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From the Horse's Mouth: How do Investor Expectations of Risk and Return Vary with Economic Conditions?

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Abstract

Data obtained from monthly Gallup/UBS surveys from 1998-2007 and from a special supplement to the Michigan Surveys of Consumer Attitudes, run in 22 monthly surveys between 2000-2005, are used to analyze stock market beliefs and portfolio choices of household investors. We show that the key variables found to be positive predictors of actual stock returns in the asset-pricing literature are also highly correlated with investor's reported expected returns, but with the opposite sign. Moreover, analysis of the micro data indicates that expectations of both risk and returns on stocks are strongly influenced by perceptions of economic conditions. In particular, when investors believe macroeconomic conditions are more expansionary, they tend to expect both higher returns *and* lower volatility. This is difficult to reconcile with the canonical view that expected returns on stocks rise during recessions to compensate household investors for increased exposure or sensitivity to macroeconomic risks. Finally, the relevance of these investors' reported expectations is supported by the finding of a significant link between their expectations and portfolio choices. In particular, we show that portfolio equity positions tend to be higher for those respondents that anticipate higher expected returns or lower uncertainty.

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1. Introduction

The link between stock market returns and economic conditions has been the subject of extensive research and debate in the mainstream asset pricing literature. This interest was spurred in large part by the empirical findings of Fama and French (1989) and many others, which suggest that historical aggregate stock returns are predictable when conditioned on observable financial variables. [1] Such predictability in stock returns is consistent with the framework of rational investors and efficient markets only if the returns investors require on stocks vary systematically over time. The consensus view is that such variation is tied to the business cycle, following a narrative along the lines offered in Cochrane's 2001 textbook: investors require a higher risk premium (i.e. expect higher returns) when economic conditions are poor because, at such times, investors either experience high economic risk, high aversion to risk, or both. Thus, stock market returns are expected to compensate investors for their exposure to macroeconomic risks. The principal agenda in this still-thriving literature has thus involved proposing and testing general equilibrium asset-pricing models that can generate expected stock returns which mimic the relationship between actual stock returns and the business cycle.

An entirely separate line of research has involved analyzing data from surveys of individual investors with the aim of directly measuring household investors' expectations of stock returns, their variation over time, and their influence on portfolio investment decisions. In these studies, DeBondt (1993), followed by others such as Fisher and Statman (2000) and Vissing-Jorgensen (2003) document that, individual investors, as a group, appear to extrapolate quite strongly from recent stock market performance when forecasting future returns. Complementing these findings, Malmendier and Nagel (2011) show that over the past 50 years, individual investor portfolio allocations to stocks have been strongly and positively related to their own lifetime experience of equity market performance, with the greatest weight assigned to the most recent experience.

While these survey-based findings are potentially very relevant to the study of time-varying aggregate expected returns, to our knowledge, little research has aimed toward reconciling observations on the views of individual investors with key inferences in the mainstream asset-pricing literature.[2] There is little, if any, analysis how actual investors' expected returns relate to conditioning variables analyzed in the return predictability literature or more direct measures of macroeconomic conditions. Our paper attempts to bridge this gap using data on individual investor expectations of stock returns drawn from two separate but somewhat comparable surveys. One of these surveys brings new data to the table that

[1] See Cochrane (2008) and Goyal and Welch (2008), for instance, for two broad perspectives on the empirical methodology and findings in the stock return predictability literature.

[2] There is a rapidly growing empirical behavioral literature on decisions of individual investors. In addition to extrapolation of past performance, it documents numerous deviations from rational asset pricing models such as investor overconfidence, lack of portfolio rebalancing, reluctance to sell underperforming assets, insufficient diversification, etc. This literature is summarized in Barberis and Thaler (2003) and Subrahmanyam (2007).

contain joint information on household investor perceptions of risk, their portfolio holdings, as well as their expectations of stock returns and assessments of macroeconomic conditions.

Our analysis proceeds in two stages. First, we examine some key time series properties of household investors' expected returns on stocks, as measured in the Gallup-UBS monthly survey of individual investors, from 1998-2007. In particular, we analyze the relationship between the average respondent's 12-month-ahead expected return on stocks and two of the most prominent predictive variables from the empirical asset-pricing literature – the aggregate dividend yield (*d/p*) and the consumption-wealth ratio (*cay*) of Lettau and Ludvigson (2001). In that literature, regressions of stock returns measured at various frequencies (whether in levels or as excess over risk-free returns) on lagged values of *d/p* and/or *cay*, always produce positive and generally quite statistically significant coefficients. Since both *cay* and *d/p* tend to be relatively high during recessions and low during expansions, this empirical relationship is interpreted as evidence that investors demand higher returns to hold equities when economic conditions are poor, i.e. expected returns are countercyclical.

Indeed, we do find a very strong association between survey investors' expected returns and these two variables, which jointly explain as much as 65 percent of the variation in their expected returns over the 10-year survey period. However, the association between respondents' expected returns and each of these variables is *negative* –precisely the opposite of results in the asset-pricing literature. These results hold for both nominal and real returns, as well as excess return measures. This suggests that the conditional expected returns inferred from regressions in the asset-pricing literature are negatively correlated with the expected returns reported by the average investor in the Gallup-UBS survey. We further explore the time series of the Gallup survey expected returns by correlating them with more direct measures of economic conditions, such as the unemployment rate, the growth rate of industrial production, and household perceptions of economic conditions. The results again support the interpretation that the average respondent's expected return is procyclical.

These findings raise the question: *whose* expectations are represented in the equilibrium asset-pricing models that aim to explain predictability of equity returns? Since the leading theories in this literature are elaborations on the consumption CAPM framework, they require the existence of at least some influential subset of household investors whose beliefs are consistent with the theory. Clearly, the Gallup/UBS data suggest that the average household investor – who is at the center of the narrative, for instance, in both Campbell and Cochrane (1999) and Lettau and Ludvigson (2001) – does not fit this paradigm. One plausible answer is that expectations of households with much greater wealth and equity holdings than the average survey respondent look very different, and are perhaps more consistent with the theoretical models and inferences of the asset-pricing literature.[3] Another possibility could be that survey

[3]Indeed, Vissing-Jorgenson (2003) points to a variety of findings suggesting that many common behavioral biases tend to be attenuated among wealthier investors.

answers are not highly relevant to household portfolio choices – that respondents do not understand the questions, or that the responses are not thoughtful and are unconnected to investing behavior.

To address these considerations, the second part of the paper draws upon a different and as yet unexploited data source on household investor expectations, gathered through a supplement to the Michigan Survey of Consumers between 2000 and 2005. This supplement, which includes some of the period covered by the Gallup/UBS survey, gathers information not only on expected stock returns, but also on risk perceptions and household investment portfolio allocations – a unique constellation of data on individual investors. Moreover, the associated Survey of Consumers also gathers data on respondent household demographic characteristics, which allows us to give greater attention to more wealthy households. Finally, it contains a variety of information on respondent perceptions of current and future economic conditions, which allows an examination of how economic conditions influence expected returns and perceived risk and, in turn, household portfolio holdings of equities.

In summary, our findings indicate that expected stock returns, over both the medium-term (3 years) and long-term (10years), are strongly and positively correlated with perceived business conditions. We find that when investors have a more favorable assessment of either current or expected economic conditions, they tend to expect higher returns, particularly over the medium term. These results are robust to a number of specifications. Perhaps most importantly among the robustness checks, we find that the result is not at all attenuated when we overweight the wealthier investors in our sample, suggesting that these views are indeed representative of those in the household sector whose expectations are more likely to influence market prices.

At the same time, we find that perception of risk in longer-term stock returns is quite negatively related to expected economic conditions, while it appears to be unrelated to the perception of current business conditions. Together with the results on expected returns, these findings suggest that, for the average household investor, forward-looking Sharpe ratios tend to be higher when the economy is expected to be strong, and are largely unrelated to current conditions. This conclusion appears to be at odds with the canonical view that variation in the conditional equity premium reflects an equilibrium where household investors' are being compensated for perceived exposure to macroeconomic risks. Rather, our results suggest that, given their views, households desire to have a much smaller exposure to stocks in their portfolio during recessions.

Indeed, one key advantage of our survey data is that they allow us to look not just at investor expectations but also their actions, as measured by self-reported portfolio allocations to equity. Connecting beliefs and actions is important both for establishing the validity of the expectations data and for highlighting a potential transmission channel for linking investor beliefs and asset returns. To that end, we find that the households' portfolio equity allocations are systematically related to their reported expectations. Specifically, the share of wealth invested in equities is significantly higher for households that anticipate higher returns or lower uncertainty. These results hold for various definitions of wealth and

regression specifications. Moreover, they are robust to the overweighting of wealthier households, whose views are presumably more relevant to the pricing of equities.

In what follows, section 2 reviews related research in the investor survey literature. Section 3 documents the time-series properties of expected returns from the surveys and places them in the context of existing results from the asset-pricing literature on stock return predictability. Section 4 describes the Michigan survey instrument and data construction, paying particular attention to links between survey measures and theory. Section 5 examines the time-series and cross-sectional determinants of investors' expectations of risk and returns in the equity market, while section 6 analyzes the relationship between investors' reported beliefs and their portfolios. Section 7 summarizes and offers some final thoughts.

