

**INSTITUTE FOR QUANTITATIVE
RESEARCH IN FINANCE®**

SUMMARY

**AUTUMN 2009 SEMINAR
OCTOBER 18 – 21, 2009**

**THE ST. REGIS MONARCH BEACH RESORT
DANA POINT, CALIFORNIA**

I. INTRODUCTION, SUMMARY AND CONCLUSIONS

Robin Greenwood made the first presentation of the Seminar, discussing the role of inexperienced investment managers in creating and continuing bubbles, using data based on age as a proxy for experience. Darrell Duffie followed, explaining how and why dealer banks encountered so many failures in the recent crisis, and suggested reforms that would reduce the number of future failures.

Ulrike Malemender contrasted traditional finance models that assume stable risk attitudes, with nontraditional models from behavioral finance and experimental economics, to show that personal experience of large stock market shocks has a lasting impact on individuals' risk attitudes. Ananth Madhavan described leveraged and inverse ETFs, how they work, why they are difficult for investors to fully understand, and the market microstructure implications of these instruments, together with some policy implications for investor protection.

Martin Leibowitz invited five delegates and special guests to speak on the "Harry Markowitz Effect," in a tribute to the extraordinary accomplishments of that great man, and to thank him for his unfailing support of colleagues. Markowitz offered a gracious and popular response.

Russ Wermers spoke on mutual fund performance, separating fund managers into three skill categories: the unskilled, who produce an alpha shortfall, net of trading costs and expenses, the zero alpha managers, who earn an alpha but relinquish all of it to the fund company, and the skilled managers, who deliver an alpha to the investors. He described an ingenious

method for identifying the role of luck in performance.

Motohiro Yogo offered a way to include health risk in retirement portfolio choice for those in retirement. An understanding of the resultant portfolio can help retirees in portfolio choices and public policy makers dealing with health care and Social Security. Leonid Kogan presented a new description of what he and his colleagues call "displacement risk," which is the risk faced by capital investors due to innovations of competitors and also by workers faced by new generations of workers with superior human capital. This risk is systematic and impossible or costly to hedge.

Rob Bauer and his colleagues measured pension plan performance at the plan level, rather than the managed account level. They offered some observations, some comparisons to mutual fund performance and costs, and suggestions for reducing costs. Albert Kyle and Anna Obizhaeva presented a study of trading style practices and resulting costs, with measures of the loss of "alpha" due to market impact and bid-ask spreads for various trading strategies under various conditions. Finally, Arthur Kortweg presented a study of risk and return characteristics of entrepreneurial companies backed by venture capital, where direct observations can occur only on the rare occasions when a price of entry or exit is revealed, and these events are themselves performance driven. A dynamic model led to conclusions drawn from data on over 5000 VC investments in almost 2,000 portfolio companies between 1987 and 2005.

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FINANCIAL MARKETS AND INVESTOR BEHAVIOR

1. Inexperienced Investors and Bubbles

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

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

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

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

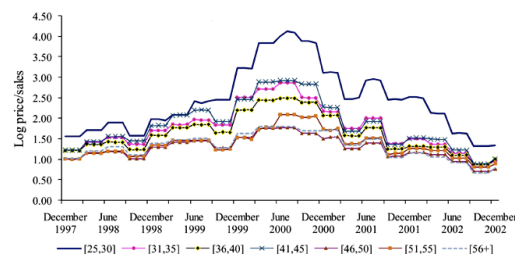
To get answers, Greenwood and Nagel studied mutual fund managers during the technology bubble that peaked in 1999. Using age as a proxy for experience, they hypothesized that young managers were more likely to:

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

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

Fact : Young managers bet more heavily on tech

Panel A: Value-weighted log P/S

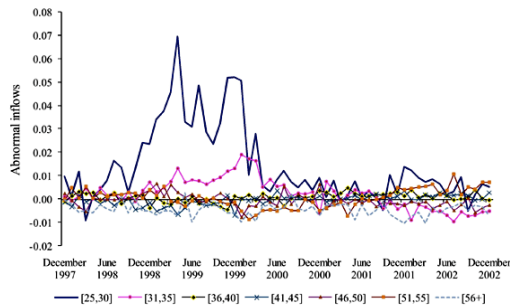


With regard to the prediction that inexperienced managers are more likely to increase technology weightings following high returns, they found that younger managers were trend chasers, and, perhaps more importantly, investors followed them as shown in the chart below. Indeed, the cumulative abnormal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

two manager groupings persist to the end of their study period, 2002.

Fact: Young managers get inflows

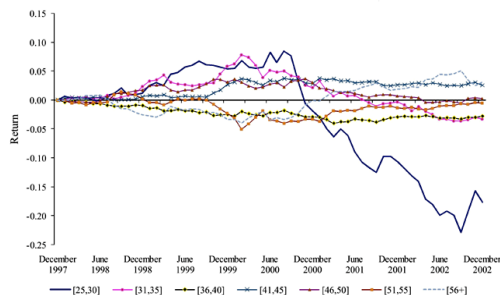
Panel B: Abnormal Flows by month (as fraction of TNA)



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

Fact: Young managers don't outperform

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



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

experienced bubble and crash before. Experience is important.

