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**EDUCATION:**

*Yale University*

PhD, Economics, expected May 2012

MPhil, Economics, December 2009

MA, Economics, May 2008

*University of Rochester*

BA, double major: Economics and Mathematics, May 2006

*Eastman School of Music*

BM, Classical Guitar Performance, May 2006

**FIELDS OF CONCENTRATION:**

Financial Economics

Macroeconomics

Applied Econometrics

**DESIRED TEACHING:**

Household Finance

Behavioral Finance

Financial Markets and Institutions

Macroeconomics

**TEACHING EXPERIENCE:**

*Graduate Teaching Fellow, Yale University*

Spring 2011, Econ 126: Macroeconomic Theory, Prof. Giuseppe Moscarini

Fall 2010, Econ 116: Introductory Macroeconomics, Prof. Ray Fair

Fall 2009, Econ 122: Intermediate Macroeconomics, Prof. William Nordhaus

Spring 2009, Econ 116: Introductory Macroeconomics, Prof. Ray Fair

Fall 2008, Econ 117: Introductory Microeconomics, Prof. Sheila Olmstead

*Undergraduate Teaching Assistant, University of Rochester*

Spring 2004, Eco 207: Intermediate Microeconomics, Prof. Steven Landsburg

**COMPREHENSIVE EXAMINATIONS:**

Oral: Financial Economics, Macroeconomics

Written: Macroeconomic Theory, Microeconomic Theory

**DISSERTATION TITLE:**     *Essays on Individual Investor Behavior and Asset Allocation*

**WORKING PAPERS:**

“Crashes over Multiple Asset Classes”

“Narrow Framing and the Popularity of Portfolio Insurance”

“The Impact of Narrow Framing on Stock Market Participation”

**WORK EXPERIENCE:**

Research Intern, Federal Reserve Board of Governors, Summer 2007

**FELLOWSHIPS, HONORS, AWARDS:**

Yale University Dissertation Fellowship, 2011

Yale University Fellowship, 2006-2010

Economics Department Prize, 2006-2010

Phi Beta Kappa, University of Rochester

Omicron Delta Epsilon, Economic Honor Society, University of Rochester

John Dows Mairs Prize in Economics, University of Rochester, 2005

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**REFERENCES:**

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## Dissertation Abstract:

### I: Crashes over Multiple Asset Classes

It is well known that the stock market is subject to periodic large declines in price. In fact, these “crashes” are not confined only to the stock market, but also occur in many different asset markets. However, predicting when these large declines occur and determining why they occur are matters that are subject to disagreement. Therefore, important questions include: does the probability of a crash change over time? If so, when is a crash most likely? Do crashes have the same properties over various asset classes? If we can better understand the conditions in which a crash is most likely, then investors will be able to better understand the crash risk they are assuming in their portfolio. In addition, the answers will shed light on why crashes actually occur.

Chen, Hong, and Stein (2001) is an important paper on this topic. They find that the distribution of daily returns for a particular stock will be more negatively skewed over the next six months if the stock experienced large returns in the recent past. This result says that a daily crash is most likely after the stock performed well in the recent past. How can we potentially interpret this result? It is most natural to connect this to the idea of bubbles, or large increases in stock prices that have seemingly little to do with movements in fundamentals.

To explore the question of whether the probability of a crash changes over time, I start by evaluating more generally over multiple asset classes whether the skewness of daily returns is impacted by past price increases. I measure the skewness of daily returns over non-overlapping periods of 1 month and 3 months. I regress these skewness measures on the price increases, and I do indeed find that larger past price increases predict a more left skewed distribution of daily returns in the future. I also find that this result is robust across a variety of markets, including aggregate indices in the United States and other countries, bonds, currency, and commodities. So, this suggests that daily crashes are most likely after a large run-up in prices, which suggests that bubbles are a good candidate to this phenomenon. However, this phenomenon holds over multiple markets, including bonds, which means that the rational bubble model as described by Blanchard and Watson (1982) is unlikely to be the correct explanation of the cause of bubbles: these bubbles and crashes can only occur in markets with an infinite horizon.

Next, I evaluate when crashes over a monthly horizon are most likely. However, it is impossible to use the same skewness methodology, as the sample size for monthly observations is much too small. So, I use a probit model to directly measure how the probability of a large decline varies over time. If bubbles are the main drivers of large declines, we should expect that the probability of a large decline is greatest after a large increase in price. However, for both stocks and bonds, I find the opposite: a large decline is actually *less* likely after large past returns. To get more insight into what’s going on, I then examine how the probability of a large increase varies over time. I find that for stocks, a large increase is also less likely after larger past returns. So, the results for stocks suggest that changes in the probability of a crash are actually driven by changes in volatility, rather than by changes in the skewness of the distribution. It is well known that stocks are more volatile after a large decrease in price, and this phenomenon is the main driver of changes in crash probability. However, for bonds, I find a different result: after a large price increase, the probability of a large gain increases and the

probability of a large decline decreases. So, in the bond market, there seems to be some momentum, even when just examining large price movements. Finally, in commodity markets, I find that large past price increases over the past year actually increase the probabilities of both a large price increase and a large price decrease. So, crashes in the commodity markets are also driven by changes in volatility, where volatility is greatest after a large price increase.