2. Previous Research

This section reviews previous research on survey-based measures of expected stock market performance. In addition, we briefly describe the basic analytical framework that undergirds the vast asset-pricing literature on time-varying expected returns, without endeavoring to provide a comprehensive review of this literature, which has been thoroughly covered elsewhere.

A. Survey-based studies of investor beliefs and behavior

In what is perhaps the earliest modern study of individual investors' stock market expectations, De Bondt (1993) analyzed data from the monthly survey of investors (beginning in 1987) by the American Association of Individual Investors (AAII). Among other findings, the study documents that stock market appreciation over the preceding few weeks or months has a strong positive effect on the propensity of investors to anticipate favorable market performance in the six months ahead. Fisher and Statman (2000) confirm this finding using updated data from the AAII monthly expectations survey. However, they also study self-reported portfolio allocations and find little relationship between monthly changes in average sentiment and monthly changes in average portfolio allocations to stocks.

Several more recent studies on investor expectations were spurred by the Gallup/UBS monthly survey of investors, which began in 1998. Using the aggregated survey results, Fisher and Statman (2002) document a strong positive correlation between recent past stock market performance and the average forecast for year-ahead returns. Employing the investor-level data, Vissing-Jorgensen (2003) similarly shows that a respondent's expected year-ahead portfolio return is strongly positively related to their past12-months' (self-reported) own portfolio performance, although this effect is somewhat attenuated among wealthier respondents. Furthermore, she finds that expectations of the more wealthy respondents tended to be lower—or less exuberant around this period (the tech stock boom)—compared to others. Still, the expected returns exhibit a very similar trajectory for all respondents between 1998 and 2002.

While our analysis also confirms investor extrapolation of past returns in our study, our aim is to explore the potential link between expected returns and economic conditions, and also to incorporate

uncertainty into the analysis. Two survey-based papers have touched upon these aspects. Dominitz and Manski (2004) use the 2002-04 special questions on the Michigan Survey of Consumer Sentiment to examine investors' market return expectations. In particular, they analyze responses on the "probability that a typical diversified stock mutual fund will increase in value over the coming year", a metric that conflates risk and expected return. They find a positive relation between probability of positive returns and expected year-ahead business conditions and they show systematic effects of gender and education on beliefs.[4] Graham and Harvey (2003) analyze CFO responses to survey questions regarding the level of their expected excess stock returns and their expected volatility of returns, both at the one-year and ten-year horizons. Although arguably more sophisticated than the average household investor, CFOs also tend to extrapolate the recent level of excess returns in their one-year forecasts. In contrast, CFOs' longer-term return forecasts appear roughly time-invariant. Moreover, while there is no apparent risk-return relationship in CFOs' shorter-term forecasts, expected returns and expected volatility are positively correlated in the longer-term forecasts.[5]

Complementing the studies of investor beliefs, some recent papers use survey data on individual investor portfolio choices to test consistency with asset-pricing theories. Using the Survey of Consumer Finances from 1960-2007, Malmendier and Nagel (2011) show that an investor's equity portfolio share, as well as the likelihood of equity ownership, are strongly and positively related to their own lifetime experience of equity market returns, with the greatest weight placed on the most recent events. Moreover, using the aforementioned UBS/Gallup survey data, together with the weighting parameters from their portfolio analysis, they show that this weighted average of experienced returns has a significant positive effect on investor return forecasts. Brunnermeier and Nagel (2008) use the Panel Study of Income Dynamics to evaluate the empirical support for time-varying risk aversion by analyzing the effects of changes in wealth on household portfolios. In contrast to the predictions of models with time-varying expected returns, they find no effect of wealth fluctuations on the share of liquid assets held in equities. Instead, inertia seems to be the dominant time-series characteristic of household equity allocations.

A final pair of studies that informs our analysis focus on the relationship between *actual* stock returns and the Index of Consumer Confidence (ICC), the composite measure of consumer/investor sentiment built from Michigan survey data. Qiu and Welch (2006) find that changes in the ICC play a robust role in explaining abnormal returns on small-decile stocks. Lemmon and Portniaguina (2006) decompose the ICC into a macroeconomic "fundamentals" component, correlated with macroeconomic

[4] In a follow-up study (Dominitz and Manski, 2011), the authors focus on categorizing respondents into three distinct categories – those expecting persistence, mean-reversion, or serial independence in future 12-month returns. The focus of the paper is on the intrapersonal stability in expectations captured in surveys six months apart, and not on the relationship between expectations of returns and economic conditions.

[5] Ben-David, Graham, and Harvey (2010) further show a strong correlation between the tightness of the CFO's confidence interval for returns ("overconfidence") and the aggressiveness of corporate policies at their firms.

news, and a residual interpreted as a measure of "sentiment". They find that increases in *both* the residual and the fundamental component of the ICC predict significantly negative abnormal returns for stocks with low institutional ownership.[6]

In these two studies, the fundamental reason that "sentiment" explains or predicts asset price movements is unknown; that is, sentiment might represent investors' expected returns, or their risk perceptions, or their tolerance of risk, or all three. In essence, the household investor class is treated as a residual influence, which might push conditional expected returns away from some equilibrium level determined by macroeconomic conditions. In some sense, we take the opposite tack: first, we isolate the component of sentiment that best measures expectations for real economic activity. Then, we attempt to identify the path – expected return or risk – through which macroeconomic conditions may influence household investor portfolio holdings.

B. Time-varying returns in the canonical asset-pricing framework

While there may be broad consensus in the asset-pricing literature that the expected returns on stocks are tied to the business cycle, there exist a variety of hypotheses on the underlying mechanism, which offer a range of specific empirical predictions. To be concrete, consider the formula for the equity premium in the canonical consumption CAPM model with power utility:

$$E_t(R^e_{t+1}) \approx \gamma(t) cov_t(R^e_{t+1}, \Delta c_{t+1})$$

Here, R^e is the expected excess return on stocks, Δc_{t+1} is expected consumption growth and $\gamma(t)$ is the coefficient of relative risk aversion. The equation implies that investors demand high expected returns if or when stock returns co-vary strongly and positively with expected consumption growth.

Broadly speaking, one set of theories focus on the idea that time variation in expected returns is the result of fluctuations in the *expected* covariance of consumption and returns. In a frequently-cited paper, Constantinides and Duffie (1996) suggest that such a time-varying covariance could be a result of time-variation in the cross-sectional variance of consumption, which may increase during bad economic times. Their theory thus implies that, in equilibrium, investors require (and expect) stock returns to be higher when they are expecting the economy to enter or remain in a recession.

Bansal and Yaron (2004) offer a more elaborate argument for a time-varying covariance between returns and consumption growth. They suggest that the economy is buffeted by persistent fluctuations in the rate of growth, and that the uncertainty about this longer-run growth rate is also time-varying and persistent. In that world, the key source of fluctuations in expected returns is the expected risk of consumption growth, which might be an important characteristic of the business cycle. Although expected growth influences equity valuations in their model, it has no predictive power for expected returns.

[6] In a similar vein, Brown and Cliff (2005) use data from the Investor's Intelligence survey of market newsletters to gauge investor sentiment and show that sentiment helps predict stock returns (with a negative sign).

Another, perhaps even more popular set of explanations for a link between the equity premium and the business cycle hypothesize time-variation in effective risk aversion, $\gamma(t)$. In these theories, risk aversion tends to be high in the depths of a recession, when the *level* of consumption is low. The most widely-cited theory in this camp is the Campbell and Cochrane (1999) habit-formation model of consumption: in that model, risk aversion is high when the consumption is low relative to "habit" (a weighted-average of past consumption), which tends to be the case following a steep decline in economic activity. Conversely, risk aversion tends to be low toward the tail end of a boom, when consumption is high relative to habit. Indeed, this is the interpretation that Lettau and Ludvigson (2001) propose to explain their finding of a positive predictive relationship between the consumption-wealth ratio (*cay*) and stock returns.

3. Time-Variation in Survey Expected Returns

Our empirical analysis starts with an examination of the time series behavior of investors' expected equity returns reported in the UBS/Gallup survey. That survey is conducted on a nationally representative sample of individual investors having at least $10,000 in direct or indirect holdings of stock, with each wave interviewing roughly 1,000 respondents. The survey began in June 1998, first running quarterly, and then running monthly February 1999 through December 2007. Among other things, the survey asks investors for the 12-month-ahead returns on their own investment portfolios. The solid (red) line in Figure 1 depicts the time series of survey mean expected returns.[7]

In addition to means and medians, Gallup published statistics on the proportion of responses within various ranges, which we use to construct a nonparametric measure of expected returns that is robust to the presence of outlier responses. The dashed line in the figure plots the proportion of respondents expecting returns of 10 percent or higher, which is highly correlated with the means but less volatile. Finally, for later reference, the dots in Figure 1 plot monthly means of the expected annual rate of return on stocks, over the next three years, reported by respondents to our the Michigan survey supplement, which we later analyze at the individual investor level. Their correlation with UBS/Gallup means exceeds 0.85.