2. The Failure Mechanics of Dealer Banks

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

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

The simplistic, and most obvious, cause for the failure of a financial institution is an excess of liabilities relative to assets. However, the direct test of ability to continue operating is whether the

financial institution can meet its transactions obligations on any given day. An institution whose liabilities are significantly in excess of the market value of its assets can, under the right conditions and behavior, regain solvency over time.

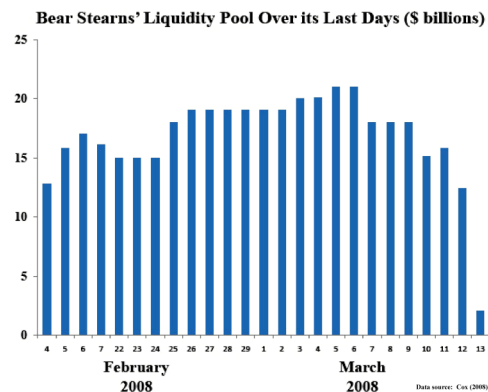
In imperfect markets several types of frictions can lead to a failure of a dealer bank to maintain transactions solvency, whether or not its assets are in principle sufficient to cover its liabilities in an orderly liquidation of its balance sheet. However, Duffie pointed out, once a crisis begins the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

1. Liquidation values of assets can be further reduced by adverse selection. The same principle limits the bank's ability to raise cash by issuing debt or equity. In a financial crisis the potential bidders who would normally be in the best position to make use of the assets are themselves likely to be in a cash constrained position, and indeed may be sellers of the same types of assets.
2. Potential value of assets as collateral for secured borrowing is reduced. In a liquidity crisis, the dealer can be given discriminatory terms for haircuts and collateral pricing. Indeed the ability to move through a liquidity crisis diminishes as the inventory of unpledged high quality collateral, such as Treasury securities, is reduced.
3. The repo market can cease to provide the financing necessary to keep assets on the dealer bank's balance sheet. At this

point, even a resale of assets is unlikely to stave off failure. Bankruptcy can follow quickly, as it did for Lehman.

4. Short-term tri-party repos are a particularly unstable source of financing given concerns over a dealer's solvency. Because tri-party clearing banks have an incentive to limit their exposures to dealer banks through both repo and non-repo positions, they may have an incentive to limit the access of a weakened dealer bank to repo financing and to clearing account functions.
5. Large dealer bank's liquidity can be worsened by the flight of prime brokerage clients, and by various defensive actions by over-the-counter derivatives counterparties, who may rationally seek to reduce their exposures by cash-draining transactions, including new trades and novation to other dealers.

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



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

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

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

3. Depression Babies: The Effect of Experiencing Macro-Economic Shocks On Individual Risk Taking

Ulrike M. Malemendier, University of California, Berkeley, presented “Depression Babies: Do Macroeconomic Experiences Affect

Risk-Taking?” work she coauthored with Stefan Nagel, Stanford University.

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

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

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

The data that were used in the study came from the Survey of Consumer Finances and included individual investors’ stock and bond market experiences over their lives and sample asset holdings data by high income households from 1964-2004. An elicited measure of risk

aversion, stock market participation from 1964-2004, bond investment from 1968-2004 and the percentage of liquid assets invested in stocks from 1983-2004 were used as measures of risk taking. The nature of the data is shown in the following table with the 10th percentile being the most risk adverse group.

Malemendier concentrated on the differences in real stock and bond returns for the two percentiles. In other tables she showed the percentage of liquid assets for the 10th percentile, 5.9 percent, the median, 43.7 percent, and the 90th percentile at 90.3 percent.

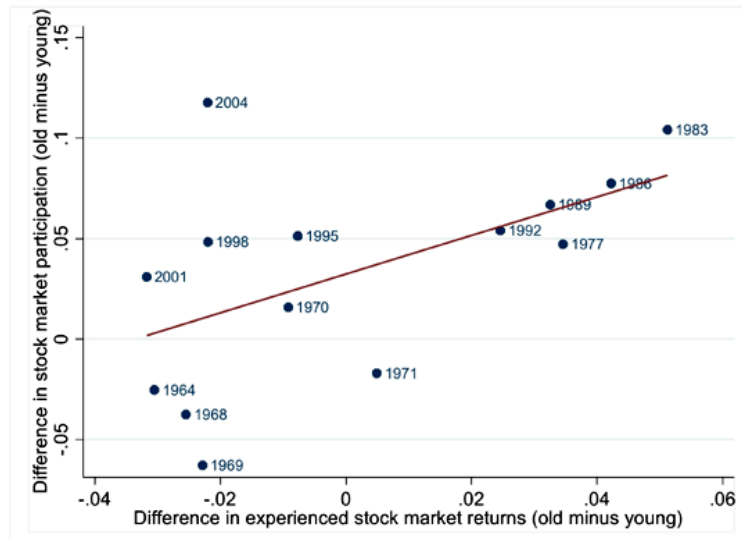
	10 th ptile	Median	90 th ptile	Mean	Stddev	#Obs.
<i>Panel A: All households 1964 – 2004</i>						
Liquid assets	696	9,820	205,590	119.858	721,755	33,600
Income	16,819	48,849	109,957	65,679	178,229	33,600
Experienced real stock return ($\bar{r}=1.25$)	0.059	0.086	0.110	0.085	0.021	33,600
Experienced real bond return ($\bar{r}=0.75$)	-0.002	0.012	0.046	0.018	0.019	33,600
Stock market participation	0	0	1	0.285	0.451	33,591
Bond market participation	0	0	1	0.322	0.467	32,269
Elicited risk aversion (1983-2004)	2	3	4	3.120	0.834	22,316

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

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

also benefited from the high returns from the 1950s and 1960s.

