actuarially fair prices for health and longevity products
In addition, he observed participants’ ownership of:
- Term and whole life insurance
- Annuities including private pensions
- Supplementary health (Medigap) insurance
- Long-term care insurance

The following exhibit shows the out-of-pocket health expenses, income, and present value of future disposable income, in constant dollars, for men born in 1936–1940. Income is then compared to out-of-pocket expenses and disposable income, dependent on state of health. Some of the numbers appear anomalous, for example, the lower negative present value of future disposable income for men over 91 in poor health. Yugo explained that this is due to the fact that the future income of individuals in poor health is truncated because they die sooner.

He gathers data about ownership of health and longevity products (the scatter in the following chart) and compares that to what he estimates as optimal, shown by the chart’s dark line.

The following chart shows the optimal health and mortality delta over a life cycle.

Retail financial advisors and insurance companies should report the health and mortality deltas for their health and longevity products. This, Yogo hopes, will:
1. Facilitate standardization of products;
2. Identify overlap between existing products;
3. Identify risks that are not insured by existing products; and
4. Lead to the development of new products that are analogous to life-cycle (equity/fixed-income) funds consisting of:
   a. Packaged life insurance and deferred annuities.
   b. Products that automatically switch from positive to negative mortality delta around retirement age.

95. Health Care Reform In The United States: Past, Present And Future (Fall 2012)

On the afternoon of the second U.S. Presidential Campaign debate of 2012, Gruber presented the history of the U.S. Patient Protection and Affordable Care Act (PPACA), legislation widely called Obamacare. He is uniquely qualified for this role. Why? Jonathan Gruber had a major role in designing the Massachusetts Health Care Reform law, signed by Governor Romney and widely called Romneycare, as well as the PPACA, signed by President Obama. Both Romneycare and Obamacare establish health insurance exchanges, prohibit insurers from denying coverage for pre-existing conditions, allow adult children to stay on their parents' insurance until age 26, and include the controversial individual mandate. This mandate, proposed earlier by the Heritage Foundation, requires people to buy health insurance. It was contested and upheld as a tax by the U.S. Supreme Court in January 2012.

Gruber described the evolution and design of the Massachusetts law. Competing
interests, ideas, and objectives meant that compromises had to be made. Of the two major problems in health care—the rising cost and the lack of coverage for large portions of the population—the focus of this bill was on the latter. Given the objective of having most Massachusetts residents covered by health insurance, it was essential to create a large risk-sharing pool of those insured. To create this pool, the Massachusetts law included the individual mandate requiring individuals to obtain health care or face a penalty. This mandate was designed to improve insurance rates for all and to eliminate the “free rider” problem of uninsured patients seeking care at emergency rooms.

The Affordable Care Act is a major law and a substantial change in our system, but it does not really kick in until 2014. Most important at this point in time is to understand the law and not assume the politically-based assessments are true. Gruber said that the biggest misconception of the national legislation is that it is some sort of socialism or federal takeover of the health-care system. Unfortunately this and other misconceptions (e.g., calling physician counseling of elderly patients “death panels”) are still given credence. The whole idea of the Affordable Care Act is to build on the existing private health-insurance system. He notes that the Massachusetts law and subsequent experience with it is proving to be a live experiment for the national health care reform.

Before concluding, Gruber discussed the challenges involved in managing health care costs and what has been done in other countries. Regarding the high the cost of drugs in the United States, he said that high prices subsidize low prices in the rest of the world. He said that this is an issue that needs to be addressed, among others, including Medicare reform.

For more information on health care legislation, see Gruber’s book entitled Health Care Reform (Farrar, Straus and Giroux, 12/20/2011) in which he explains in a graphic novel style the complicated piece of legislation.

96. The Market Value Of Social Security (Spring 2012)


Social Security is on the national agenda again and yet, Zeldes says, we continue to face the same questions:

1. How healthy is the U.S. Social Security system?
2. What is the present value shortfall?
3. How large an increase in taxes would it take to restore Social Security balance?
4. Would it save money to index Social Security to prices instead of wages?

The answers to all of those questions, he says, depend on the choice of discount rate for Social Securities’ revenues and benefits.

Typically, to calculate the actuarial value, in spite of the riskiness of the Social Security cash flows, a Treasury bond yield is used as a discount rate. Zeldes advocates a change from actuarial value to market value that is calculated using a risk-adjusted discount rate. He says that the market value provides a more accurate assessment of the projected revenue-benefit shortfall than does the actuarial value.

While advocating market value, Zeldes cautions that estimating the risk-adjusted discount rate in this or any other pension related application has its challenges:
1. Risk-adjusting discount rates for wage-linked cash flows is more complicated than it is for stocks and bonds.

2. Imputing the right discount rates requires estimating:
   a. How much uncertainty there is about the path of future wages and how that uncertainty varies with horizon.
   b. How correlated wages are with the factors that determine asset prices (e.g. aggregate stock market and consumption) and how that correlation varies with horizon.

He says there are two possible models he can use to understand the process: the standard general equilibrium macroeconomic model or a reduced-form that links wages and stock prices. The standard model implies a strong contemporaneous correlation between wage growth and stock returns. This, Zeldes says, is counter to empirical evidence. To break this link, he adds a “news shock” in each period during which agents get “news” about future productivity growth. Thus Zeldes’ model incorporates asset prices that react today to news about future wages, wages that change only when the future is realized. As a result his model has:

1. Low contemporaneous correlation between stock returns and wage growth.
2. Positive correlation between stock returns and future growth in wages.
3. Returns on “wage bond” (a security with payoffs tied to the future economy-wide-average wage at various horizons that is not equal to wage growth).
4. A correlation between “wage-bond” returns and consumption growth that increases with the horizon.

In this model the risk premium is always positive and the term structure of discount rates is upward sloping; the risk premium built into discount rates increases with the horizon and is more like a bond rate over short horizons and a stock return over longer horizons. Using three approaches (market, actuarial, and a one created using a factor analysis model), Zeldes estimates the discount rate over the long term. This results in three quite different discount rate estimates over time that can be seen below: Discount rate – risk-free rate (three approaches).

Using the new market discount rate paradigm, Zeldes solves for the prices and expected returns of various financial assets, including the wage bond. In addition, Zeldes says, he examines a reduced-form model with a link between wages and stock prices that generates the same term structure of risk premia as that for wage bonds. After calibrating these models, he computes the set of implied risk-adjusted discount rates.

Once done, he uses these discount rates to re-compute the common measures of Social Security’s funding status [present value of future (outflows minus inflows) minus the value of the trust fund] depending upon whether future participants, future contributions and benefits are included. The actuarial shortfall ranges from $18.3 to $5.3 trillion. Using the market value approach, the risk-adjusted shortfall in Social Security is 18 - 68% less than indicated by the official statistics. The following chart shows the outcome for the market and actuarial present values for what Zeldes calls the closed group.
Zeldes assesses the three policy changes that have been proposed to bring the Social Security system back into balance. His analysis includes many provocative, colorful and useful charts that show the current situation and the possible changes outlined below:

1. Increasing payroll taxes, decreasing benefits, and indexing benefits to prices rather than wages. His assessment is that even though adjusting for risk reduces the present value shortfall, it actually would further increase the tax rate necessary to bring the system back into balance.
2. Decreasing benefits. He concludes that the risk adjustment would have an ambiguous effect on the magnitude of benefit cuts.
3. Indexing benefits to prices rather than wages. Linking benefits to prices instead of wages would increase the cost of Social Security benefits and thus increase the shortfall. The chart that follows shows the differences.

Zeldes summarizes the results of creating his simple model-based recipe for performing risk adjustment:

1. Large risk adjustments have very small short-run correlations between wage growth and stock returns.
2. Most imbalance measures are significantly smaller under the market value approach.
3. The cost gap between wage indexing and price indexing shrinks when using the risk adjustment: under some parameterizations wage indexing becomes less expensive than price indexing.

As next steps Zeldes plans to:

1. Do additional research to enhance and calibrate macroeconomic models of wage risk.
2. Allow for an inflation risk premium.
4. Estimate magnitudes of policy changes necessary to restore balance to the system (tax increases, benefit cuts).

Encourage governments to adopt market-value approaches to measurement and policy evaluation.

97. Pension Funding And Investment Strategy Issues From Market Value Account (Spring 2012)

M. Barton Waring, Global Chief Investment Officer for Investment Strategy and Policy at Barclays Global Investors (retired) presented "Insights About DB Pension Plans From Market Value Accounting."

This presentation captures the spirit of some key portions of Waring’s recently published book, Pension Finance: Putting the Risks and Costs of Defined Benefit Plans Back Under Your Control. Waring says the book provides a “clean-sheet-of-paper” approach to pension accounting and actuarial science using market value accounting principles and discusses its implications (for
contribution and expense risk, for affordable benefit levels, and for investment strategy and policy).

Waring says that in a good-hearted, but perhaps misguided effort to make good retirement benefits widely available, actuarial science failed to control risks and costs of defined benefit (DB) plans. This effort supported higher benefits than can be paid for with planned funding levels and biased contributions downward, thus back-loading obligations. To make the DB issues more difficult, a plethora of sufficiently complex actuarial methods forestall debate and convey no real information. Despite the complexity, Waring says that “if you manage the economics, the actuarial and accounting versions will follow.”