A. Expected Returns, the Dividend Yield, and the Consumption-Wealth Ratio

While covering only a decade, the UBS/Gallup survey provides the longest available time series on expected stock market returns reported by a representative sample of individual investors. We begin by correlating the survey expected returns with key conditioning variables found to predict returns in the

[7] During the first four years, the survey also asked investors for their expectation of 12-month-ahead returns on the "stock market more generally." The mean responses to this question move in lock step with mean expected own-portfolio return (correlation=0.97), though always around one percentage point lower, so we consider the longer time series to be a very close proxy for the evolution of expected stock market returns. Vissing-Jorgensen (2003) uses the micro data to analyze the relative responses to these questions.

asset-pricing literature. Arguably, two of the most important conditioning variables in this literature are the log of the aggregate dividend-price ratio (*d/p*) and the log consumption-wealth ratio (*cay*). Historically, the dividend–price ratio has garnered the most attention, though its robustness as a predictor has been the subject of much debate (Stambaugh, 1999).[8] Lettau and Ludvigson (2001) proposed *cay* as an alternative measure and its predictive power and statistical significance was found to be quite strong. In the literature, both of these variables have *positive* coefficients in regressions predicting quarterly, annual and longer-horizon stock returns. Since both variables tend to be relatively high during recessions and low during expansions, their predictive power is normally interpreted as indicating that expected returns are countercyclical, i.e. higher when economic conditions are poor.

Figure 2 plots the share of UBS/Gallup survey respondents expecting a 10 percent or greater annual return alongside the log dividend yield on U.S. stocks (panel A), and *cay* (panel B), which is scaled so that its standard deviation is one. Clearly, survey-based expected returns are strongly negatively correlated with both of these measures over the sample period at hand, a striking contrast with the positive coefficient these variables have in standard predictive regressions. The statistical relationship between the *d/p* and *cay* and expected stock returns is established in Table 1. The first three columns show regressions of the Gallup/UBS expected 12-month return on the one-month lag of the *log dividend yield* and the most recent quarterly value of *cay*, separately, and then together. The next three columns consider alternative measures of expected return: expected real returns (subtracting the mean expected 12-month inflation, as reported in same month by the Michigan survey for a similar cohort of respondents), expected excess returns (subtracting current 1-year Treasury note yield), and the share (of respondents) expecting ≥10%. In all cases, both explanatory variables are strongly statistically significant and their coefficients are positive, or of the "wrong" sign. This suggests that conditional expected returns inferred from regressing *realized* returns on the dividend yield and/or *cay* are very poor measures, indeed contrary measures, of the average household investor's expected returns.

B. Expected Returns and Measures of Economic Conditions

Before moving to the household-level analysis, it is instructive to clarify somewhat the relationship between our estimates of expected stock returns and measures of economic conditions. The coefficients on the dividend-price ratio and *cay* provide only an indirect perspective on how expected returns vary with economic conditions, as they serve as only proxies for economic fundamentals. Thus, we briefly examine how the Gallup/UBS time series of expected returns correlates with more direct measures of business cycle conditions.

As outlined earlier, some asset-pricing theories focus on time variation in risk aversion and link the expected equity premium to the *current level* of consumption or economic activity, relative to the past.

[8]The statistical significance of the dividend yield is not entirely robust to sample period in that literature. Boudoukh, et al. (2007) attribute this to the rising importance of stock repurchases between 1984 and the mid-1990s.

Other theories focus on time variation in risk, and tie the expected equity premium to the *expected risk* of future growth. We look at five measures of economic conditions, each of which would be predicted by popular asset-pricing theories to be negatively related to expected equity returns:

(i) Current employment rate (inverse of unemployment rate)
(ii) Past 12-months' industrial production (IP) growth
(iii) Current conditions, relative to a year ago (Michigan Survey)
(iv) Current business conditions, level (Michigan Survey, imputed)
(v) Expected business conditions (Michigan Survey)

The *Employment rate* (one minus unemployment rate) is among the most basic measures of economic conditions, which theories suggest should be highly correlated with the average household's level of marginal utility: when the employment rate is low; marginal utility and risk aversion tend to be high, which boosts the required equity risk premium. An alternative rationalization of such a relationship would be that the consumption-return covariance tends to be high when employment is low. The second basic measure of actual economic conditions we consider is *Past 12-months industrial production growth*, which gauges the growth in the manufacturing component of industrial production. Again, all else the same, asset-pricing theories such as Campbell and Cochrane (1999) would tend to predict a higher degree of risk aversion and higher required returns, following unusually low growth.

The last three measures gauge *perceived* economic conditions, and are based on responses to the Michigan Survey questions about the economy.[9] To measure investors' views of current economic conditions, we use the diffusion index (BAGO) constructed by Reuters/Michigan, based on responses to the following question:

"Would you say that at the present time business conditions are better or worse than a year ago?"

Responses are classified as (i) better now, (ii) about the same or (iii) worse now. The variable *Current conditions, relative* is a diffusion index equal to the percentage that respond "better" minus the percentage that respond "worse". This measure ought to be highly positively correlated with measures of recent economic growth, such as *past 12-month IP growth*. At the same time, *Current conditions, relative* should also be correlated with the perceived *level* of current conditions (and thus the level of marginal utility). However, an even better measure of the perceived "level" of current business conditions could be derived by integrating *Current conditions, relative,* that is, by taking the cumulative sum of this index. We name the resultant time series variable *Current conditions level.* As shown in Figure 3B, since *Current conditions, relative* tends to fluctuate around a mean close to zero, its cumulative sum also appears to be stationary.

[9]These measures are used again when we move to the analysis of the investor-level data. For the macro analysis, we use the aggregated diffusion indexes provided on the Reuters/Michigan website pertaining to responses from survey respondents with a college degree. This is the demographic group which we later find to have a relatively high stock market participation rate and which accounts for the lion's share of the equity market exposure.

To measure investors' forward-looking views of economic conditions, we use the diffusion index (BUS5) constructed by Reuters/Michigan from responses to the question:

"Looking ahead [is it more likely that the U.S. will have] continuous good times during the next 5 years or so, or that we will have periods of widespread unemployment …, or what?"

The variable, *Expected business conditions*, is equal to the percentage of respondents expecting "good times" ahead minus the percentage expecting "bad times". Absent any relationship between expected future economic performance and expected risk, many theories tend to be mute or suggest only a weak relationship between forward-looking growth expectations and expected returns. But theories like Constantinides and Duffie (1996) which hypothesize that more favorable economic conditions tend to coincide with lower consumption risk, would predict expected stock returns to be lower when E*xpected business conditions* are favorable.

A simple visual comparison of Panels A and B suggests a fairly tight link between our two measures of actual conditions and household perceptions of current and prospective economic conditions. To quantify this, Panel B of Table 1 shows time series correlations amongst the variables going back to 1978 – the first year of the Michigan survey. Our measure of the perceived favorability of current business conditions (*Current conditions level*) is indeed very tightly correlated with the unemployment rate, while *Current conditions, relative* (to a year ago) is quite highly correlated with *12-month IP growth*. Finally, *Expected business conditions* exhibits a pretty strong positive correlation with both inverse unemployment and 12-month IP growth.

A general sense of how expected stock returns vary with these measures of economic conditions is provided by the matrix of correlation coefficients in Panel C of Table 1. Each column corresponds to a measure of economic conditions, while the rows contain the alternative measures of expected returns examined in the earlier regressions. Again, without delving into the details, the broad implication of the plethora of significant *positive* correlations is unambiguous. While theories in the asset-pricing literature are largely geared to explain why expected stock returns are countercyclical, this table documents broad evidence suggesting that the average investor's expected return is decidedly procyclical, at least over the 10-year period covered by the Gallup/UBS data.

Reflecting on these observations, short of dismissing *all* household investors' perceptions as a mere sideshow for asset pricing—or, in effect, dismissing the relevance of the consumption CAPM framework for explaining asset prices—brings up the following questions, which we attempt to address with investor-level data: (i) Do the expectations of wealthier household investors, who presumably wield disproportionate market influence, mimic the pattern of the average household's expectations, or are they more consistent with the assumptions of the asset-pricing literature? (ii) How do investor perceptions of risk vary with economic conditions? (iii) Is there evidence that the expected returns from the surveys are action-relevant; i.e., are they related to respondents' portfolio allocations and do they play a role distinct from perceptions of risk? The second half of the paper focuses on addressing these questions.

4. Michigan Survey Data and Variable Construction

A. Survey description

Our household-level data are obtained from the Michigan Survey of Consumer Attitudes, conducted by the Survey Research Center (SRC) at the University of Michigan. Each month, the SRC conducts a minimum of 500 phone interviews, the data from which are used to compute a number of commonly cited gauges of economic conditions, such as the Index of Consumer Sentiment. A special supplement with questions pertaining to respondents' views about stock returns was added to 22 of the surveys conducted between September, 2000 and October, 2005.[10] These questions were asked only of households that reported at least $5,000 in stock or stock mutual fund holdings. Such households accounted for between 35 and 45 percent of the respondents in any given survey month.[11] Among these households, the median size of investments in equities was about $75,000.