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



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

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

- The research provided a potential explanation for variations in stock market valuation levels and expected returns over time.

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

4. The Dynamics of Leveraged and Inverse ETFs

Ananth Madhavan, Barclays Global Investors, presented "Dynamics of Leveraged and Inverse ETFs," work he coauthored with his Barclays' colleague, Minder Cheng. Madhavan had previously presented at the Spring 1991, the Spring 2001, and the Fall 2007 seminars of the Q-Group®.

Madhavan started by saying that since leveraged and inverse funds are not well understood, even by industry professionals, his goal was

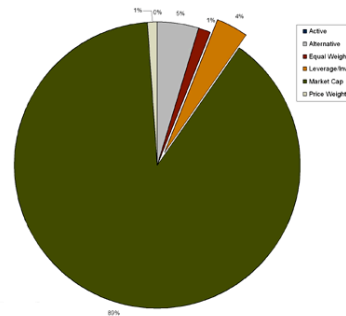
to provide a unified framework to better understanding:

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

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

Leveraged and inverse ETFs

AUM by weighting scheme for US equity ETPs, August 2009

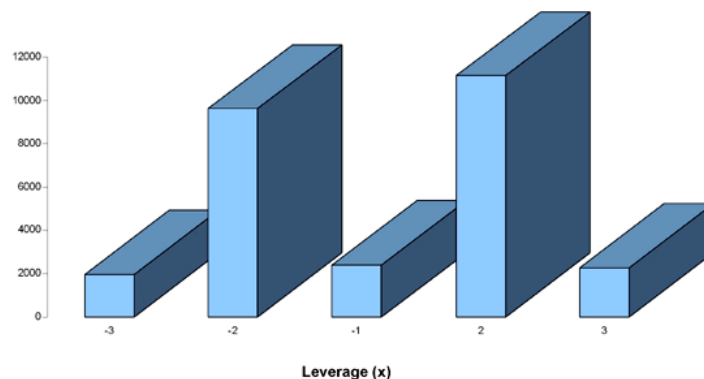


Source: BGI and authors' estimates

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

AUM for all inverse and leveraged ETPs

(in millions of dollars as of August 2009)



Source: Authors' estimates based on Bloomberg data and reported leverage for 139 funds

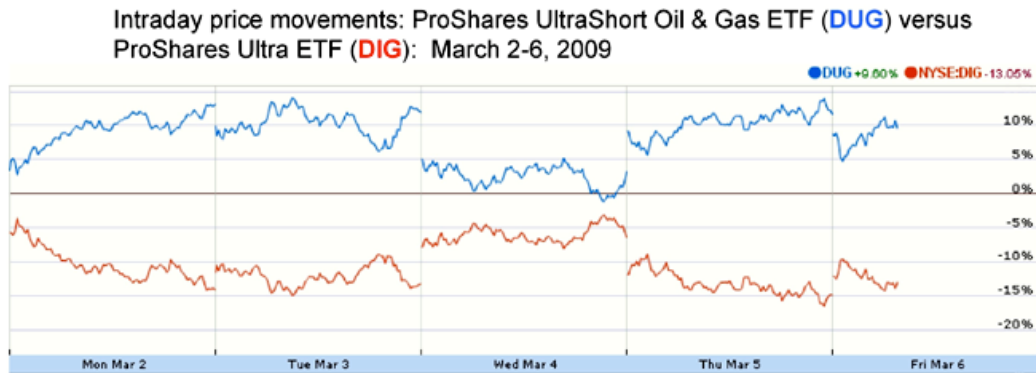
These securities operate like leveraged mutual funds except that the leverage is explicitly embedded as part of product design. The design of these instruments creates both intended and unintended characteristics not seen in ETFs, and

thus, Madhavan contended, they should be clearly differentiated and called Exchange Traded Products (ETPs).

Leveraged and inverse ETFs are designed to provide leveraged long

or short exposure to the daily return of various indexes, and sectors Asset

classes track well at the daily and intraday level as shown below.



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

ProShares UltraShort Oil & Gas ETF (DUG) versus ProShares Ultra ETF (DIG): September 1, 2008- March 6, 2009
Six Month Returns: **DUG = -17.3%** **DIG = -74.73%**



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

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

1. Hedging demands magnify volatility, increasing the market impact coefficient for all flows, irrespective of their source, and provides additional momentum to same day returns that increases the price pressure effect of any signed order imbalance regardless of source.
2. Price impact is greater with higher volatility, lower market liquidity, higher same day effects, increased AUMs, and higher leverage ratios: the presence of

the lagged hedge induces serial correlation in returns because the previous period's hedge is linearly related to the previous return.