The central question is “What is the right discount rate?” While actuaries prefer the expected return on the pension asset portfolio, economists argue that the expected return on the liability-matching asset portfolio is the correct rate. To date, Waring notes, this argument has only been about measuring the liabilities rather than contributions, the subject upon which he focuses.

Of economic interest are three liabilities:

1. Full Economic Liability: Present value of benefits for all past, current, and future employees (less termination option on future accruals).
2. Present Value of Future Benefit Payments: For all past and current employees (less termination option), the payment schedule drives expenses and contributions.
3. Benefit Security Liability: The accrued liability representing the promised payments due and owed based on some choice of normal cost method. About this, he says he will have more to say later.

Warning then provides the following graph to show the results of using each method.

No matter what method is used, the benefit payments are the same and since the investment policy is constant, the returns will be constant. The fact is that the higher discount rate is just a cover for reducing the normal cost and contribution payments, he asserts. This leads him to ask the question “Why discount at the expected return on assets?” He says that the answer is that there are huge savings to the DB sponsor (or at least they appear to be huge) and the higher discount rate is just a cover for reducing the normal contribution payments.

A critical issue in the pension debate is the rate used to discount liabilities. Typically the expected return on assets is used. As you can see from the chart below, the lower the rate the smaller the contribution and the larger the savings for the DB sponsor.

Warning says the problem is that investors do not get the expected return just because they are long term investors, while the assumed actuarial discount rate depends
on it. He reminds us of the facts: the S&P 500 has only delivered a 0.55% per year compound average return for the years from 2000 to 2011. At the same time, the dollar grew to only $1.07, less than 1%, far less than the result when using the actuarially expected 8% return assumption. A dollar would have grown to $2.52. Thus the resulting assets in the pension plan are only worth 42% of what was expected. Waring says, “No wonder there is a pension crisis.” It will take a compound average return of 16% per year for the next 12 years to make up this shortfall and, in spite of many bad returns being offset with good returns, there is a 50% probability that the ending portfolio expected could vary from what is projected by a substantial amount.

Showing the outcome for the single employee example, holding benefit payments and investment returns constant, and discounting by the expected return on assets, results in larger than planned contributions more than half the time (the leftmost chart). In contrast, the chart to the right shows that contributions seldom badly disappoint when the risk-free rate is used.

Given the possible shortfalls in contributions that could occur, it is important to ask: When contributions are overdue, who will pay?

1. Contribution rules, with their long term amortizations and wide corridors, are not remotely likely to make up any resulting accrued liability deficits.
2. In a bankrupt plan, participants will ultimately bear the loss, recovering only a portion of each benefit dollar.

After being told for years that their benefits are secure, participants, Waring warns, should understand that good intentions and blind faith in the expected return assumption will not adequately fund a pension plan.

Waring points out that discounting with the expected return on assets is not cheaper but a way to set-up a slow motion bankruptcy. No one else in finance and banking, he says, uses the expected return on debtor assets to discount that debtor’s future cash flow obligations except the government. “No One Else” and “No Where Else” he says. “Why then”, asks Waring, “are pension actuaries, the GASB, and others supporting this harmful practice?

98. Diversification Over Time (Fall 2011)

Barry Nalebuff, Milton Steinbach Professor, Yale University School of Management presented “Diversification Across Time,” he coauthored with Ian Ayres, William K. Townsend Professor, Yale University Law School was the last presentation of the Fall 2011 Q-Group.

Nalebuff starts with the motivation for this research, a quote from Paul Samuelson (1969)

[The businessman] can look forward to a high salary in the future; and with so high a present discounted value of wealth, it is only prudent for him to put more into common stocks compared to his present tangible
wealth, borrowing if necessary for the purpose.

Based on their work, Nalebuff comes to the following conclusion: buy stocks using leverage when you are young. He provides the following example to make the reason clear. A person has two choices, a fund that allocates:

1. Seventy-four percent of the initial portfolio to equities and the remainder to government bonds, or a
2. Leveraged lifecycle fund that begins by allocating 200% of the initial portfolio value to stocks ramping down to 50% as the person nears retirement.

Instinctively, he says, most people feel that the leveraged strategy is riskier since it starts with the higher proportion of the portfolio in equities and is levered. What they do not factor in is that the leveraged strategy ends with a lower stock allocation at a point when the absolute size of the portfolio is larger.

Using historical stock returns (from 1871 through 2009) Nalebuff demonstrates that with identical mean returns for the two strategies the 74% strategy has lower volatility. The result comes from the leveraged lifecycle strategy’s lower standard deviation. This results in a strategy with lower volatility that better diversifies the stock risk exposure across time with no loss of return.

To assess the two strategies Nalebuff and his coauthor use simulation to examine a worker’s 44-year experience in the markets spanning the period from 1871 through 2009. Each group, cohort of workers, begins working at age 23 and retires at 67. The first cohort of workers was born in 1848, started work in 1871 and retired in 1915. The table on page 24 provides strong evidence that a leveraged lifecycle strategy can reduce retirement risk: the 200/50 strategy has a 21% lower standard deviation in the retirement accumulation.

Nalebuff says there are several reasons the leveraged approach is superior. It:

1. Reduces volatility by having higher lows and lower highs.
2. Is better diversified because it spreads the exposure to stocks across time.
3. Channels all the incremental benefits of better temporal diversification to risk reduction.
4. Brings the investor closer to their utility-maximizing allocation: the improvement in the certainty equivalent of retirement wealth is between 35% and 39%.

As to the impact of major market declines on their results, there are two concerns: losses and the impact of potential margin calls. As for losses, he says that in their monthly data, the stock market never declined sufficiently to wipe out the preexisting investments of any retirement group they studied when that cohort adopted a leveraged strategy. To test for the impact of margin calls, they perform a reality check by examining the results for groups who lived through the depression years. Nalebuff reports that workers who retired just after the crash were not severely hurt because the leveraged strategy had already eliminated
their leverage: workers retiring in 1932 would have had 50% of their portfolio invested in the market when the market lost more than a third of its value. However, because of the success of their investments in previous years they still would have accumulated a retirement wealth greater than if they had used the constant percentage strategy.

Nalebuff reports on their robustness checks before turning to his conclusions.

1. The data supports that the Samuelson-Merton notion that people with constant relative risk aversion should invest a constant percentage of their lifetime wealth each period in stock.
2. Young workers require leveraged to implement the strategy.
3. Their recommended investment strategy is simple to follow.
4. The potential gains of risk reduction from such leveraged investments are striking.

Nalebuff points out four important points. First, their estimation does not take into account the impact of non-portfolio wealth such as housing and human capital. The relevance of this issue will vary across professions and he suggests that all investment strategies, including target-date funds, should be different by profession thus reflecting the different indirect exposure to equities via human capital.

Second, their estimation also does not take into account the potential general equilibrium effects that might occur if a substantial segment of investors began adopting leveraged lifecycle strategies. Nalebuff moderates that concern by pointing out that, as a historical matter, economies have successfully adapted to leveraged investments in both housing and education.

Third, their results have implications for legal reform. The natural places to engage in disciplined leveraged purchases are in IRA and 401(k) accounts. Yet, with the exception of the index options, other leveraged and derivative investments inside these accounts are prohibited. What mitigates this possibility is the fact that an employer who offered workers the option of investing in a fund that implements a leveraged strategy might risk losing its statutory safe harbor.

Fourth, Nalebuff recognizes that legal constraints are not the primary reason that people fail to buy enough stock when they are young. Despite compelling theory and empiricism, many people have a strong psychological aversion to mortgaging their retirement savings. While families are encouraged to buy a house on margin, they are discouraged and/or prohibited from buying equities on margin. We are, he says, taught to think of leveraged investments as having the goal of short-term speculation rather than long-term diversification. As a result, most people have too little diversification across time and too little exposure to the market when young. Based on theory and historical data, the cost of these mistakes, Nalebuff says, is substantial.

Trading, Information, Transaction Cost

99. Forced Liquidations, Fire Sales, And The Cost Of Illiquidity (Fall 2015)

Andrew Weisman presented a lively talk that exposed problems with the common treatment of liquidity risk in investment portfolios. Simply put, Weisman highlighted that most measures of illiquidity of funds tend to focus on liquidity during normal times; he shows that investors need to consider potential forced liquidations and fire sales during times when markets are stressed and the holdings of a fund are forced to be re-priced by an interested creditor to the fund—whether it is a counterparty or lender. A key intuition to Weisman’s paper is that there is a “threshold effect,” where the fund is forced to re-price its holdings when its “true value”
deviates from its quoted value by a significant amount.

Most research approaches to measuring illiquidity examine the degree of serial correlation of returns of an investment fund. However, these measures tend to miss the largest costs of illiquidity that investors should be concerned with: forced liquidations (“fire sales”). This is because forced liquidations are rare, and measures of serial correlation in returns do not capture such rare events.