The supplements contained questions on (i) expected average stock market returns over various horizons, (ii) the likelihood that particular *ranges* of outcomes would be realized, and (iii) the respondents' portfolio holdings.[12] In addition, we extract response data from the standard monthly survey that measures respondents' assessments of macroeconomic conditions and their own economic prospects. We also use demographic information collected by the survey on respondents' age, education, income, and family status. Finally, we dropped observations in which respondents did not provide answers to all the key questions on stock market expectations, which reduced the sample size from 4,012 to 3,340 observations. In addition, we excluded observations for which the interviewer denoted that the respondent had a low "level of understanding" or a relatively poor "attitude" toward the survey, trimming another 116 observations from the sample.

B. Measuring Expected Returns, Perceived Risk and Equity Holdings

We measure expected market returns from the question that asks:

"Looking forward, what is the annual rate of return that you would expect a broadly diversified portfolio of U.S. stocks to earn, on average, over the next three years?"

A follow-up question then asks if they would "expect the average returns over the next 10 to 20 years to be much different and, if so, then what would they expect. The respondent is similarly asked for their expected long-term returns on their *own* equity portfolio. The top panel of Table 1 reports summary statistics of these three measures of expected returns. Over the span of 22 surveys, the median investor

[10] Specifically, questions on stock market beliefs were asked on 11 surveys conducted between September 2000 and November 2001. Beginning January 2002, such questions were asked quarterly, and semi-annually after April 2003. The set of questions in this special section of the Survey evolved somewhat over this time.

[11] By this measure, the equity ownership profile of Michigan survey participants was consistent with that in the population-weighted data from the contemporaneous Surveys of Consumer Finances (SCF), which indicate that 40 percent of U.S. households owned at least $5,000 in equities.

[12] The survey document is available upon request.

reported expected annual returns of 10 percent over the long-term horizon, on both the market and their own portfolio, and about 8 percent over the shorter horizon. The interquartile range of responses runs from 7 to 12 percent for the longer horizon and 5 to 10 percent for the shorter horizon. The returns distribution is right-skewed, reflecting the presence of some upside outliers and the near-absence of responses below zero. To minimize the potential influence of outlier responses, the regression results shown below are estimated on a censored sample where we have excluded observations in which the expected return is above the 98thpercentile of responses in any given month.[13]

Perceptions about the risk in stock returns are inferred from a question that asks for the likelihood that the average return over the next 10 to 20 years will be close to their expected average return, specifically:

> *"Since no one knows future stock returns for sure, on a scale of 0 to 100, where 0 means absolutely no chance and 100 means absolutely certain, what do you think the chance is that the average return … will be within 2 percentage points of your guess, that is, between (X– 2) and (X+2) percent per year? [where X is the respondent's expected 10 to 20-year return]"*

The responses thus provide an estimate of the perceived probability mass in the four percent band centered on the reported expected return. It is more convenient to discuss the complement of this measure – the probability that average annual returns will fall *outside* the band – which we call "*Uncertainty*". As shown in panel B of Table 1, the empirical distribution of *Uncertainty* spans a wide range. At the same time, there is a large density of responses at 50 percent, which is a common feature of survey questions that elicit probabilistic assessments. As argued by Bruin, et al. (2002), a 50/50 response to open-ended probabilistic survey questions can indicate epistemic uncertainty – a self-perceived lack of knowledge.[14] Finally, for the analysis that follows, we dropped the small fraction of observations in which the response was either a zero or a 100 percent chance, which are logically problematic and preclude the construction of an implied standard deviation.

This measure of the return risk can be translated into the conventional standard deviation if, for instance, annual stock market returns are assumed to be lognormally distributed, implying that their time averages are asymptotically normal. Standard deviation can then be backed out from the inverse of the standard normal cdf. Specifically, defining *Uncertainty* as *Prob* $|R\text{-}R^e| > .02$, the perceived standard

[13]The positive skew in the responses partly owes to the absence of negative responses, which is not necessarily an anomaly, since the special survey section was only administered to households reporting positive current equity holdings. Nonetheless, there is strong evidence that predictions of stock performance are influenced by how the question is framed. For instance, Glaser, et al. (2007) shows respondents are relatively more likely to predict trend continuation when asked to forecast *returns* but mean reversion when forecasting a stock *price level*.

[14] A similar argument is put forth in Tversky and Kahneman (1974), who attribute the prevalence of 50/50 responses to the behavioral bias called 'anchoring'. They found that, when experimental participants are asked open-ended questions like: "What is the probability that *x* will occur?" they tend to anchor on 50%, which could be interpreted as expressing "no opinion". If so, these observations might bias estimation results, a issue that we consider in our tests for robustness.

deviation of average returns over a 10-20 year period is given by: $\sigma_{10\text{-}20} = -0.02 / \Phi^{-1}(0.5*\textit{Uncertainty})$. The implied *annual* standard deviation then requires an assumption on the horizon that respondents have in mind, since the question left this vague – from 10 to 20 years.

Panel B of Table 1 reports the distribution of $\sigma_{10\text{-}20}$. The midpoint and the interquartile range of these imputed standard deviations are somewhat lower than historical averages, though not unreasonable. For instance, with a 20-year horizon, the median implied standard deviation of 2.96 percent represents an annual return volatility of $2.96*\sqrt{20}$ or 13.2 percent, about two-thirds of the historical average of 18 percent (Campbell, Lo, and MacKinlay, 1997). A 10-year horizon implies an annual volatility of 9.4 percent, which is at the low end of historical experience.

The third key variable drawn from the survey supplement is the respondent's share of financial wealth invested in equities. In all but the first four survey months, respondents were asked to indicate one of five buckets, or ranges, that best approximates the share of their financial assets invested in stocks or stock mutual funds. Responses, summarized in panel C of Table 1, are fairly evenly distributed, with about a fifth of the respondents having less than 10 percent invested in equities, and a third having over 50 percent in equities. We impute a cardinal measure of equity portfolio share using the mid-point of the reported range; by this measure, the sample average equity share is 37 percent.[15] In addition, based on a question that asks for the value of total stock holdings, panel C shows the distribution of the absolute size of respondents' equity holdings, which span the range from $5,000 to $14 million.

C. Perceived Economic Conditions, Past Returns, and Demographics

To exploit the cross-sectional as well as time-series variation, we measure perceived economic conditions from responses to the two Michigan survey questions we used in the aggregate time series analysis above. In particular, we gauge the respondent's perceptions of current conditions from responses to the question (BAGO): "Would you say that at the present time business conditions are better or worse than they were a year ago?" We code the variable *Current Conditions* as 1, 0, or -1, depending on whether the individual responds that conditions are better, same, or worse, respectively. Similarly, we gauge *expected* conditions from responses to the question (BUS5) asking if it is more likely that "we'll have continuous good times over the next five years…or periods of widespread unemployment…or what." The variable *Expected Conditions* is coded as either 1 or -1 for responses that the survey coded "good times" or "bad times", respectively, or as 0 when the response was ambiguous or uncertain.[16]

[15] This distribution is qualitatively similar to that reported by equity owners in the 2001 Survey of Consumer Finances (SCF). With financial wealth defined as taxable and tax-deferred investment accounts (excluding transaction assets such as checking and savings accounts), two-thirds of stockholders in the 2001 SCF report equity shares of at most 50 percent. About 18 percent of equity owners report shares of more than 75 percent.

[16] Alternatively, we experimented with the use of dummy categories for the optimistic and pessimistic households and found that this decomposition had no qualitative effect on results and their interpretation.

As discussed earlier, research on investor expectations suggests they may be strongly influenced by recent experience of past returns or the overall lifetime experience. To control for the potential extrapolation of past performance, we construct a respondent-specific measure of weighted average past returns that mirrors the Malmendier-Nagel metric. Specifically, we calculate a weighted average of past returns, where the horizon depends upon the respondent's reported years of investment experience as well as a decay parameter that gives greater weight to more recent observations.

We also include a control for the respondent's expectations for their own economic prospects, based on responses to the survey question: *"What do you think the chances are that your (family) income will increase by more than the rate of inflation in the next five years or so?"* The responses and the associated variable, *Own Income Prospects,* range in value from 0 to 100 (%). This measure of respondents' own prospects might also convey information about their macroeconomic outlook that is not reflected in *Expected Conditions*, since the latter measure is qualitative and much coarser.

A few additional variables are used to control for respondents' demographic characteristics and their experience. Specifically, we construct dummy variables that control for the respondents' education level, broad age category, and gender. We also construct a measure of investment experience from the survey question that asks respondents for the number of years they have been investing in equities.