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

5. The "Harry Markowitz Effect," 50 Years Later and Still Counting

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

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

6. False Discoveries in Mutual Fund Performance: Measuring Luck in Estimated Alphas

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

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

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

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

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

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

One innovation in this paper was using a method not before used in finance research, False Discovery Rate (FDR). They used this method because of their concern about the normal testing for fund alpha that uses a null hypothesis that all funds have an alpha of zero. However, Wermers contended this assumption of zero alpha is overly conservative if some managers are skilled. In their approach they let the data estimate the proportion of zero-alpha funds, rather than making the normal ex-ante assumption of a zero alpha. The following example was used to demonstrate the process. Suppose we observe 100 basketball players shooting free-throws: 20% make 2 of 10; 60% make 5 of 10; 20%

make 8 of 10. The question is: How can we estimate the proportion that are skilled enough to make 8 of 10 over the long-run? Their approach was to use the center of the distribution (60% average players) to estimate the tails. Examining the role of luck required some special ingenuity. Their model is shown below:

$$\hat{T}_\gamma^+ = \hat{S}_\gamma^+ - \hat{F}_\gamma^+ = \hat{S}_\gamma^+ - \hat{\pi}_0 \cdot \gamma / 2$$

Where:

$\hat{T}_\gamma^+$ = skilled funds

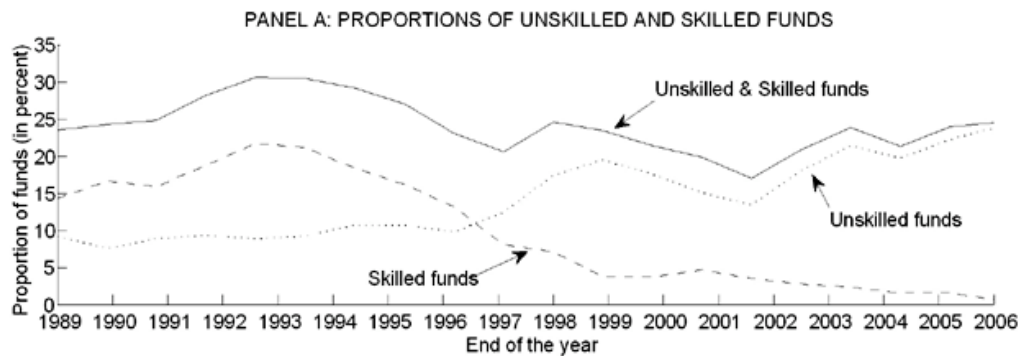
$\hat{S}_\gamma^+$ = Significant alpha funds

$\hat{F}_\gamma^+$ = Lucky funds
(or False Discoveries)

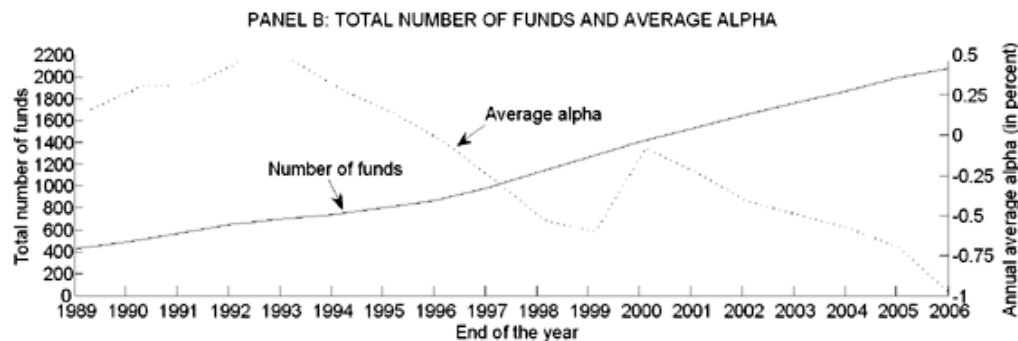
$\hat{\pi}_0$ = Proportion of zero alpha funds

Clearly, the key is how to measure $\hat{\pi}_0$

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



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



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

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

In answer to his initial questions about performance, Wermers said:

1. Luck has a stronger impact on the right tail of the estimated alpha distribution.
2. Skilled funds are in the extreme right tail, while unskilled funds are spread throughout the left tail.
3. The proportion of truly skilled fund managers has decreased substantially over time.

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

- It is a simple tool which makes it possible to correctly measure the number of funds with truly positive and negative performance.
 - It is flexible and can be applied to different performance measures and hedge fund industry data.
 - It has wide application.
- 7. Portfolio Choice in Retirement: Health Risk and the Demand For Annuities, Housing and Risky Assets**

Motohiro Yogo, The Wharton School, University of Pennsylvania, and National Bureau of Economic Research, presented "Portfolio Choice in Retirement: Health Risk and the Demand for Annuities, Housing, and Risky Assets."