Therefore, I find that investors who are concerned about crash risk should not try to predict whether there is a bubble in the market. Instead, for stocks and commodities, they should focus on forecasting volatility, and for bonds, they should focus on momentum.

## II: Narrow Framing and Investment Choices

Past research has shown that when deciding whether or not to accept a gamble, people tend to evaluate the gamble in isolation rather than evaluating the impact of the gamble on total wealth. This behavior is called narrow framing, and shows a clear departure from expected utility theory. One of the first studies to document departures from expected utility theory is by Kahnemann and Tversky (1979). In their study, they pose the following situations to individuals:

### Situation 1:

In addition to whatever you own, you have been given 1000. Now choose between:

A: gain another 1000 with probability 0.5

B: gain 500 with certainty

### Situation 2:

In addition to whatever you own, you have been given 2000. Now choose between:

C: lose 1000 with probability 0.5.

D: lose 500 with certainty

Notice that in terms of final wealth outcomes, A is identical to C and B is identical to D. However, in situation 1, most people preferred B, whereas in situation 2, most people preferred C. Despite the fact that the choices are identical in the two situations, the way the choice is framed matters for preferences. So, in essence, there is narrow framing: to some extent, the gambles are evaluated independently of the implications for overall wealth.

There has also been a significant amount of empirical research documenting the deviation of investor behavior from the normative prescriptions of expected utility theory. The first example is that a significant fraction of households, including wealthy households, do not invest any wealth in stocks. Under expected utility theory, though, there is local risk neutrality over small gambles, which means that households should invest at least a small fraction of their wealth into stocks as long as stocks provide a positive expected return.

Secondly, there is also evidence that when people do invest in stocks, they are under-diversified. In particular, they exhibit “home bias”: when they participate in the stock market, they invest the vast majority of their stock investments into domestic stocks. However, to achieve stronger diversification, they should allocate a large fraction of their portfolio to foreign

stocks because they are less correlated with the conditions of the domestic economy. In fact, it can be shown that people should actually short their national stock market to invest further in foreign stock markets.

Thirdly, there has been work trying to figure out why structured products, or investments that combine a risky asset with a derivative asset, have been increasing in popularity, as expected utility investors would be better off investing in a combination of risky asset and risk free asset. The most common type of structured product involves portfolio insurance, where investors insure against the return going below a certain level in exchange for giving up a fraction of the potential gain beyond that point.

Barberis, Huang, and Thaler (2006) and Barberis and Huang (2009) explain stock market non-participation and home bias in terms of narrow framing. Rather than evaluating a stock investment through its impact on overall wealth, investors evaluate stocks in isolation from overall wealth, and find the gamble unappealing. Then, in the case where they do invest in stock, they evaluate foreign stocks separately from domestic stocks, and decide against investing in foreign stocks.

In the first part of this paper, I test the impact of narrow framing on stock market participation and home bias. In essence, narrow framing investors disregard potential diversification benefits that an investment can offer for overall wealth. My hypothesis is that investors who frame gambles narrowly do so because they do not understand how an individual gamble impacts overall wealth. In particular, investors should be aware of the difference between aggregate and idiosyncratic risk. Idiosyncratic risk can be diversified away, and therefore spreading your money across multiple assets can reduce the volatility of your overall portfolio. Second, the correlation of an asset with aggregate risk is very important: an asset that is negatively correlated with aggregate risk is more valuable than an asset that is positively correlated with aggregate risk, as it can be more effective in reducing the volatility of your total wealth. I test whether individuals who have greater understanding of these concepts are more likely to hold stock and diversify their portfolio by holding foreign stock. I develop an original survey that tests these concepts and conduct the survey on the Yale School of Management's eLab system. I find that narrow framers are indeed less likely to hold stock, but I find no evidence that narrow framing impacts home bias.

In the second part of the paper, I show that narrow framing can explain the growing popularity of portfolio insurance. When presented with an asset allocation decision, strong narrow framers will invest their entire savings into one asset, and often, the risk free asset is favored over investing in the stock market. However, even though the structured product is made up of a stock and derivative asset, investors are unlikely to frame each of these assets narrowly because they do not choose an allocation to each of these assets. Instead, it is presented as a package, and individuals must choose the guaranteed return under the one product. Therefore, rather than investing entirely in the stock or entirely in the risk free asset, narrow framers can indeed choose a compromise between the two by investing in the structured product. I find that the investor would be best off if he or she does not frame the stock and risk free asset separately, but given narrow framing behavior, the investor is best off choosing the structured product.