D. Household Wealth

Lastly, but quite central to our cross-sectional analysis, we use a couple of alternative methods to gauge the level of respondent wealth, which enables us to examine whether the beliefs of more wealthy investors differ from those of the broader population of households. Presumably, the actions and thus beliefs of wealthier individuals are likely to have a greater collective bearing on asset prices. In particular, if wealthier households are on average more sophisticated financially, they might also have systematically different views on the relationship between economic perceptions and future equity returns.

The special survey module provides one rough but straightforward estimate of respondent wealth inferred from their responses on the size of the equity holdings (dollar value) and the share of their financial assets invested in equities (available in all but the first four survey months). This estimate has some drawbacks. Notably, it may be subject to large errors because the ranges of both the size and the share buckets are quite wide. Also, given the huge swings in equity prices over the 1990s and early 2000s, it is possible that the respondents' financial wealth is endogenous to their choice of portfolio allocation (and thus their beliefs). Finally, one might believe that broader measures of wealth are more indicative of potential household influence on asset prices.

To impute alternative estimates of respondent wealth, we use the Survey of Consumer Finances (SCF). In particular, using the sample of stock owners in the 2004 SCF, we regress the log of wealth (measured in several different ways) on a set of covariates available in both data sets. These include household income, home ownership status, age, education, marital status, and the number of children.

Our primary estimate of imputed wealth includes all household financial assets, defined as the sum of household-controlled retirement and non-retirement assets held in financial instruments (including cash), but we consider broader wealth measures for robustness. After estimating the wealth regressions on the SCF data, coefficient estimates are used to impute wealth values for the Michigan survey respondents.[17] These are then used in regressions that weight respondents in proportion to their (logged) wealth.

5. Regression results for expected returns and perceived risk

A. Determinants of expected returns

Results from regressing respondents' 3-year (medium-term) and 10-year (long-term) expected returns on their perceptions of economic conditions and past returns are presented in Tables 3 and 4, respectively. Of the two horizons, the 3-year horizon should provide the better measure of business-cycle-related variation in expected returns, while the responses for the longer-term horizon should serve as a useful comparison. As mentioned earlier, to minimize outlier influence, the regressions exclude respondents whose expected returns were above the 98th percentile response in each survey.[18] In every specification, the set of covariates includes gender and education level indicators.

The baseline specification in column (1) focuses on gauging the effect of *Past Market Return*, the factor analyzed most extensively in previous survey studies of expected returns. Similar to the measure proposed by Malmendier and Nagel, *Past Market Returns* is constructed as a weighted average of historical returns, but with the extent of look-back determined by the respondent's self-reported years of investment experience (from the survey), rather than age. As in previous studies, the results here suggest that past performance has a significant positive effect on expected returns. In particular, the coefficient estimate of 0.098 implies that a 10 percentage point increase in past annual returns raises expected annual returns nearly 1 percent. This effect is about one-sixth the magnitude found by Malmendier and Nagel (2011), a discrepancy that might reflect the different sample period or perhaps our question's longer horizon—3 years rather than 12 months.[19] —or. The other result worth noting is the positive coefficient on the gender dummy, suggesting men are on average more optimistic about stock returns, a result that also generally accords with the literature.

Specification (2) adds our survey-based measures of the individual respondent's economic perceptions. As can be seen, consistent with aggregate correlations, the coefficient estimates on the respondent's own view of *Current Conditions* and *Expected Conditions* are both positive, with the latter

[17] The SCF regressions generate R^2 values between 0.65 and 0.81 depending on the wealth measure.

[18] Including outliers has little qualitative effect on statistical inferences but causes coefficient magnitudes to be less stable across subsamples or specifications. If we instead do use quantile regressions or Hamilton's (1991) "robust regression" GLS algorithm without truncating the sample, results are again very similar to those presented.

[19] Using investor age rather than years of investment experience in experience weighting has little effect on coefficient magnitude.

being highly statistically significant. The coefficient 0.493 implies a modest effect: for instance, a change expected business conditions from poor to neutral (from -1 to 0), raises expected annual 3-year returns about a half percentage point. In any case, as in the aggregate survey analysis, by either measure, there is no evidence here that expected returns vary negatively, or countercyclically, with perceptions of economic conditions.[20] Finally, the positive coefficient on *Own Income Prospects* suggests that a respondent's assessment of their own chances of seeing real income growth is positively associated with their return expectations. For instance, an increase in perceived probability of real income growth of 50 percent raises expected returns about a half percent. At the same time, after controlling for this measure of individual optimism, gender is no longer statistically significant for explaining expected return.

One potential drawback of this specification is that the respondent-level measure of current conditions only gauges the economic environment relative to 12 months ago. In theory, a cumulative sum of the Michigan Survey monthly diffusion index for *Current Conditions* (from Table 1) ought to be a better proxy for the absolute measure of the perceived favorability of current conditions for the average respondent. We add this aggregate measure of *Current Conditions* in specification (3). At the same time, we also control for the aggregate (or, consensus) perception of expected future conditions, equal to the Michigan Survey diffusion index measure of *Expected Conditions*.

As can be seen in the third column, the coefficients on both the consensus view on the favorability of *Current Conditions* and the consensus view of *Expected Conditions* are positive and significant. What is more, after controlling for the consensus view of current conditions, the estimated coefficient on the respondent's own view of current conditions becomes larger and statistically significant. Finally, adding the aggregate measures of economic conditions reduces the estimated marginal influence of the still significant *Past Market Returns*. Presumably, past market returns contains much of the same times series information as aggregate economic conditions.

As argued earlier, a key benefit of our data is that it allows us to focus the analysis on the expectations of wealthier respondents. Specifications (4) and (5) consider two alternative approaches to up-weighting the views of wealthier household investors. In column (4), we re-estimate specification (3) on the full sample using weighted least squares, with weights equal to the log of respondent financial wealth (in millions), the imputation of which was described earlier. The resultant weights vary by a factor of 12: the highest-weighted respondent is given 12 times the weight as those at the bottom of the wealth range. In column (5), we instead re-estimate (3) using OLS on the wealthier half of the sample, that is, respondents with financial wealth above the median in their survey month. For this split, we use our direct measure of wealth based on survey questions regarding respondent portfolios.

[20]The regressions in Table 3 get much (but not all) identification from cross-sectional variation in beliefs about future business conditions and disagreement on where the economy is now. Hence, "procyclical" should be taken to mean not just the usual "as the business cycle evolves", but also "as the business cycle is perceived by respondents".

The bottom line from this exercise is unambiguous. In both of these regressions, all of the variables measuring perceived economic conditions remain positive and significant. Even more striking, the coefficients on most of those regressors are larger in these regressions. Also somewhat interesting is that the R^2 of these regressions, particularly (5), are higher (and RMSEs are lower) than that for the unweighted full sample (3). The stronger estimated effects for the wealthier investors are plausibly rationalized by the presumption that they are more attuned to the stock market and economic conditions and have stronger views about their relation (even if they contradict those amongst financial economists).

Table 4 shows results from repeating this analysis for expected 10-20 year annual returns. The qualitative pattern of results is quite similar, though with the long-run expected returns some of the variables have more attenuated effects, as one might reasonably expect. For instance, *Past Returns* has a coefficient of about half the size compared with the Table 3 regressions. To the extent that individual investors extrapolate from their historical experience of stock returns, they apparently don't expect that persistence to last over the long-run. Perhaps the biggest difference we find in Table 4 is that the coefficient on current economic conditions, while positive, is never significant; in addition, aggregate *Current Conditions* are marginally significant in only one specification. Here again, it seems quite reasonable the investors expect current conditions to matter over a 3-year horizon, but not a 10-20 year horizon. In contrast, the effects of the forward-looking variables (*Expected Conditions*, individual and consensus, and *Own Income Prospects*) have roughly the same coefficients as in the 3-year return regressions. Finally, we find little or no difference between equal-weighted and wealth-weighted results.

B. Determinants of perceived risk

As described earlier, we measure perceived risk from a respondent's assessment of the likelihood that market returns will fall outside the 4 percentage point band centered on their expectation for long-term (10 to 20 year) annual stock returns. We label this probability measure "*Uncertainty*", with higher values indicating higher perceived risk.[21] To gauge how perceived risk varies with perceptions of business conditions, we regress *Uncertainty* on the respondent's view of both *Current Conditions* (relative to 12 months ago) and *Expected Conditions*.[22]The regressions control for the potential influence of several demographic factors, including gender, self-reported years of investment experience, and level of education. We also consider time dummies that control for survey month.

[21]Throughout, we interpret investor responses to this survey question as primarily gauging perceived volatility of stock market returns. However, we recognize that replies may well conflate notions of uncertainty and risk, with some interpreting the question as a referendum on their forecasting ability, rather than a question about objective risk in the stocks. If so, higher numeric responses to this question could be indicative of overconfidence in the operational sense of Gervais and Odean (2001) or Ben-David, Graham, and Harvey (2010). The relative importance of these two interpretations presents a difficult and interesting question, which is left for future research.

[22] We use raw probability responses instead of imputed standard deviations on the left-hand side. This allows the analysis to be robust to other return distributions, since the relationship between a covariate and a raw probability response will have the same sign as that for an implied standard deviation from any underlying distribution.