Weisman reviewed the factors that affect the illiquidity mismatch in a portfolio, which is defined as the difference between the funding (liability side of the balance sheet) and the investments (asset side). These include:

1. Use of leverage, including swaps, futures, and margining of long positions
2. Fund gates, lock-up periods, and notice periods (these tend to mitigate the mismatch)
3. Network factors, including the use of common service providers (e.g., securities lending counterparties), strategy correlation among many funds, and commonality in the investors across different funds (so that they behave similarly in their investments and redemptions in several funds)

Weisman introduces the concept of the “credibility threshold”. The idea is that illiquid assets can be valued at a “perfect markets” liquid price (e.g., the price at which these assets might ideally trade, based on the prices at which other assets trade) until the “first interested party” (such as a prime broker or significant investor) takes action to force a sale (and true price discovery) of such illiquid securities. Weisman defines the “credibility threshold” as the level at which price marks trigger forced selling. Determining this level is very tricky, as the fund manager may normally value securities with the assumption that they can be liquidated in an orderly fashion over time, while an “interested party” may value securities with the assumption that they should be able to be liquidated quickly. One of the key contributions of the paper is to challenge the notion of a unique price representing “true” fundamental value. The “fair” (or true) price to pay for an asset during normal quiescent periods may differ dramatically from the price that can be realized during a liquidation. Furthermore, the liquidated value will depend on the overall level of stress in the system. This poses a significant problem in thinking about how to mark portfolios and determining the prices at which investors can enter and exit funds.

Weisman models the credibility threshold as a barrier option, where the difference between the reported value and the “true” value of the portfolio (the amount of “overstatement of value”) is the underlying asset. The barrier option pays off only when the “true” value is lower than the quoted value of the portfolio by a certain percentage. When this happens—reported value exceeds “true” value by a certain percentage—the exercise of the “repricing option” by an “interested party” results in an adjustment of the reported value to the “true” value minus a penalty for overreporting. (This penalty represents the amount of “fire sale” discount that results from forced selling triggered by the revaluation by the “interested party”).

Using this paradigm, a fund’s reported value can be modeled as a process that equals the ”true” value with some time lag, minus the value of this barrier option.

Weisman conjectures, based on the serial correlation in HFRI hedge fund indices, that hedge fund managers typically report returns that reflect less than 50% of the true change in the value of their portfolios. He then proceeds to use the Morningstar-CISDM
Hedge Fund Database (which contains both live and dead funds) to estimate the value of the barrier option that results from this level of misreporting. He finds that the average return of these hedge funds, 11.8%/year, is reduced to 6.3%/year when we adjust for the value of the (short) barrier option—5.5%/year.

Weisman further checks the credibility of his barrier option approach by graphing the estimated option value of hedge funds vs. their maximum drawdowns, shown below. The resulting correlation indicates that his barrier option approach reasonably represents the actions of investors:

The key intuition to remember from this talk: if you invest in an illiquid and levered portfolio that is dependent on funding from an external party, then you have written an option to the market—where an interested third party may exercise and force liquidation at “distressed” repricing—which could result in a permanent and significant loss.

Bibliography

100. Trading Costs Of Asset Pricing Anomalies (Fall 2014)

Toby Moskowitz, Fama Family Professor of Finance at the University of Chicago, employs a unique database provided by AQR of actual execution costs of stocks to estimate the net-of-trading-cost alphas of some standard quantitative strategies. The database consists of nearly $1 trillion of actual trades by AQR from 1998-2013 across 19 developed equity markets. AQR manages $118 billion AUM (as of Oct 2014), and accounts for 1.1% of daily volume in these stock markets. The great majority of the trades in the database occurred during 2007-2013.

There are hundreds of papers in academia that study various alleged anomalies in the cross-section of stock returns; these academic papers typically analyze alphas gross of transaction costs. However, we also need to know whether stock anomalies are profitable, net of realistic trading costs. Academics wish to know whether markets are efficient, with frictions, and asset managers need to know if and when then can expect to profit from well-known investment signals. While the field of market microstructure and several prior papers that used Plexus data, such as Keim and Madhavan (1997), attempt to estimate institutional trading costs, Moskowitz notes that arbitrageurs often obtain much better trading execution than the average institution.

So, the research questions that Moskowitz addresses can be summarized as follows:

1. How large are trading costs faced by large arbitrageurs?
2. How robust are anomalies in the literature to realistic trading costs?
3. At what size of position implementation do trading costs start to constrain arbitrage capital?
4. What happens if we take realistic transactions costs into account, ex-ante—can we improve the payoff of anomalies?

Moskowitz focuses on four well-known anomalies: size, book-to-market, momentum, and short-term (monthly) reversals in stock returns. While Fama and French (1993), Jegadeesh (1990), and Jegadeesh and Titman (1993) document these patterns gross of trading costs, it is not clear which survive after costs. Moskowitz notes that he does not take a position on whether these stock return predictors are truly anomalous or whether they are compensation for risk. He merely wishes to see whether they survive, ex-trading costs, whether we call them alpha or “smart beta.”

Moskowitz notes that AQR implements these strategies, but not exactly like they are done in the papers. For example, the book-to-market factor (HML) is formed with equal-weighting of securities, which makes it expensive to trade in reality. AQR implements modified version of these strategies which avoid excessive trading costs. So, Moskowitz measures net-of-trade-cost returns of long-short portfolios based on the implementation of, e.g., HML actually done by AQR at each particular point-in-time (a “sampled” HML strategy). For instance, AQR trades, on average, 62% of the stocks in Fama-French’s HML portfolio in the U.S., and 35% of HML in non-U.S. developed markets.

He attempts to separate the anomaly profits from profits achieved by a savvy trader who generates some additional alpha while trading—perhaps through a smart provision of liquidity to the market or through careful splitting of orders across exchanges. To do so, to compute the price impact, he compares the VWAP of the executed trade (by AQR) to the open price of the day for each desired trade. He then separates this total impact into (1) permanent and (2) temporary impacts. Permanent impact is the amount of price impact that does not reverse within one day after the trade package is complete.

He finds that AQR’s permanent, temporary, and total trading costs are 8.5, 2.5, and 11 bps, on average. He interprets this to mean that we need to deduct 11 bps, on average, for a careful arbitrage strategy that implements these four stock return predictors—much lower than that predicted by prior literature. Interestingly, Moskowitz finds that inflow- and discretionary trades have similar trading costs. That inflow-related trades, which must be made without undue delay, have similar costs reassures us that the trade costs in the database do not reflect endogeneity, that is, AQR changing its trades based on point-in-time liquidity for a particular stock. If that were true, the trading costs might not be realistic and generalizable to another investor.

Moskowitz notes that 95% of AQR trades, all achieved through limit orders, are completed within one day; these trades are conducted through direct market access through electronic exchanges. AQR randomizes the trade size, time, and actual stocks traded at a particular point-in-time in order to limit the ability of other traders to reverse-engineer and then “front-run” their strategies.

Moskowitz uses the actual AQR trades to estimate a multivariate trading cost model that controls for a time trend in trade cost, market cap, etc. Key variables in the model are “fraction of daily volume” and “Sqrt(fraction of daily volume)” represented by the AQR trades.
to Q-Group members, Moskowitz plans to publish the trading cost model coefficients on the web, including price-impact breakpoints, so that researchers and investors can evaluate trading costs of other strategies.) Next, he uses the fitted regression to simulate the net-of-cost returns to HML, SMB, UMD, and return reversal portfolios. One version uses actual trade sizes of AQR, the second extrapolates to the prescribed trade sizes of the strategies from the source academic papers using the fitted regression model.

From this analysis, Moskowitz estimates trade costs at different levels of total market trading in the strategies, as well as break-even total strategy sizes. Break-even is defined as the total amount of asset management money, among all investors, that could be employed such that net-of-trading-cost abnormal returns are zero. These break-even levels, for long-short portfolios that capture size, value, and momentum, are $103, 83, and $52 billion dollars in the U.S., respectively, and $156, 190, and 89 billion dollars, globally. A combination of value and momentum, used by many quantitative shops, has even higher capacity ($100 billion U.S., $177 billion globally) due to netting of trades across negatively correlated positions (i.e., value and momentum sometimes involve taking opposite positions). Short-term reversal strategies, on the other hand, are not scalable beyond $9 billion in the U.S., or $13 billion globally.

References


101. A Primer On Fast Electronic Markets (Spring 2014)

In the Spring 2010 Q Group meetings Harris had provided a primer on electronic markets. Events, including the recent publication of Michael Lewis’ Flash Boys, and increased concern by regulators and Congress, has elevated the importance of understanding these markets. As a result Harris agreed to provide an optional tutorial for Q participants on the markets and updated the data from 2010 “Equity Trading in the 21st Century.”

Harris describes electronic order matching systems and says they are very cheap to operate once built. The systems do exactly what they are programmed to do and maintain perfect audit trails. These systems have largely displaced floor-based trading systems in all instruments for which order-driven markets are viable. He goes on to describe:

1. Types of Electronic Traders
2. Main Proprietary Strategies including Liquidity Trading and Parasitic Low Latency Strategies
3. Electronic Buy-Side Traders
4. Needs for Speed
5. How To Trade Fast
6. Why Electronic Traders Are Efficient

He says that the efficiency of electronic trading strategies led to their widespread adoption by proprietary traders, buy-side traders, and their brokers. At the same time
electronic traders have displaced traditional dealers, arbitrageurs, and brokers in electronic order-driven markets.

The update of the empirical results from his 2010 “Equity Trading in the 21st Century” shows, Harris says, that market quality in the U. S. has remained high by all measures, despite concerns expressed by some practitioners and regulators. Improvements in market quality have benefited small traders and new evidence indicates that it also has benefited the institutional trader executing very large orders over many days.

While he finds this encouraging, he notes that certain changes in market structure could produce even better markets. He has particular concerns about maker/taker pricing and its cousin, taker/maker pricing. The later represents a subversion of the sub penny rule of Regulation NMS with the attendant implications for front-running trading. Also of concerned is front-running of large institutional traders by traders employing computerized pattern recognition systems. Large institutional traders could be protected from these strategies by a simple change in trade reporting procedures. Finally, he notes that high frequency traders are engaged in a dissipative arm’s race that is not benefiting public investors. A slight random delay in order processing could reduce the importance, and thus the costs, of winning this race.