Labor income risk has been adequately dealt with in life-cycle theory during the working phase of

life. However, there has been little corresponding work on health risk in the retirement phase. Yogo began by saying that the lack of work in this area is particularly troublesome for public policy makers and those grappling with potential reform of health care and Social Security. This is not just a policy issue: those who create financial products that ensure the financial security of retirees should consider health risk in life-cycle product design and the design of other products including such things as annuities (including deferred and variable), reverse mortgages, long-term care insurance, and life insurance.

In his presentation Yogo undertook to do three things:

1. Explain the entire investment portfolio composition (bonds, stocks, annuities, and housing) using a positive rather than normative analysis.
2. Create a realistic model of health risk where health expenditures are an endogenous response to health shocks, and retirees who can adjust health expenditures in response to changes in health and wealth and may be able to change the distribution of future health outcomes through investment in health.
3. Address the "annuity puzzle:" why so few people purchase fixed, immediate, lifetime annuities for their retirement portfolios.

To understand investment portfolios held by individuals, he provided the following chart.

Financial Asset Holdings and Participation Rates by Age						
Age	Stocks		Investment Funds		Retirement Accounts	
< 35	\$ 3.0	(13.7 %)	\$ 18.0	(5.3 %)	\$10.0	(41.6 %)
35-44	\$15.0	(17.0 %)	\$ 22.5	(11.6 %)	\$36.0	(57.5 %)
45-54	\$18.5	(18.6 %)	\$ 50.0	(12.6 %)	\$67.0	(64.7 %)
55-64	\$24.0	(21.3 %)	\$112.0	(14.3 %)	\$98.0	(60.9 %)
65-74	\$38.0	(19.1 %)	\$ 86.0	(14.6 %)	\$77.0	(51.7 %)
≥ 75	\$40.0	(20.2 %)	\$ 75.0	(13.2 %)	\$35.0	(30.0 %)

Source: 2007 Survey of Consumer Finances, thousands of dollars

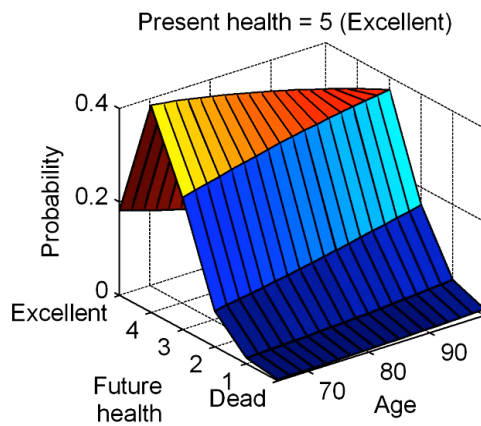
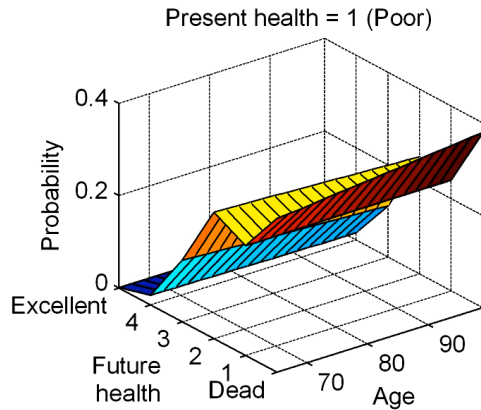
The size of the investments for older individuals was surprising to those in attendance at the seminar. Yogo pointed out that housing was retirees' most important asset, and described health care choices as depending on both wealth and state of health. The retirees' problem is to maximize health relative to wealth. In his model he maximized expected discounted utility over retirement until death, assuming that:

1. The individual owns and lives in a home that is subject to realistic housing price risk, and can sell, upgrade or borrow up to 20 percent of the value of the home.
2. Health is an accumulation process where exogenous shock in each period has a distribution that depends on previous health.
3. The individual is able to improve health at the margin through technology.
4. Cost depends upon health insurance (primarily Medicare).

Key choice variables included consumption, health expenditure, and wealth including bonds, stocks, annuities, and housing.

Endogeneity was important to Yogo's work for several reasons. First, it reduced background risk arising from health. Second, it reduced overstatement of market incompleteness that comes with exogenous health expense models that overstate the importance of liquid assets relative to illiquid assets (annuities and housing). Third, it created more useful models for policy and welfare analysis. Fourth, it provided an alternative market structure (e.g., new financial products or Social Security reform) that can change the endogenous accumulation of wealth.

Yogo's data came from a study of retired single females born from 1891 to 1940 and aged 65 or older who were interviewed every 2 years about health, health expenditures, health insurance and health status. He provided provocative charts showing the health transition probabilities in the absence of health investment for self reported health, two of which are shown below. The first chart shows the transition over time for those who self reported poor health, the second for those reporting that their health was excellent.



Yogo used an ordered probit model to estimate transition probabilities between health status, while controlling for observables and health investment. He compared his results to study data from HRS, and found that his benchmark model results were consistent with the RAND HRS Data File (National Institute for Aging and the Social Security Administration) data. A variety of model calibrations were used. The chart below shows the model calibrated for initial endowment. The color highlights the data and model results for the oldest age group.