As shown in the Column 1 of Table 5, the coefficient on *Expected conditions* is negative and statistically significant, implying that respondents that expect favorable economic conditions over the next few years are less uncertain about equity returns. On the other hand, *Current conditions* has no measurable statistical effect on *Uncertainty*, which is perhaps not surprising given that uncertainty is being measured with respect to10-year-ahead returns. Interestingly, the respondent's *Own Income Prospects* has a highly significant and large positive coefficient. On its face, this suggests that investors who feel more optimistic about their personal economic prospects also perceive stock market returns to be less risky. However, another quite plausible interpretation is that this regressor conveys quantitative information about prospects for economy-wide growth that the more qualitative *Expected Conditions* fails to pick up. In that case, it provides further evidence that expected risk in stock returns is countercyclical—it is higher when the likelihood of expected real income growth is lower.

In contrast with our findings for expected returns, *Uncertainty* is strongly influenced by demographic characteristics. Gender, the only such characteristic that mattered somewhat for expected return, has a large effect on perceived risk: the coefficient implies that, holding everything else constant, males tend to report a value for *Uncertainty* that is 10 percentage points lower than females. This result is consistent with Barber and Odean (2001), which finds that males hold riskier portfolios and tend to trade more often. The authors attribute these results to greater overconfidence among male investors in their trading abilities, pointing out that male overconfidence is a well-established finding in a substantial literature in psychology.[23] Our result is also consistent with the broader behavioral literature (e.g., Weber, Blais and Betz, 2002), which finds that women tend to report higher risk assessments than men in many different domains.

We also find that *Uncertainty* is negatively related to educational attainment as well as to self-reported years of investment experience, both of which are presumably indicators of financial markets knowledge. In other words, increased financial sophistication boosts the respondent's confidence in their own forecast, which induces a tighter subjective distribution for expected returns. Clearly, these results suggest that the dependent variable contains an important element of subjective uncertainty, which might be even more important than variation in perceived objective risk, the workhorse of conventional financial markets theory.

Revisiting the first result, the negative coefficient on *Expected Conditions* in our uncertainty regressions is consistent with the view that stock market risk is countercyclical. By itself, this result is easily reconcilable with equilibrium models where time varying stock returns are driven by a consumption CAPM framework with rational household investors (e.g., Bansal and Yaron (2004) or Constantinides and Duffie (1996)). However, it poses a conundrum when viewed in conjunction with our

[23] Barber and Odean (2001) rule out the possibility that the results are driven entirely by systematically lower risk aversion among men from the fact that the portfolio performance of men (that trade more) suffers as a consequence.

findings of procyclical expected stock returns in Tables 3 and 4. The implication is that expectations of economic expansion are associated with both high expected returns *and* low risk, while the prospect of poor economic conditions is associated with both lower expected returns *and* higher risk. Taken at face value, these results imply that forward-looking Sharpe ratios of household investors are procyclical. As a group, these investors do not expect stocks to compensate them for the higher risks that they pose when economic conditions are poor.

Indeed, we can construct estimates of household-level Sharpe ratios for the broad equity market using the implied standard deviation of returns backed out from *Uncertainty*, together with 3- or 10-year expected returns and Treasury bond yields of matching horizons. When these Sharpe ratios are regressed on our measures of expected economic conditions and other covariates (not shown), we find them to be positively related to respondents' expected economic conditions and unrelated to current conditions. While in a narrow sense these represent new findings, they seem to echo previous results on investor perceptions regarding (cross-sectional) stock selection. In particular, studies such as Shefrin and Statman (1995), or Statman, Fisher and Anginer (2008), document that investors tend to identify stocks that promise a higher expected return as the same stocks that are less risky, consistent with the so-called *affect* heuristic (Slovic et. al., 2002). According to our findings, this phenomenon also holds in comparisons over time: when the economy is expected to be bad, this appears to portend bad stock performance—in terms of *both* lower returns and higher risk.

The remaining columns in Table 5 document the robustness of the column (1) results to the inclusion of time dummies (survey fixed effects) and to over-weighting of wealthier respondents. As in the previous section, we estimate using weighted least-squares, with log (imputed) financial wealth as the regression weight (3), or we estimate using OLS on the wealthier half of the sample (4). Either way, we find no attenuation in any of the key findings; indeed, to the extent that results change, the coefficients tend to increase in magnitude. As a final robustness test of our *Uncertainty* regressions, we re-estimate (1) on a subsample that excludes households that gave the (most popular) response of 50 percent to the *Uncertainty* question. As noted earlier, some of those respondents may simply have been expressing lack of opinion, rather than a specific probability of 50 percent. If so, excluding such responses could strengthen the estimated relationships. Indeed, in column (5) the estimated coefficients on almost all of the variables increase in magnitude relative to (1); moreover, they retain statistical significance despite the drop in sample size.

6. Portfolio Holdings: Do investors' actions reflect beliefs?

The relevance of our inferences about investor beliefs hinges on whether those beliefs, as measured in our data, actually influence portfolio allocation decisions. This section tests for such a relationship using data on respondents' self-reported shares of equity in their financial portfolios. The most succinct test of the relevance of reported beliefs involves comparing (expected) Sharpe ratios across

respondents reporting different portfolio exposures to equities. Here, Sharpe ratios are measured using the respondents' expected 10-year returns on their own equity portfolios, less the 10-year Treasury bond yield in the survey month, divided by the implied standard deviation of returns on the broad market. As shown in Table 6, there is a monotonic upward progression in median and mean Sharpe ratios as we move from respondents in the lowest equity portfolio share bucket to those in the highest bucket. Moreover, differences in the median Sharpe ratios between households with low (< 25 percent), middle (25 to 50 percent), and high (> 75 percent) equity exposures are all highly statistically significant.

To test whether both components of the Sharpe ratio have explanatory power for portfolio holdings, we estimate a regression motivated by the classic portfolio choice model of Samuelson (1969). That model implies that the portfolio share invested in stocks should be proportional to the expected risk premium and inversely proportional to the product of expected variance and the coefficient of relative risk aversion: $share_i = (R_i^e - R^f) / \gamma_i \, E[Var_i(R)]$. Taking logs on both sides yields a linear specification[24]:

$$log\,(share_i) = \beta_0 + \beta_1 log\,(R_i^e - R^f) + \beta_2 log\,(E[Var_i(R)]) + \varepsilon_i\,, \qquad (1)$$

Because risk aversion is unobservable, its idiosyncratic component is in the regression error term, while the average level of (log) risk aversion is reflected in the constant. Taken literally, the theory would predict that $\beta_1 = 1$ and $\beta_2 = -1$. Age-group dummies control for life-cycle effects.

In estimating (1), a respondent's (equity) *share* is measured as the porfolio equity share bucket midpoint, while R^f is measured by the yield on the 10-year Treasury bond at the time of survey. Results from OLS regressions are reported in the bottom panel of Table 6.[25] The estimated coefficients on both expected returns and perceived risk are statistically significant and their signs are consistent with theory: equity portfolio shares are increasing with expected (excess) returns and decreasing with expected risk. To check if these results are robust to over-weighting of responses from wealthier individuals, column (2) presents estimates for wealth-weighted least-squares, as in Tables 4 and 5. Here, the coefficients on expected returns and expected risk remain practically unchanged.[26] While these results are statistically strong, the coefficients are quite small compared to the predictions of the theoretical model, making a literal interpretation of this exercise somewhat problematic. One plausible explanation for smaller coefficients is measurement error in our expectations variables (particularly perceived risk), which could result in attenuation bias that pushes both β's towards zero. In an attempt to address this concern, we examined an IV specification (not shown) in which expected volatility and excess returns are

[24] This formulation implies that causality runs from investor beliefs to portfolio choices. It is possible that those with higher equity holdings feel more optimistic about equity markets by virtue of rationalizing their portfolio decisions.

[25] Since our dependent variable is discrete and follows a clear ordinal ranking, we also estimated an ordered logit specification, which produced qualitatively similar results. As the OLS estimator is consistent and is easier to interpret, we focus on the least-squares results.

[26] The same results obtain for the subsample of investors with above-median wealth, not shown here for brevity.

instrumented by their respective ranks.[27] In this variant, the magnitude of the coefficient on instrumented volatility variable rises to -0.13, while that on expected excess returns is virtually unchanged. Another, more economic, rationale for the low portfolio sensitivity to expectations is a likely damping effect from inertia related to transaction costs or inattention. This interpretation is consistent with existing empirical evidence on very infrequent portfolio rebalancing (Ameriks and Zeldes, 2001).[28]

As a final check on the robustness of these results, in columns (3)-(4) we present results from estimating the portfolio share regression in a reduced-form linear specification, where portfolio share is regressed on expected excess return, $(R_i^e - R^f)$ and *Uncertainty*. Here again, the coefficients have the expected signs and are statistically significant. In sum, the analysis of portfolio allocations provide evidence that survey responses to questions about expected risk and return do reflect the actionable views of respondents, rather than idle speculation.