Various proposals to change market structure are troubling and he believes they would damage market quality substantially. Foremost among these are proposals to impose transaction costs on trading and minimum resting times on quotes. Both proposals would hurt liquidity without producing the desired improvements in market quality.

With so much current controversy about equity market structure, taking a fresh look at the structure of our markets from a broad perspective is important. Harris concludes that the empirical results show that the markets are functioning reasonably well despite the many calls for change. At the same time, various economic distortions and principal-agency problems suggest that market structures could be enhanced to better serve investors. Such changes should be guided by sound economic and legal principles when their application is well understood. When they are not, pilot studies and policy phase-ins can produce additional economic evidence that could improve policy decisions. However, regulators should not create pilot studies simply to defer good policies that are politically difficult to implement.

102. The High-Frequency Trading Arms Race: Frequent Batch Auctions As A Market Design Response (Spring 2014)

Cramton starts with some anecdotes about the current state of electronic, high-frequency trading, especially in light of last week’s publication of Michael Lewis’s Flash Boys:

- In 2010, Spread Networks invested $300mm to dig a high-speed fiber optic cable from NYC to Chicago. It shaves round-trip data transmission time from 16ms to 13ms.
- Within three years, Spread’s fiber optic cable was obsolete.
- Industry observers joke that 3ms is an eternity and that next innovation will be to dig a tunnel, thus avoiding the planet's pesky curvature.
- Microwave technology has advanced sufficiently bringing the round-trip NY-Chicago transmission time from 10ms to 9ms and now to 8.5ms.
- Analogous races are occurring throughout the financial system, sometimes measured as finely as nanoseconds.
- Last month a Business Wire reported on the use of lasers to transmit data.
Cramton says that the HFT arms race is an optimal response from market participants given the current market design. He believes, however, that continuous-time trading and continuous limit order book are basic flaws in modern financial market design. He proposes replacing continuous-time trading with discrete-time frequent batch auctions: uniform-price sealed-bid double auctions conducted at frequent, but discrete, time intervals (e.g., every 1 second or 100ms). He argues this would be a minimal departure from the current system where the arms race is a never-ending, and the market design harms liquidity and is socially wasteful. The cost to investors of this change would be very short wait-time-to-trade.

One of the arguments against discrete-time batch auctions is that they may facilitate break-downs in correlations across assets which normally would be highly correlated. Cramton argues that correlations break down for technical reasons at some trade frequency even under continuous trading. The following table, for instance, shows pairwise correlations of related companies’ stock prices at various horizons.

<table>
<thead>
<tr>
<th></th>
<th>1 ms</th>
<th>100 ms</th>
<th>1 sec</th>
<th>10 sec</th>
<th>1 min</th>
<th>10 min</th>
<th>30 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD-LOW</td>
<td>0.008</td>
<td>0.101</td>
<td>0.192</td>
<td>0.434</td>
<td>0.612</td>
<td>0.689</td>
<td>0.704</td>
</tr>
<tr>
<td>GS-MS</td>
<td>0.005</td>
<td>0.094</td>
<td>0.188</td>
<td>0.405</td>
<td>0.561</td>
<td>0.663</td>
<td>0.693</td>
</tr>
<tr>
<td>CVX-XOM</td>
<td>0.023</td>
<td>0.284</td>
<td>0.460</td>
<td>0.654</td>
<td>0.745</td>
<td>0.772</td>
<td>0.802</td>
</tr>
<tr>
<td>AAPL-GOOG</td>
<td>0.001</td>
<td>0.061</td>
<td>0.140</td>
<td>0.303</td>
<td>0.437</td>
<td>0.547</td>
<td>0.650</td>
</tr>
</tbody>
</table>

While all pairs are highly correlated at a one-minute interval, the correlations start to break down at intervals of ten seconds or less.

This following chart depicts the correlation between the returns of the E-mini S&P 500 future (ES) and the SPDR S&P 500 ETF (SPY).

As is readily apparent, in 2005 the pairwise correlation had completely broken down (i.e. was below 10%) at a 100ms trade interval. By 2011, that level of breakdown did not occur until trade intervals of less than 10ms were reached. This chart, Cramton says, is a clear depiction of the high-frequency arms race.

At short enough trade horizons, there is room for arbitrage between the ES future and the SPY ETF. The following table presents data, over the January 2005 to December 2011 period, for arbitrage opportunities between the E-mini S&P 500 future (ES) and the SPDR S&P 500 ETF (SPY).

Cramton goes on to estimate annual potential value of ES-SPY arbitrage at $75mm, suspecting it is an underestimate. Furthermore, he says, ES-SPY is just the tip of the iceberg when it comes to the value of execution speed - one of many potential arbitrage opportunities.

He concludes his talk with some of the open questions: Isn't the arms race just healthy competition? What's the market failure? Why hasn't some exchange tried it? What is the equilibrium if there are both batch and continuous exchanges operating in parallel? What would be the mechanics? What are some of the likely unintended consequences? What is the optimal time
interval? What would be the role of trading halts? What trade information should exchanges release and when? What are the adverse information impacts from a structure that will still allow faster traders to act on news between the batch auctions? Interesting proposal, intriguing questions.

103. Those Who Know Most: Insider Trading In 18th C. Amsterdam (Fall 2013)

How is private information incorporated into security prices? This is the question that Peter Koudijs researches using information from the market for English securities from 1771-1777 and 1783-1787, periods characterized by peace on the European continent. His interest is in how the information that traveled between the stock market in London to the secondary market in Amsterdam. Koudijs suggests that the arrival and departure of mail packet boats, sailing ships between the ports of London and Amsterdam, signaled the possible arrival of new information about such things as prices in the London market. This era, Koudijs says, provides a unique opportunity to infer how insiders or informed agents trade on their information and the process by which private signals are revealed to the market as a whole.

The packet boats carried both public news including newspapers which contained stock prices and private letters. They were practically the only source of news. Although the exact sailing time between London and Amsterdam depended on the marine weather conditions, the median travelling time was 4 days. Ships left on preset days (Wednesday and Saturdays), thus making information arrival relatively discrete. This discrete arrival of information, depicted below, allows the identification of how information is revealed over time.

Koudijs gathered what was needed to study the information flows between these two ports from Dutch and English newspapers:

1. Daily stock prices in London and three times a week in Amsterdam.
2. Arrival and departure dates from both ports.

In addition, to estimate sailing time, he gathered marine weather data from a Dutch observatory.

Using this data he reconstructs the arrival dates of sailing ships and examines the movement of English security prices between ship arrivals. Two models of information dispersion were considered by Koudijs:

1. Agents with private information act in a competitive fashion without taking into consideration the impact on prices. They trade right after they receive a private signal and do so aggressively. Thus, the privately-informed immediately reveal their private information.
2. Insiders are strategic and take into account the price impact of their trades. They understand that profits fall as prices become more informative and thus constrain their behavior. Price discovery, the process by which private information is incorporated into price, is prolonged.

Koudijs says that strategic behavior is not a sufficient condition for slow price discovery.

To examine the data, Koudijs uses the classical two period model of strategic insider trading developed by Kyle (1985). This model posits that an informed trades slowly over time. The rate at which private information is incorporated into prices depends on when the agent expects the private signal to be publicly revealed. Using his Amsterdam and London packet trade data, Koudijs finds:
1. Private information is slowly revealed to the market; the speed depends on how long insiders expected it to take for the private signal to be publicly revealed.

2. Price movements in Amsterdam between the arrival of boats were correlated with the contemporaneous (but as of yet unreported) returns in London. This is consistent with the presence of a private signal that is slowly incorporated into prices in both markets.

3. The time to arrival of the next packet, impacts the speed of revelation. The initial co-movement of Amsterdam and London prices was stronger when the next boat was expected to arrive early. This is consistent with strategic behavior on the part of the insider.

4. The importance of private information is underlined by the response of London prices to price discovery in Amsterdam: conditional on its own price discovery, the London market updated its beliefs based on price changes in Amsterdam.

5. The co-movement between Amsterdam and London reflected permanent price changes: it is unlikely that the co-movement was the result of correlated liquidity trades or other transitory shocks.

The arrival of news through channels other than the official packet boats did not account for the empirical results.

One important thing about his study that Koudijs noted was that information flows during these time periods were less complex than flows today. Moreover, they can be perfectly reconstructed. Since information arrived in a non-continuous way, clean identification of private information was possible. The fact that the lengths of time over which insider information remained private in Amsterdam varied exogenously and this allowed for a direct test of the strategic behavior of insiders.

Koudijs is aware that historical results can be generalized or may not be relevant today. About this he says three things:

1. While insider trading has become illegal since the 18th century and one might think that private information has therefore become less relevant, empirical evidence does not square with this conclusion.

2. The speed of information transmission was a lot slower and more infrequent in the 18th century. However, private information itself, the fundamental thing, was not the result of primitive communication technology but the result of London insiders having access to superior sources of information. This is similar to today where corporate insiders are likely to be better informed than the market as a whole.

Koudijs concludes that while he studied a different venue in a different time, only the speed of transmission has changed. While different today – more advanced technology makes private information much shorter lived, and markets have not become more information. Long-lived private information, held by monopolistic agents is as relevant today as it ever was.