Distribution of Health

Calibration: Initial endowment at age 65–66

Health Status	Age				
	65–66	71–72	77–78	83–84	89–90
Panel A: HRS Data (% of Retirees)					
Poor	10	11	12	13	14
Fair	24	25	26	26	27
Good	33	33	33	33	33
Very good	25	24	23	22	21
Excellent	8	7	7	6	5
Panel B: Benchmark Model (% of Retirees)					
Poor	10	8	8	9	11
Fair	24	15	17	20	23
Good	33	32	33	35	36
Very good	25	33	31	29	26
Excellent	8	13	10	7	5

From his analysis Yogo concluded that:

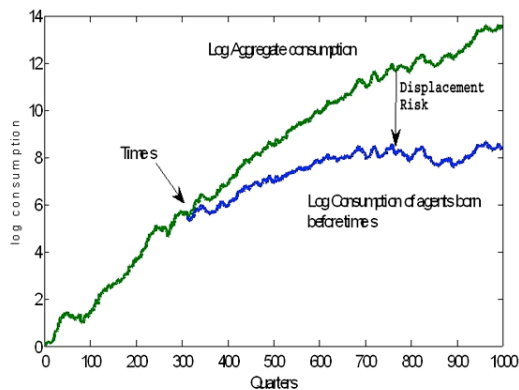
1. The life cycle model with health risk explains the cross-sectional distribution and the joint dynamics of health expenditure, health, and asset allocation in retirement.
2. A realistic calibration with health risk and a bequest motive reduces the size of the “annuity puzzle”: why so few people purchase fixed, immediate, lifetime annuities for their retirement portfolios.
3. There is a link between annuities and health care: the same frictions that prevent private annuitization increase the demand for healthcare.

8. The Demographics of Innovation and Asset Returns

Leonid Kogan, Massachusetts Institute of Technology, and NBER, presented “The Demographics of Innovation and Asset Returns,” a paper he coauthored with Nicolae Garleanu, UC Berkeley, NBER and CEPR, and Stavros Panageas, LBS, and NBER.

Kogan offered a number of comments to develop the innovation idea: innovation generates systematic risks; existing firms may lose market share to competition, resulting in risk to financial capital. Thus, human capital of the current generation of workers is less compatible with new technologies than human capital of new generations. This risk to human capital they called displacement risk.

In specifying their new model, they provided the following graph showing future per-capita aggregate consumption is not the same as the future per-capita consumption of the current population of agents.



Kogan and his colleagues called this new factor that captures the exposure to displacement risk a value-growth factor. Placing this squarely in the investment markets, Kogan said, the value premium in the market is due to hedging demand for growth stocks, and long-horizon investing does not keep up with the market average in the face of innovation. This, he said, is done only with a portfolio with a growth tilt in the portfolio. However, it is costly.

To test their idea, they used household-level consumption data,

creating cohorts of households that entered the market at various dates. They estimated the displacement factor as a change in relative consumption of a group of households. They found evidence that supported their model, and Kogan shared four conclusions:

1. Displacement risk is a fundamental risk factor.
2. There is empirical evidence for displacement risk.
3. Calibration is quantitatively realistic.
4. The theory gives us a better understanding of the value-growth factor, value premium, equity premium.

To clarify value/growth in identifying companies, Kogan said that new companies are value firms that produce but do not invent and growth firms both invent and produce. He does say that older companies can capture some of the innovation by owning growth firms.

9. Pension Funds: Performance, Costs and Benchmarks

Rob Bauer, Maastricht University, presented "Pension Funds: Performance, Benchmarks and Costs," work he coauthored with Martijn Cremers and Rik Frehen, also from Maastricht University.

Bauer began by enumerating the problems in the pension fund performance literature. Many of these problems are the result of poor quality or incomplete data being used in many studies. Bauer's

concern, and impetus to this study, was that most data are focused on the managed accounts level rather than the plan level. The data are likely to be biased since there is no reporting obligation, no cost data or information on the fund benchmarks.

Bauer and his coauthors set out to rectify some of the data problems by measuring the domestic equity performance of US pension funds at the total plan level for a variety of fund types, benchmarks and cost levels. The main results of their analysis were:

1. Pension fund domestic equity performance at total plan level is zero after costs in most cases or slightly positive in some.
2. Size of collective vehicle (pension fund) creates economies of scale in costs that are transferred directly to end-consumers (beneficiaries).

The study data came from the Cost Effective Management Benchmarking (CEM) database that has self reported information on approximately 40 percent (market value) of the pension fund universe in the US from 1990 to 2006 that includes information on fund type, sponsor, and mandate type. CEM Benchmarking collects yearly questionnaires and provides annual fund-specific returns, benchmarks and cost data. The data are available at low aggregation level (portfolio) and can be aggregated to a total plan level. There is information on 463 Defined Benefit (DB) funds (1990-2006) and 248 Defined Contribution (DC) funds (1997-2006). Bauer reported that since they were concerned about possible data bias

they performed a number of tests. However, they found no evidence of performance related bias.

Costs are another important issue. Bauer presented the following table regarding costs and size of equity holdings.