7. Conclusion

Using data from a Gallup/UBS survey of individual investors and from a supplement to the Michigan Survey of Consumer Attitudes, we examine the stock market beliefs of household investors. This is an important subset of market participants, not only by the sheer proportion of outstanding equities they hold, but also by their central role in all variations on the consumption CAPM model of asset pricing. We show that, over a period of about 10 years, the expectation for 12-month-ahead or 3-year ahead stock returns exhibits a strong negative correlation with both the dividend-price ratio and with the consumption-wealth ratio, or *cay*. This pattern contrasts sharply with inferences normally drawn from the traditional approach in the asset-pricing literature, where *realized* returns are used as a noisy proxy for expected returns.

Indeed, using more direct measures of economic conditions, we also find that household investors tend to report higher expected returns when the economy is stronger or, similarly, when respondents have a more optimistic assessment of macroeconomic conditions, either at the current time or prospectively. Again, this inference contrasts sharply with pattern of time-variation in expected returns that is normally inferred in the asset-pricing literature. Moreover, by exploiting the demographic information in the microdata, we establish that this pattern for expected returns is similar, and not at all attenuated, among wealthier household investors. On the other hand, we also find that perceived risk is lower when

[27] The assumption here is that the ranking of expected volatility is driven by the true measure of risk perception and not by the measurement error.

[28]The Samuelson portfolio model is limited in that it ignores other assets that may affect household equity allocation choices. Two asset classes that have received considerable attention in the literature are housing and proprietary business wealth (Heaton and Lucas, 2000; Davis and Willen, 2002; Yao and Zhang, 2005). Consequently, in an earlier version of the paper, we relate reported equity holdings to broader measures of wealth imputed from the SCF. One of these measures adds home equity to household financial wealth. The other measure further adds the value of proprietary business holdings, vehicles, and other real estate investments. The signs and statistical significance of the coefficients were unaffected, though their magnitudes decline.

favorable economic conditions are expected, which is largely consistent with previous empirical and theoretical modeling of the time-variation in return volatility. This result holds up even while we control for household investors' take on their own economic prospects as well as demographic factors that have quite a strong influence on perceptions of risk.

Together, these results imply that forward-looking Sharpe ratios are procyclical, in contradiction to the predictions of rational asset-pricing models. These results are robust to techniques that give greater weight to individuals with more investable assets. Perhaps even more importantly, we find that respondents' portfolio choices are consistent with their reported beliefs. In particular, we find that equity exposures tend to increase with self-reported expected returns and decline with perceived risk.

All told, these results suggest that at least part of the *realized* time-varying equity risk premium is due to variations in beliefs about the economy and prospective returns. Household investors tend to associate a favorable macroeconomic outlook with high and less volatile stock returns. They act on these expectations by shifting assets into equities and driving up equity prices, which also pushes down the dividend yield and the consumption-wealth ratio. At such times, household investors must on average have unduly optimistic expectations; and the resultant boost to stock valuations produces the preconditions for lower-than-average returns going forward. In the dichotomy that characterizes much of the literature, this would be classified as a "behavioral" explanation. Alternatively, as argued by Kurz and Motolese (2007), in a non-stationary economy, a wide range of beliefs cannot be ruled out by historical data in real time and thus are not irrational per se. In such a world, beliefs themselves become an important state variable.

A possible rejoinder to this conclusion is that professional investors are likely to have a more informed model of the economy and stock returns; therefore, they could take positions that counter the influence of household investors. While this is possible, it is not clear that rational investors as a group would or could entirely offset the influence of investment choices driven by household investors' beliefs. They might be constrained by limited capital or limited investment horizons (De Long, Schleifer, Summers and Waldmann, 1990), or they might see greater profitability in trying to "ride the bubble" (Brunnermeier and Nagel, 2004, Nofsinger and Sias, 1999). Moreover, studies such Barber, Odean and Zhu (2009) have already shown that trading propensities of retail investors do indeed influence subsequent returns, particularly for small-cap stocks. In any case, our findings should provide some discouragement for efforts at modeling time-varying expected returns as the outcome of a fully rational consumption-CAPM framework.

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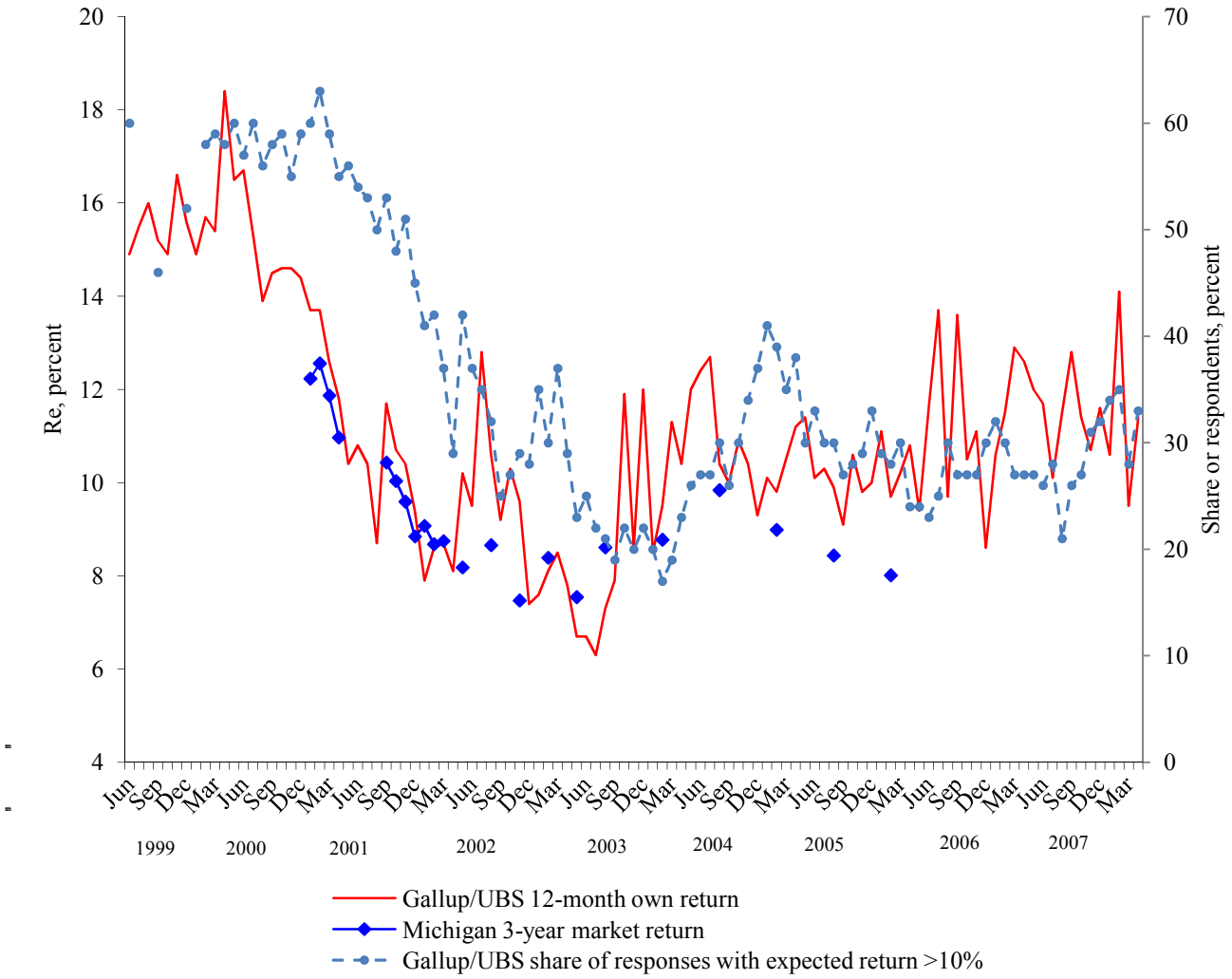
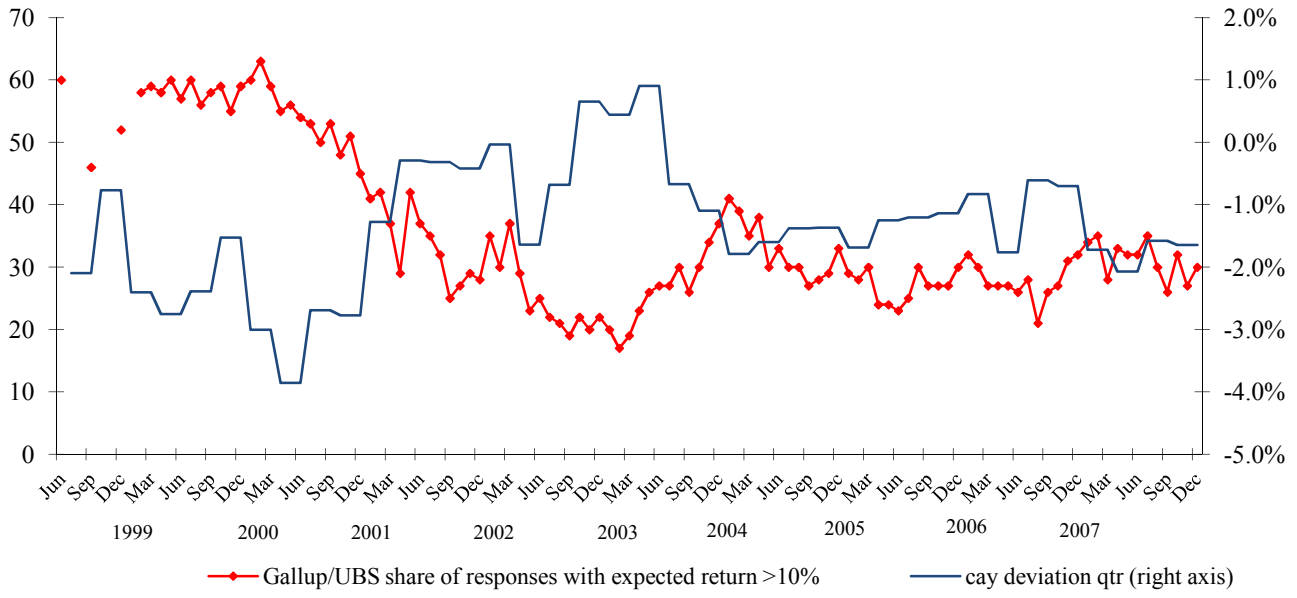
Figure 1
Measures of Expected Near-term Stock Market Performance
Michigan and Gallup Survey Means