Shue asks whether, absent news, the passage of time contains information and whether the market incorporates this information. To illustrate the point she references the Sir Arthur Conan Doyle quote: “The dog did nothing in the night time ... that was the curious incident.” She mentions other examples where the absence of news implies information:

1. A citizen who lives through a sustained period without terrorist attacks should update positively on the government’s anti-terrorism programs effectiveness.
2. A manager who observes that an employee has executed a difficult task without incident should update the employee’s quality positively.

“No news” also can be news in many financial contexts. For example, if:

1. A firm does not lay off workers or declare bankruptcy after a macroeconomic shock, investors should update positively on the firm’s underlying strength.
2. A firm repeatedly fails to announce new investment projects, investors may be justified in updating negatively on the firm’s growth prospects.
3. Investment returns that seldom display newsworthy variation can reveal information about the underlying investment or, if overly consistent, may be suggestive of fraud, as in the case of Bernie Madoff’s investment fund.

In this talk, Shue uses the context of mergers to examine whether markets fully incorporate the information content of “no news.” Mergers provide a convenient empirical setting for the analysis because each merger has a defined starting date, the announcement date, and the returns to merger arbitrage depend heavily on a definitive and stochastic ending point.

If markets fully incorporate this information, expected returns should be sufficient to compensate for the probability of a failed merger and reward investors for the use of their capital. In particular, Shue says, there is no reason for hazard rates and realized rates of return to be strongly related. However, Shue describes finding a strong relation between the hump shape of the hazard rates and the hump shape of mean merger arbitrage returns - with cash financed mergers earning a mean return of 20bp per week in the first weeks after a merger announcement. Returns peak at 40bp per week around event week 25, and then decline sharply over time.

Shue posits two possible explanations for the findings. First, she suggests that the positive correlation between returns and hazard rates can be explained by a behavioral model in which the agents underreact to the passage of time. If agents do not fully appreciate the variation in hazard rates associated with the passage of time, they will behave as if hazard rates are less time-varying (flatter) than they are. The second plausible explanation is that it is a rational reaction to changes in risk or trading frictions over time.

After controlling for other kinds of risk, Shue concludes that event time variation in selling pressures and asymmetric information are unlikely to explain the observed returns patterns. Shue concludes that aggregate hazard rates of merger completion predict merger returns because markets underreact to the information content of the passage of time. Importantly she finds under reaction is concentrated in the subset of deals with lower liquidity and higher transaction costs, suggesting that trading frictions prevent sophisticated investors from arbitraging away the mispricing.

Shue goes further when she concludes that evidence of under-reaction in mergers markets also is suggestive of a more general phenomenon in which agents underreact to the passage of time because it is often less salient than explicit news stories. Under reaction to no news can be persistent, and can potentially exacerbate asymmetric information problems in many other contexts. As to future research, she wants to explore the extent to which under reaction to no news pervades other contexts such as the interactions between voters and politicians, managers and employees, or investors and insiders.

Shimon Kogan asks, what moves stock prices? In his Presidential Address to the American Finance Association, Richard Roll (1988) found little relation between stock prices and news - a finding that has been confirmed in many other studies. To challenge this Kogan’s research extends previous textual analysis methodology and utilizes an information extraction platform, “Stock Sonar”. This system uses a dictionary-based sentiment measure to count positive and negative words in a news article, and analyzes phrase-level patterns to decide whether the article contains relevant news. As an example of what "Stock Sonar" can do, Kogan says from 2000-09, the Dow Jones Newswire produced over 1.9 million stories about S&P500 companies and estimated that roughly 50% of those stories had relevant news. Kogan classifies articles from 2000-09 into possible company events, and classifies each into unrelated news (Unid) or news related (Iden) to an identifiable event. Of the 1,229,359 total news days, 57% had no news, 30% were unidentified and 13% were identified news days (as shown in the table that follows).

Kogan then turns to the question of whether this refined measure of news can be used to consider Roll’s empirical no-news-moves-stock-prices finding.

Based on the variance ratios (reported in the table below) Kogan concludes that the answer is “yes”: the median stock exhibits return variance on identified news day that is 2.2 times the variance of no news days. These results appear robust: over 90 percent of stock variance ratios exceed 1.0 on identified news days.

Kogan goes on to report direct evidence that overturns Roll’s anomalous result. He uses one- and four-factor pricing models finding the R’s are similar no news and unidentified news days, consistent with Roll’s results. However, on identified news days it is much lower as shown in the following table.

Kogan concludes that this research stands in sharp contrast to the last 25 years of literature on the relationship between stock prices and news. Whereas past research failed to find a strong link, he finds that when information is more properly identified, a much stronger link can be found.

Most, maybe all of us, believe that news impacts investor sentiment and can change investor action. Kogan gives us a new way to look at news using computer-based information-extraction technology to test our beliefs. He identifies a link between news and stock price changes although he cannot yet answer the question of whether investors can profitably trade on news releases. The remaining, and perhaps more difficult, questions are whether news releases can be forecast and/or increases in the speed of information incorporation into investor action make a difference. Kogan intends more research to answer questions like these.
106. High Frequency Trading And Price Discovery (Fall 2012)

Brogaard said that financial markets have two functions important for asset pricing: liquidity and price discovery. Historically, financial markets relied on intermediaries to facilitate these functions. When stock exchanges became fully automated, the markets’ trading capacity increased and intermediaries were enabled to expand their use of technology. This reduced the need for human market makers and led to the rise of a new class of intermediaries, typically referred to as high frequency traders.

Many do not believe that high frequency trading (HFT) is benign. To demonstrate this Brogaard presented a sample of stories about HFT and its potential for harm that appeared during 2009 in *The New York Times*:

> It's hard to imagine a better illustration of social uselessness than high-frequency trading. The stock market is supposed to allocate capital to its most productive uses, for example by helping companies with good ideas raise money. But it's hard to see how traders who place their orders one-thirtieth of a second faster than anyone else do anything to improve that social function.
>  
> — Paul Krugman, August 2, 2009—*New York Times*

Brogaard acknowledged that these concerns are legitimate. However, he said, HFT is “socially useless” only if there is no new price discovery. To examine price discovery, Brogaard used a state-space model which incorporates the interrelated concepts of price discovery and price efficiency. He used the model to decompose price movements into permanent and temporary components and to relate changes in both to HFT. The permanent price movement component is normally interpreted as information and the transitory component is seen as pricing errors (also referred to as transitory volatility or noise). He used a NASDAQ dataset that includes trading data on a stratified sample of stocks in 2008 and 2009 and provides information on whether the trade is a liquidity-demanding (HFTD) or liquidity-supplying (HFTS) trade.

Brogaard stated that he found the following impact on price discovery:

1. Overall, HFT trades make prices more efficient.
2. Results are stronger on high-volatility days.
3. Market order trading shows positive correlation with efficient price and negative correlation with pricing error/noise. This is consistent with forecasting both parts of returns.
4. Limit order trading coefficients have opposite signs: negative with efficient price and positive with pricing error/noise.
5. Efficient price is a consequence of standard adverse selection of liquidity providers.
6. Noise could be the result of adverse selection, manipulation, and/or order anticipation.

The most important issue at this point is whether these passive trades make money. The answer, Brogaard said, is yes. They earn the spread and liquidity rebates, although the overall HFT profitability is quite low (around $0.03 per $10,000 traded).

Brogaard provided considerable analysis before presenting these conclusions:

1. Overall, HFT increases the efficiency of prices by trading in the direction of
permanent price changes and in the opposite transitory pricing errors. This is done through marketable orders. In contrast, non-marketable HFTS (liquidity-supplying) orders are adversely selected on both the permanent and transitory component of prices.

2. HFT marketable orders’ informational advantage is sufficient to overcome the bid-ask spread and trading fees to generate positive trading revenues.

3. HFT predicts price changes occurring a few seconds in the future.

4. Brogaard said that there is no evidence that HFT contributes directly to market instability in prices. In fact, during a period of relative market turbulence from 2008 to 2009, overall HFTs traded in the direction of reducing transitory pricing errors, both on average days and on the most volatile days measured.

5. HFT imposes adverse selection costs on liquidity suppliers both overall and at times of market stress. This could lead, he said, to non-HFT liquidity suppliers withdrawing from the market and indirectly result in HFT reducing market stability.

Brogaard concluded that HFTs are a type of intermediary. When thinking about the role HFT plays in market it is natural to compare the new market structure to the previous one. There are some primary differences: there is free entry into HFT; HFT does not have a designated role with special privileges; HFT does not have special obligations.

When considering the optimal industrial organization of the intermediation sector, HFT more resembles a highly competitive environment than a traditional market structure. A central question, Brogaard said, is whether possible benefits from the old, more highly regulated intermediation sector outweigh the disadvantages of lower innovation and higher entry costs that are typically associated with regulation.

107. The Impacts Of Automation And High Frequency Trading On Market Quality (Fall 2012)

The U.S. equity markets have changed from predominantly manual markets with limited competition to highly automated and competitive markets. One method that has attracted the attention of the media and policy makers is high frequency trading (HFT). Studies using proprietary exchange provided data that distinguishes activity by HFT firms show they contributed directly to narrowing bid-ask spreads, increasing liquidity, and reducing transitory pricing errors and intra-day volatility.