Costs and Size of Equity Holdings

	Costs		Size	
	DB	DC	DB	DC
Total	28.75	51.09	4,183	1,186
Largest 30%	16.09	42.47	10,759	3,023
Smallest 30%	39.92	61.30	389	192
Corporate	32.63	48.45	2,269	1,190
Largest 30%	24.42	39.16	5,860	2,695
Smallest 30%	40.22	56.90	370	219
Public	21.33	58.68	6,964	1,629
Largest 30%	9.32	55.26	17,313	4,387
Smallest 30%	34.05	73.15	661	234
Other	29.46	-	2,863	-
Largest 30%	14.75	-	6,275	-
Smallest 30%	42.75	-	291	-

From these data Bauer reported:

- Cost difference between plan type, defined benefit (DB) and defined contribution (DC), is approximately 20 basis points.
- Within DB and DC larger funds have lower cost levels, and, in general, pension fund cost levels are lower than those in the mutual fund universe.
- Size matters and differs between fund types and fund characteristics.
- Passively and internally managed funds are less costly than those that are actively or externally managed.

In their analysis of equity holdings they found that allocation within equities does not vary a lot between different funds (Corporate, Public and other); public funds invest more internally (size related); large funds have fewer small cap portfolios, less active portfolios and

more internally managed portfolios (size related); DC Funds are less heterogeneous.

Very interesting was the benchmark evolution Bauer presented. For large cap funds, Bauer pointed out, the S&P 500, Russell 3000 and Russell 1000 were competing for benchmark dominance. For the small cap portfolios, the Russell 2000 small cap benchmark stood out, its use rising from 20% to 60% of funds over the same period.

As for returns, Bauer first described their risk-adjustment procedure and presented risk adjusted net returns. These returns were zero after costs, thus showing that pension funds outperformed mutual funds. There was one aberrant return; the return for the small cap segment was about 3 percent, even after adjustment and verification.

Bauer noted the critical role that the pension fund boards may play in reducing costs by demanding separate accounts with client-specific investment guidelines, better monitoring of external managers, and tougher cost control, without added agency costs. All this can result in the added benefits being transferred to plan participants. The larger the fund, the more bargaining power.

10. Market Microstructure Invariants

Albert S. Kyle and Anna A. Obizhaeva, both of University of Maryland, presented "Market Microstructure Invariants." Kyle presented the theory and Obizhaeva,

the empirical results. Kyle had previously presented papers at the Spring 1989, the Spring 1995, and the Spring 2001 seminars of the Q-Group®.

Kyle began the presentation, stating that it is important for the asset manager to understand the level of transactions costs, both market impact and bid-ask spread, and how transactions costs vary cross-sectionally across stocks as the level of trading activity varies. He posed following questions:

- What percentage of "alpha" is lost due to transaction costs?
- How much money can be allocated to a seemingly profitable strategy before it becomes non economic due to high transaction costs?
- Is it reasonable to restrict the rate of trading to a fixed percentage of trading volume, or should the maximum percentage of average daily volume vary across stocks?
- If one broker executes orders for small stocks and another broker executes orders for large stocks, can their performances be compared?

To explain why market impact and bid-ask spread vary across stocks with different trading activity, they developed a model of market microstructure invariants that generated predictions concerning cross-sectional variations of these variables. They tested predictions using a set of portfolio transitions and a trading game approach first described by Jack Treynor. Since managers trade many different stocks, we can think of them as

playing many different trading games simultaneously, a different game for each stock.

Kyle described three proposed theories and their implications; the first he characterized as “preferred,” the others as “naïve”:

Preferred:

- *Trading Game Invariance*, has deep parameters (number of bets and their size) that are invariant, but the length of the trading games vary across stocks. The model implies that when trading activity increases by one percent:
 - The size of a bet increases by $1/3$ of one percent.
 - Frequency of bets per calendar day increases by $2/3$ of one percent.
 - Length of trading game decreases by $2/3$ of one percent.

Naïve:

- *Invariant Bet Frequency* has more volume resulting from larger liquidity trades but not from more liquidity trades per calendar day. Kyle pointed out that this is the default model for managers and it incorrectly justifies trading no more than 1% of average daily volume for all stocks, regardless of level of trading activity and imputing the same number of basis points in transactions costs for individual stocks in a basket with both active and inactive stocks. This model implies that:
 - All variation in trading activity is explained exclusively by variation in bet size.

- The bid-ask spread is constant.

- *Invariant Bet Size* suggests more volume results from more liquidity trades but not from larger liquidity trades per calendar day. All variation in trading activity is explained by variation in bet frequency alone. The model prediction is that when trading activity increases by one percent, the
 - Average size of a liquidity trade/average daily volume decreases by one percent;
 - Market impact of trading percent of average daily volume increases by $1/2$ of one percent.
 - Bid-ask spread decreases by $1/2$ of one percent.

Kyle noted that the level of market impact, bid-ask spreads, and the average size of liquidity trades are not identified by the theory but can be estimated from data. In addition, the length of the trading day was not identified and cannot be estimated using their methodology.