To begin his analysis, Litzenberger discussed the structure of pre-electronic markets and the evolution of electronic trading. The idea of an electronic marketplace was articulated far earlier than the technology allowed. To emphasize this he pointed to a statement by Don Weeden, a “financial prophet,” who wrote the following to the SEC in 1969.

“With today’s electronic miracles available to the industry, all market makers wherever located could be combined into a central, interrelated market for fast and efficient access by investors to all its segments. The true central marketplace demand access to all available pools of positioning capital for maximum liquidity.”

It took four decades to create Weeden’s “electronic miracle.”

NASDAQ was first to automate. Other exchanges followed in 2005 after rules that negated the advantages of ATS were lifted. One such rule was the “trade through rule” under which all orders in NYSE shares were required to be exposed to the floor for a 30-second period for price improvement before trading. By early 2005 automatic trading networks (ATS) accounted for half of all trading.
Litzenberger noted that HFT has certain characteristics:

1. Market making that uses resting orders to quote two-sided prices and rapidly adjusts quotes in response to market conditions.
2. Profit reduced by adverse selection that comes from the bid–ask spread.
3. Directional trading that uses marketable orders and includes mean-reverting and momentum strategies.

In practice, he said, distinctions between market marking and directional trading are less clear. As a result of regulatory change and the decimal rule, spreads declined between 1993 and 2002. They have declined further since 2006 and the onset of automated trading. The declines, Litzenberger said are directly related to HFT.

This is not only true in the United States. Citing the work of others, Litzenberger said that liquidity has increased, trade sizes have decreased, and block trades remain unused. In addition, there are positive trading revenues from HFT, although they have declined with greater competition.

Litzenberger summarized what we know as follows:

1. A large and growing body of evidence shows that the quality of the U.S. equity markets has improved significantly over recent decades. Many of the benefits can be attributed to improved competition, automation, and high frequency trading.
2. The benefits include a reduction in quoted and effective bid-ask spreads, an increase in posted liquidity at NBBO and within six cents of the NBBO, and a decline in the transitory price pressure impacts of large trades.
3. Net HFT marketable order flow is positively related to permanent price movements and inversely related to transitory price movements.

4. Marketable orders are sufficiently profitable to offset execution costs and the bid-ask spread. Resting orders earn sufficient spreads and rebates to offset the impact of adverse selection.
5. Large buy or sell programs implemented through execution algorithms and facilitated by HFT are consistent with the observed decline in trade sizes.
6. Net HFT resting orders are negatively related to permanent price movements and positively related to transitory pricing errors. To Litzenberger, this suggests that resting orders provide liquidity to informed traders and absorb adverse selection.

Much of the empirical evidence on the direct impact of HFT on the U.S. equity markets relies heavily on limited samples of proprietary data provided by NASDAQ and BATS to several financial economists. Broadening these samples to include other trading venues, including more stocks and time periods, and making the information more widely available, Litzenberger said, would result in more empirical research on a larger data set and more reliable inferences drawn from this data.

Finally, Litzenberger encouraged thoughtful initiatives such as pilot programs and structured deployments of rule and technology changes to provide the opportunity for further empirical study and better understanding of the markets.

108. Noise As Information For Illiquidity (Spring 2012)

Jiang Wang, Mizuho Financial Group Professor, MIT Sloan School of Management, CAFR and NBER, presented “Noise as Information for Illiquidity,” coauthored with Xing Hu, Assistant Professor, University of Hong Kong, and Jun Pan, Professor of Finance, MIT Sloan School of Management, CAFR and NBER.
If the Financial Crisis taught us anything, it is that liquidity is essential for markets. However, Wang says, it is only partially understood and there is no clarity about:

1. How to measure liquidity.
2. What determines liquidity.
3. Whether there is commonality in liquidity across markets.

Wang says that noise in asset prices (pricing errors) reflects market illiquidity:

1. During normal times, an abundance of arbitrage capital forces prices close to fundamentals, smoothing out variations around the yield curve.
2. During times of crisis, a shortage of arbitrage capital allows prices to deviate from fundamentals. Thus, limited arbitrage capital allows more noise in yields.

For Wang, the amount of noise in yields provides a measure of illiquidity.

The basic premise in Wang’s work is that the abundance of arbitrage capital during normal times helps smooth out the Treasury yield curve and keep the average dispersion low. During liquidity crises, however, the lack of arbitrage capital forces the proprietary trading desks and hedge funds to limit or even abandon their relative value trades, leaving the yields to move more freely and resulting in more yield curve noise. Wang argues that these abnormal noises in Treasury prices are a symptom of a market with a severe shortage of arbitrage capital. Furthermore, this is not unique to the Treasury market and can impact overall financial markets.

In this study he focuses on the U.S. Treasury market for two reasons. First, it is by far the most important asset market in the world and a shortage of liquidity in this market provides a strong signal about liquidity in the overall market. Second, the fundamental values of Treasuries are determined by a small number of interest rate factors easily captured empirically to create a more reliable measure of price deviations.

Using the CRSP daily Treasury database, he constructs a noise measure by backing out a smoothed zero-coupon yield curve (the yield curve used to price all available bonds on that day). He then aggregates the deviations across all bonds to create a measure of noise. Wang notes that in the fixed-income literature, deviations from a given pricing model are often referred to as noise.

Wang says the results are rather informative regarding the liquidity condition of the overall market. During normal times the noise is kept to an average of 3.94 basis points comparable to the average bid/ask yield spread of 2 basis points. Because of this he concludes that arbitrage capital is effective in keeping the deviations within an unattractive range given transaction costs during normal times. However, during a crisis the noise measure spikes up much more prominently than the bid/ask spread, thus implying a misalignment in bond yields sufficiently large to attract relative value arbitrageurs. The following charts contrast the yield curve on normal days (the first chart) and during crisis periods (the second chart). The curves represent the key period and two time periods around the key date. Note the
legend provides the dates and the yield curve deviations from those on the key date.

Clearly, the size of the noise measure spiked during the Financial Crisis. This is further shown on the event annotated chart in the next column.

![Image](image.png)

Figure 2: Daily time-series of the noise measure (in basis points).

Wang says that the sharp rise of the noise measure during crises of different origins and causes suggests that the noise measure may capture market-wide liquidity risk. He wonders if noise factor can explain asset returns. Specifically, he examines whether the returns on assets he deems sensitive to changes in market-wide liquidity (such as hedge funds and the currency carry trade) can be explained by his noise measure and finds that it explains cross-sectional variation in hedge fund returns and currency carry trade strategies. Liquidity is important.

109. **What Does Equity Orderflow Tell Us About The Economy? (Fall 2011)**

Michael W. Brandt, Kalman J. Cohen Professor of Business Administration, Duke University and NBER presented “What Does Equity Sector Orderflow Tell Us about the Economy?” he coauthored with Alessandro Beber, Amsterdam Business School, University of Amsterdam and CEPR, and Kenneth A. Kavajecz, Associate Professor of Finance, Madison School of Business University of Wisconsin – Madison.

Investors rebalance their portfolios as their views about expected returns and risk change. In this paper Brant uses empirical measures of portfolio rebalancing to back out investors’ views, specifically their views about the state of the economy. His focus is on orderflow, the act of initiating the purchase or sale of securities, not price or returns.

Orderflow, Brandt says, is the conduit through which information about economic fundamentals are aggregated into asset prices. Asset prices help forecast business cycles and orderflow is the mechanism by which asset prices change. This raises the question, Brandt says, of how orderflow is related to current and future economic conditions and whether it contains less, the same, or more information than prices or returns. Orderflow contains:

1. Less information if a substantial portion of the price formation process is due to unambiguous public information resulting in instantaneous price adjustments.
2. The same information if it simply passes through to asset prices.
3. More if unique information relative to prices is not fully incorporated in them but is passed through investors’ trading behavior.

The latter is possible if, Brandt says, orderflow represents actions of investors while returns reflect consequences.

There are many different ways to investigate these issues, just as there are many strategies investors use to adjust their portfolios in response to changes in their views about economic fundamentals. In this research Brandt and his colleagues focus on sector rotation, a highly publicized investment strategy that exploits differences in the relative performance of sectors at different stages of the business cycle. Specifically they analyze the dynamics of orderflow across ten U.S. equity sectors to
determine whether sector-based portfolio adjustments are related to the current and future state of the macro economy and the aggregate stock and bond markets. As a result of the research, Brandt says they find that:

2. Orderflow contains more and different information when compared to such things as returns.
3. The nature of the information is common across markets.
4. There is a line between this information and the macro economy as seen through its relationship to non-farm payroll announcements.
5. Their results are stronger when orderflow is less dispersed within sectors. This lends further support to the conjecture that the sector orderflow measures reflect the empirical footprints of broad sector rotation rather than stock-picking within particular sectors.
6. The correlation between active sector orderflow and mutual fund flows in core categories suggests to Brandt that orderflow measures are indeed capturing institutional trader flows.
7. Orderflow contains asymmetric information: it is primarily defensive in nature and largely related to wealth preservation.

To reach these conclusions, Brandt creates equity orderflow data constructed using the Trades and Quotes (TAQ) dataset over the sample period 1993 through 2005 and combines it with stock market data. After constructing the basic sector and stock market level net orderflow measures, they define passive and active measures:

1. Passive orderflow is defined as the total net orderflow to the stock market multiplied by the weight of that sector in the market portfolio.
2. Active net orderflow for each sector is the difference between sector level total net orderflow and passive net orderflow.

Examining the data Brandt reports that they find the percentage of orderflow across years remains fairly stable, although there are variations that occur, particularly leading up to and during the economic downturn in 2000. Further, the shifts in the shares of orderflow across sectors appear more pronounced for large orders and suggest that market participants placing large orders may be more aggressive and/or savvy in positioning their portfolios ahead of changes in the economy.

When their data is sorted into sectors chosen by their cyclicality with the U.S. business cycle, they find that the aggregate portfolio rebalancing across equity sectors is consistent with sector rotation, an investment strategy that exploits perceived differences in relative performance at different stages of the business cycle. The empirical foot-print of sector rotation, he says, has predictive power for the evolution of the economy and future bond market returns, even after controlling for relative sector returns. Contrary to many theories of price formation, trading activity therefore contains information that is not entirely revealed by resulting relative price changes.

As to the link of orderflow to the economy, they examine whether sector orderflow has predictive power for the Chicago Federal Reserve Bank National Activity Index (CFNAI) expansion indicator. Intuition suggests to Brandt that pro-cyclical (counter) sectors would have positive (negative) coefficients. What they find is that active orderflow of large orders into the material sector predicts higher levels of the expansion index both one and three months ahead. Conversely, active orderflow of large orders into financials, telecommunications
and consumer discretionary predicts lower levels of the expansion index at the one and three month horizons. It is interesting to note, he says, how pro-cyclical sector orderflow tends to lead the economy while the reverse is observed for counter-cyclical sectors.

After investigating the relationship between the expansion index and sector, they turn to an analysis of the cross-section of orderflow. Specifically, they are interested in determining the orderflow factor (i.e. the set of sector loadings) with the highest correlation to the state of the macro economy. Based on this, Brandt says, it is clear that the link between aggregate sector orderflow and the macro economy is strong, with large-sized active orderflow in specific sectors forecasting expansions/contractions up to one quarter ahead. In addition,

1. Large-sized sector orderflows, likely to originate from institutional investors, appear to contain the bulk of the predictive power in aggregate orderflow.
2. Target sectors for trading on the macro economy are consistent with common financial wisdom concerning sector rotation and portfolio allocation tactics: positive coefficients for pro-cyclical sectors; negative coefficients as sectors become more counter-cyclical.

Brandt does address whether prices/returns contain the same information as orderflow. He discusses their approach to examining this question and their tests before concluding that active net orderflow provides more and materially different information than that contained in returns and traditional low frequency market variables and contains information about the near term performance of the equity and bond markets.

As for practicality, when Brandt and his coauthors translate sector orderflow movements into tilts to the market portfolio and produce an orderflow mimicking portfolio, they find that it has superior risk and return properties relative to both the traditional market and to industry momentum portfolios. This is because, he says, orderflow contains asymmetric information that it is primarily defensive in nature and largely related to wealth preservation.

In the discussion that ensued, Brandt was asked about whether the results held up during the Financial Crisis. He said they did not.

110. The Flash Crash: The Impact Of High Frequency Trading On An Electronic Market (Spring 2011)

Albert S. Kyle, Charles E. Smith Chair Professor of Finance at the University of Maryland’s Robert H. Smith School of Business, and Commodities Future Trading Commission (CFTC) presented “The Flash Crash: The Impact of High Frequency Trading on an Electronic Market” coauthored with Andrei Kirilenko, Chief Economist, CFTC, Mehrdad Samadi, Economist, CFTC, and Tugkan Tuzun, Ph.D. candidate University of Maryland and the CFTC. Kyle has been a frequent contributor to Q-Group® seminars.

On May 6, 2010, major US stock market indices, stock-index futures, options, and exchange-traded funds experienced a sudden price drop of more than 5% followed by a rapid rebound, all in about 30 minutes. The price and volume data for June 2010 E-Mini S&P 500 Stock Index Futures Contract on May 6, 2010 are shown below.

Kyle points out two dramatic examples of the incredible volatility during the period: Accenture’s share price fell to $0.01 and
Apple’s rose to $100,000. He also reminds us that flash crashes are not that rare. After the October 1987 stock market decline, there were several other flash crashes in the week that followed.

This brief period of extreme, intraday volatility on May 6, 2010, commonly referred to as the “Flash Crash,” raised a number of questions about the structure and stability of US financial markets. One survey reported that over 80% of US retail advisors believed that “overreliance on computer systems and high-frequency trading” were the primary contributors to the volatility. The results of a survey of retail advisors included as culprits the use of market and stop-loss orders, a decrease in market-maker trading activity, and order routing issues among securities exchanges. In August, following the crash, representatives of individual investors, asset management companies, and market intermediaries, testifying at a hearing before the CFTC and the SEC, suggested that in the current electronic marketplace such an event could easily happen again.

Kyle and his coauthors take on the assertion that High Frequency Traders (HFT) played a role in creating the “Flash Crash.” To examine the role of HFTs in the crash he asks three questions:

1. What may have triggered the Flash Crash?
2. How did HFT and other traders act on May 6 in comparison to other days?
3. What role did HFT play in the Flash Crash?

To examine these questions, Kyle first provides a brief tutorial of the S&P 500 E-mini contract provisions and distinguishes between electronic trading (all E-mini trading), algorithmic trading (electronic trading based on computer algorithms) and high frequency trading (algorithmic, electronic trading that takes advantage of trading opportunities in the shortest time intervals measured in milliseconds).

In answer to his first question, the origin of the crash, Kyle says that it was the result of one account that sold 75,000 contracts worth $4.1 billion, 1.5% of the day’s volume, precisely at 13:32 CT. It was executed by an algorithm set to target 9% of trading volume, and it was the largest net position change in the E-mini of the year. While trades of this size are usually executed over a day, it was executed in approximately 20 minutes. Kyle believes that the way the trade was targeted, as a percent of trading volume, exacerbated the market selloff: as volume increased the sell target remained fixed at 9% of trading volume. In addition to the sell target of this very large trade, market conditions played a role: there had been large price declines earlier in the day and the buy side of the limit order book was greatly depleted at the moment of the sale.

To answer the questions about the role of HFT, Kyle and his coauthors use trading data on the E-mini S&P 500 equity index futures on May 6. They use audit-trail, transaction-level, data for all regular transactions. This allows them to identify the price, quantity and time of execution, as well as the identity of buyer and seller.

They sort the 15,000 trading accounts that participated in transactions on May 6 into one of six categories:

1. High Frequency Traders (16): high volume and low inventory relative to volume that account for significant portion of trading volume, although they do not accumulate large net positions.
2. Intermediaries (179): market makers with lower volume and low inventory relative to volume.
3. Fundamental Buyers (1,263): consistent buyers during the day.
4. Fundamental Sellers (1,276): consistent intraday sellers (including the 75,000 contract sell program).
5. Small (Noise) Traders (6,880): trade few contracts each day.
6. Opportunistic Traders (5,808): all other traders including index arbitrage, day traders and miscellaneous speculators.

High frequency traders were the least numerous of the trading categories with only 16.

Kyle then turns to his question about trading activity on May 6 versus that on previous days. In the table shown below, the average activity of the 3 days preceding the Flash Crash and May 6, one can see that May 6 was quite unusual.

<table>
<thead>
<tr>
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<th>May 3-5</th>
<th>May 6th</th>
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<tbody>
<tr>
<td>Volume</td>
<td>2,397,639</td>
<td>5,094,703</td>
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<tr>
<td># of Trades</td>
<td>446,340</td>
<td>1,030,294</td>
</tr>
<tr>
<td># of Traders</td>
<td>11,875</td>
<td>15,422</td>
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<td>Trade Size</td>
<td>5.41</td>
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<tr>
<td>Order Size</td>
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<td>9.76</td>
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<tr>
<td>Limit Orders % Volume</td>
<td>95.45%</td>
<td>92.44%</td>
</tr>
<tr>
<td>Limit Orders % Trades</td>
<td>94.30%</td>
<td>91.75%</td>
</tr>
<tr>
<td>Volatility</td>
<td>1.54%</td>
<td>9.82%</td>
</tr>
<tr>
<td>Return</td>
<td>-0.02%</td>
<td>-3.05%</td>
</tr>
</tbody>
</table>

Kyle and his colleagues also plot the holdings of various types of traders, and their profits and losses relative to price, for each of the 4 days. Kyle makes the following observations about HFT activity during the period:

• The net holdings of HFTs fluctuated around zero so rapidly that they rarely held more than 3,000 contracts long or short on the day of the Flash Crash.
• HFTs did not change their trading behavior during the Flash Crash from that before: HFTs aggressively took liquidity from the market when prices were about to change and actively kept inventories near a target level.
• The trading of HFTs appears to have exacerbated the downward move in prices: HFTs initially bought contracts from Fundamental Sellers, reversing this after a few minutes competing for liquidity with Fundamental Sellers.
• HFTs appeared to buy and sell contracts from one another rapidly and many times, generating what Kyle calls a “hot potato” effect before falling prices attracted Fundamental Buyers to take these contracts off the market.

In an assessment of the HFTs role, Kyle says that their analysis shows that HFTs:

• Exhibit trading patterns inconsistent with the traditional definition of market making.

• Aggressively trade in the direction of price changes. This comprises a large percentage of total trading volume but does not result in a significant accumulation of inventory.
• Whether under normal market conditions or during periods of high volatility, HFTs are not willing to accumulate large positions.
• Fundamental Traders may mistake higher trading volumes for liquidity.
• When rebalancing their positions, High Frequency Traders may compete for liquidity and amplify price volatility.