Obizhaeva presented the empirical implications of the three proposed models that were tested using a proprietary dataset of portfolio transitions that occurred when a legacy portfolio is replaced with a new portfolio during fund manager or asset allocation changes. The data included more than 2,680 portfolio transitions executed by a large vendor of portfolio transition services from 2001 to 2005. Using data on transition orders to examine which model made the most reasonable assumptions about the frequency of liquidity trades and

how size varies with trading activity, she reported that the three models

differ only in their predictions of alpha.

Tests for Liquidity Orders Size - Design

All three models are nested into one specification that relates **trading activity** W and the average size of liquidity trade $\bar{Q}$, proxied by **a transition order of X shares**, as a fraction of average daily volume V :

$$\ln\left[\frac{X_i}{V_i}\right] = \bar{q} + a_0 \times \ln\left[\frac{W_i}{W_*}\right] + \tilde{\epsilon}$$

The variables are scaled so that $e^{\bar{q}} \times 10^4$ is the average size of liquidity trade as a fraction of daily volume (in bps) for **a benchmark stock** with:

- daily standard deviation of **2%**,
- price of **\$40** per share,
- trading volume of **1 million** shares per day,
- trading activity $W_* = 2\% \times \$40 \times 1 \text{ million}$.

Obizhaeva concluded that their tests provided strong support for the model of Trading Game Invariance and showed that using this model extrapolates these estimates, and can calculate expected *trading costs*, C , for any order of X shares for any security using a simple formula:

$$C(X) = \frac{1}{2} \lambda^* \left(\frac{W}{(40)(10^6)(0.02)} \right)^{1/3} \frac{\sigma_r}{0.02} \frac{X}{(0.01)V} + \frac{1}{2} k^* \left(\frac{W}{(40)(10^6)(0.02)} \right)^{-1/3} \frac{\sigma_r}{0.02},$$

where trading activity $W = \sigma_r \times P \times V$

- ▶ σ_r is the expected daily volatility,
- ▶ V is the expected daily trading volume in shares,
- ▶ P is the price.

Obizhaeva concluded with a list of practical implications for the trading rate, components of trading costs and execution of trading quality.

11. Risk and Return Characteristics of Venture Capital – Backed Entrepreneurial Companies

Arthur G. Korteweg, Stanford University, presented, "Risk and Return Characteristics of Venture

Capital-Backed Entrepreneurial Companies," work he coauthored with Morten Sorensen, Columbia Business School and NBER.

Valuations of entrepreneurial companies are observed only occasionally, albeit more frequently for well-performing companies than poor performers. This infrequent trading valuation problem occurs not only for entrepreneurial companies but for many other infrequently traded assets — real

estate, corporate and municipal bonds, small-cap stocks, structured products, and OTC traded securities. Since valuations are known only when the securities trade, data for these assets are sporadic and can be quite stale. Consequently, estimators of risk and return must be corrected for sample selection to obtain consistent estimates. Korteweg and his coauthor developed a general model of dynamic sample selection using data from venture capital investments in entrepreneurial companies.

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

they address by developing a new empirical methodology.

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

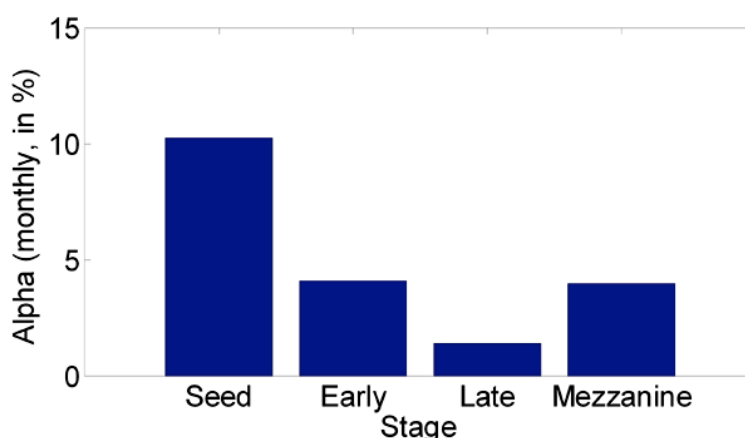
Variable	Effect on prob of observing a financing event
Return since last financing round	(+)
Time since last financing round	(+) when low (-) when high
Aggregate # acquisitions of VC-backed firms	(+)
Agg. # IPOs of VC-backed firms	(0)/(-)
Agg. # financing rounds	(+)
Market return	(+)

Using the Fama French model, the find the following

	No Selection	With Selection
Intercept	-1.2%	-5.4%
RMRF	2.3	2.3
SMB	1.1	1.1
HML	-1.2	-1.6
Idiosyncratic volatility	35.6%	40.3%

They conclude that VC-backed private firms behave like small growth firms. The factor loadings

for the FF model are dependent upon the stage in the VC process as shown below:



Korteweg concluded that in dealing with the sample selection problem, they had developed and estimated a dynamic model to account for estimators of risk-return of infrequently traded assets, and in doing so, provided the most comprehensive risk-return estimates of entrepreneurial companies to date. Their estimates showed reasonable patterns both in return and selection equations and the methodology is generally applicable to hedge fund performance, real-estate, corporate bonds, and CLOs / CDOs.

His presentation ended with some caveats:

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