Consequently, Kyle concludes:

• Irrespective of technology, markets can become fragile when:
  • Imbalances arise as a result of large traders seeking to buy or sell quantities larger than intermediaries are willing to temporarily hold, and
  • Long-term suppliers of liquidity are not forthcoming even if significant price concessions are offered.
• Technological innovation is critical for market development.
• As markets change, appropriate safeguards must be implemented to keep pace with trading practices enabled by advances in technology.

111. Paired Bond Trades (Spring 2011)

Eric Zitzewitz, Associate Professor of Economics, Dartmouth College, presented “Paired Bond Trades.” Zitzewitz had previously presented a paper at the Q-Group® seminar in Fall of 2007.

Zitzewitz begins by pointing out what we know about bond trading:

• Essentially all bond trading is in dealer markets despite existence of exchanges (e.g. NYSE bonds).
• Bonds do not trade frequently.
• Trading costs are high, especially for small trades.
• Many investors are locked into using a single dealer as a counterparty.
• Recent regulation has sought to reduce trading costs with some success.

In spite of what we know, he says that there are many open questions:

• Do trading costs reflect rents?
• Is price regulation (ex post enforcement actions when markups are deemed excessive) optimal?
• Should exchange-based trading be mandated?

In this research Zitzewitz examines why trading costs are so much higher for small versus large bond trades. There are two leading explanations for the difference: bonds trade almost exclusively in dealer markets rather than on an exchange; a lack of price transparency. Trading in dealer markets increases costs for several reasons: it is more labor intensive than exchange trading; trading and dealer costs have a fixed component per trade, thus requiring a higher percentage spread for smaller trades. The second explanation focuses on transparency: dealer markets are less transparent than exchanges. This can differentially disadvantage small-trade clients particularly if they face higher costs of comparison shopping across dealers.

To examine this, Zitzewitz uses information about small corporate bond trades. He finds that these trades are routinely “paired” - same size client and interdealer trades occur within 60 seconds of each other, and these pairs of trades are usually for exactly the same quantity and/or are executed during the exact same second. Controlling for trade size, pairing of clients is more common for “vanilla bonds,” senior investment grade bonds with no credit enhancements, callable/convertible issues, and non-round-number-priced client trades. He does find that the pairings are typically made for seasoned bonds, although not right before they mature. In addition, his pairings show that two dealers pair more frequently as shown in the following chart, though he says it is not clear why.

To look at the paired trades Zitzewitz uses the ex-post corporate bond transaction information from Trade Reporting and Compliance Engine (TRACE). From that data he locates what appear to be paired trades: trades of equal quantities occurring in proximate time. He finds:

1. Thirty seven percent of dealer-client corporate bond trades are paired with a dealer-dealer trade, usually for same exact quantity and executed at exact same second.
2. Trading costs are higher for paired trades of given size and the spread is split roughly 50-50 between pairing dealer and ultimate dealer.
3. Implied pairing dealer profit is essentially never negative (0.4 % of pairs).
Pairing rates are:

a. Much higher for trades under $100k (46%) than for trades over $500k (4.5%).

b. Lower for institutional (NAIC matched) trades of a given size.

In addition he finds that the pairing rate is lower for round-price trades and the interdealer spread is higher for small trades and bonds of low credit quality, although pairing shows the dealer spread is U-shaped in trade size and credit quality. Putting trade size and cost together with pairing dealer profit, Zitzewitz finds that profits for paired trades decline as the trade size increases but are non-negative for paired trades made within 15 minutes. For all of his matched finds there were no trades made at a loss.

Zitzewitz spells out the implications of his research. First, pairing suggests many investors do not (or cannot) search over the entire market, and dealers with preferred access to orders (due to contracts or relationships) earn substantial and nearly risk-free trading profits. Second, by Wall Street standards, pairing dealer profits are tiny, out of $3.8B/yr. corporate bond dealer profits, only $360M are pairing dealer profits. Third, there is, he says, some evidence that excessive markup regulation has an impact in holding down excessive profits. Finally, he concludes that understanding pairing is important to other empirical bond asset pricing research.
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The State-of-the Art in Investment Management

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Speaker: Andrei Shleifer, Professor of Economics, Harvard University

The Effect Of Housing On Portfolio Choice
Speaker: Raj Chetty, Professor of Economics, Harvard University

The Flash Crash: The Impact Of High Frequency Trading On An Electronic Market
Speaker: Pete Kyle, Charles E. Smith Professor of Finance, Robert H. Smith School of Business, University of Maryland

Conflicting Family Values In Fund Families
Speaker: Utpal Bhattacharya, Associate Professor of Finance, Indiana University – Bloomington

Who is doing what to whom on Wall Street and why?
Speaker: Charles Gasparino, Senior Correspondent, FOX Business Network

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Share Issuance And Factor Timing
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Portfolio Choice With Illiquid Assets
Speaker: Andrew Ang, Ann F. Kaplan Professor of Business, Columbia Business School, Columbia University

Short Sellers And Financial Misconduct
Speaker: Jonathan M. Karpoff, WAMU Endowed Chair in Innovation, Finance and Business, Michael G. Foster School of Business, University of Washington

Paired Bond Trades
Speaker: Eric Zitzewitz, Associate Professor of Economics, Dartmouth College

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Socially Responsible Investing And Expected Stock Returns
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Betting against beta
Speaker: Andrea Frazzini, Assistant Professor of Finance, The University of Chicago

Innovative Efficiency And Stock Returns
Speaker: David Hirshleifer, Professor of Finance, Merage Chair in Business Growth, The University of California, Irvine

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Speaker: Rear Admiral Michael J. Yuring, Director of Strategic Planning and Communications for Submarine Warfare, United States Navy

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What Does Equity Orderflow Tell Us About The Economy?
Speaker: Michael W. Brandt, Cohen Professor of Business Administration Duke University

The Other Side of Value: Good Growth and the Gross Profitability Premium
Speaker: Robert Novy-Marx, Assistant Professor, University of Rochester

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Why Bank Equity Is Not Expensive.
Speaker: Anat R. Admati, George G.C. Parker Professor of Finance and Economics, Stanford University

Institutional-Quality Hedge Funds
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Global Crises And Equity Market Contagion
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Pension Funding And Investment Strategy Issues From Market Value Account
Speaker: Barton Waring, CIO (Retired), Barclays Global Investors

Hurricane Outlook for the 21st Century.
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What Is Risk Neutral Volatility?
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Bubbling with excitement: an experiment.
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Will My Risk Parity Strategy Outperform? Lisa R Goldberg
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The Equity Premium And Beyond
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High Frequency Trading And Price Discovery
Speaker: Jonathan Brogaard, University of Washington

The Impacts Of Automation And High Frequency Trading On Market Quality
Speaker: Robert Litzenberger, RGM Capital Advisors

Are We Headed For A Demographic Winter?
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Marty Leibowitz, MSCI
Bill Sharpe, Stanford University
Laurence B. Siegel, Research Foundation of CFA Institute

Does Mutual Fund Size Matters: The Relationship Between Size And Performance
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Martin J. Gruber, New York University

Health Care Reform In The United States: Past, Present And Future
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Dynamic Conditional Beta
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Global Pricing Of Gold
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No News Is News: Do Markets Underreact To Nothing?
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The Mutual Fund Industry Worldwide: Explicit And Closet Indexing, Fees, And Performance
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The Optimal Holding Of Annuities  
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Paul Kaplan, Director of Research, Morningstar, Inc.

The Success Equation: Untangling Skill And Luck In Business, Sports And Investing  
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Estimating Private Equity Returns From Limited Partner Cash Flows
Speaker: Andrew Ang, Columbia University

Investor Sentiment Aligned: A Powerful Predictor of Stock Returns
Speaker: Guofu Zhou, Washington University

The Economics of Big Time College Sports
Speaker: Roger Noll, Stanford University

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Dissecting Factors
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The Not So Well-Known Three-and-One-Half Factor Model
Speaker: Steven Thorley, Brigham Young University Marriott School of Management

A Primer On Fast Electronic Markets
Speaker: Larry Harris, Marshall School of Business University of Southern California

Impact Of Hedge Funds On Asset Markets
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Speaker: Peter Cramton, University of Maryland

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Speaker: Terrance Odean, Rudd Family Foundation Professor of Finance, University of California, Berkeley

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Origins Of Stock Market Fluctuations  
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Speaker: Ian Cooper, Professor of Finance, London Business School
Do Funds Make More When They Trade More?
Speaker: Robert Stambaugh, the Miller Anderson & Sherrerd Professor of Finance, the Wharton School
A Solution To The Palm-3Com Spin-Off Puzzles
Speaker: Chester Spatt, Pamela R. and Kenneth B. Dunn Professor of Finance, Carnegie Mellon University, and former SEC Chief Economist

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Speaker: Vineer Bhansali, Managing Director and Portfolio Manager at PIMCO
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Speaker: Jonathan Berk, A.P. Giannini Professor of Finance, Stanford Graduate School of Business

Systematic Risk And The Macroeconomy: An Empirical Evaluation
Speaker: Bryan Kelly, Associate Professor of Finance and Richard N. Rosett Faculty Fellow, University of Chicago

Monetary Policy Drivers Of Bond And Equity Risks
Speaker: Carolin Pflueger, Assistant Professor of Finance, University of British Columbia
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