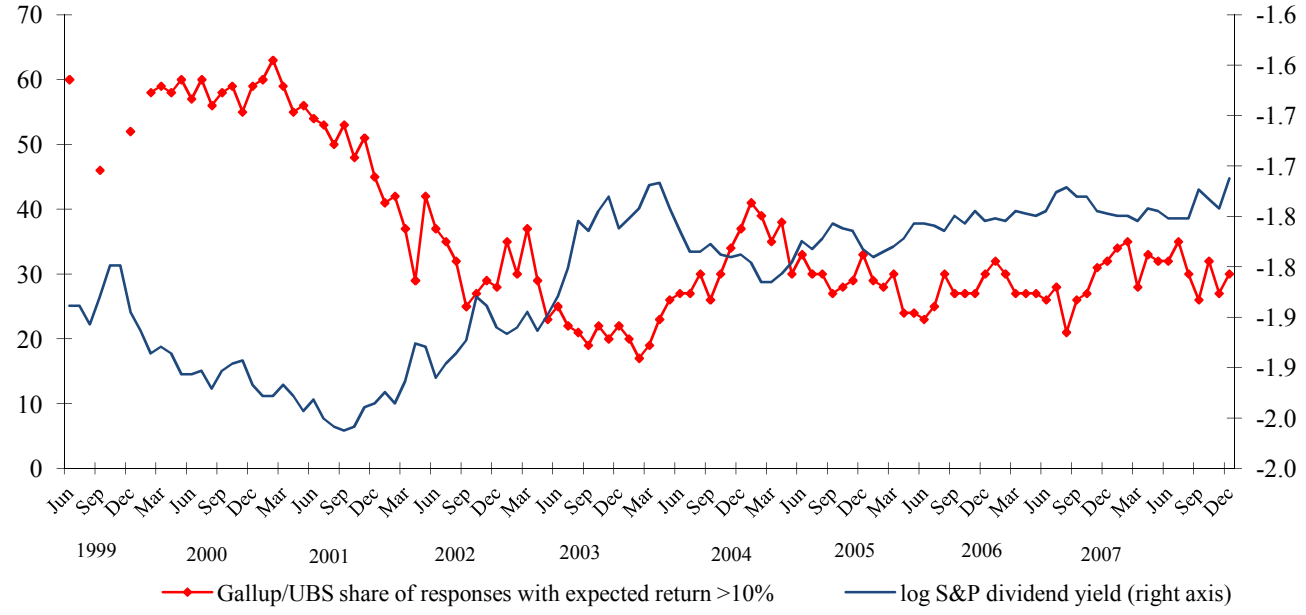
The solid line depicts mean response values for 12-month expected returns on own equity portfolio holdings, as collected by monthly surveys jointly sponsored by the Gallup Organization and UBS. The dashed line presens the monthly shares Gallup?UBS respondents who report 12-month expected returns in excess of 10 percent. The series on expected 3-year market returns are survey-specific means of the Michigan survey respondents.

Figure 2
Survey Expected Returns and Conventional Macro Conditioning Variables

Panel A. *cay* and survey expected returns

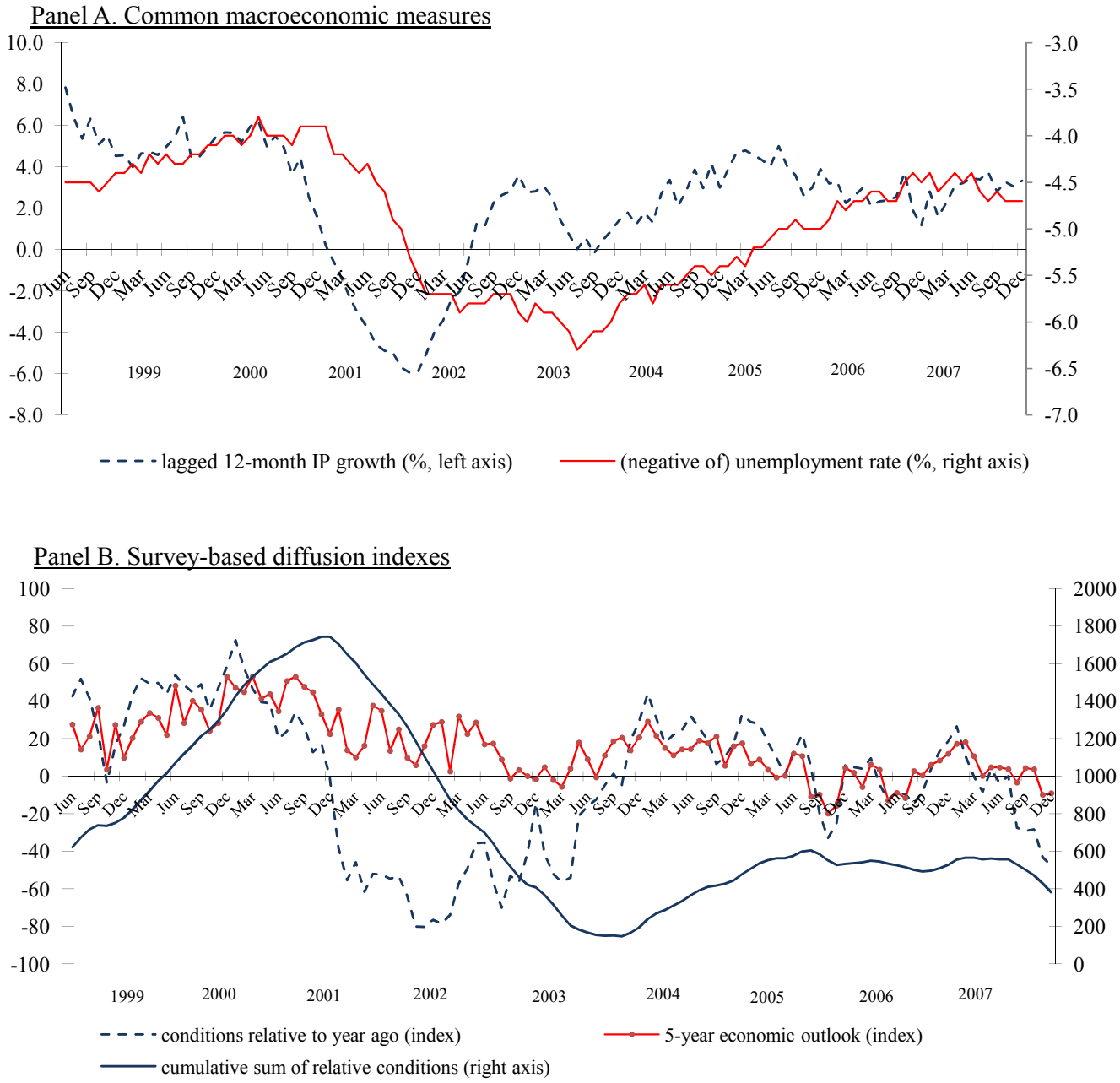


Panel B. Dividend yield and survey expected returns



The means of 12-month expected own equity portfolio returns from UBS/Gallup surveys are plotted against the trend deviation of *cay* series (panel A) and the log dividend yield series (panel B). The *cay* series are constructed as in Lettau and Ludvigson (2001) and updated to cover the period through Q4, 2007.

Figure 3
Alternative Measures of Economic Conditions



The top panel shows time series of two common measures of the business cycle: lagged growth in industrial production (dashed line) and the (negative of the) unemployment rate (solid line). Asset-pricing theory suggests that each of these series should be negatively correlated with expected equity returns. The bottom panel presents time series of several Michigan survey-based measures of the business cycle. The dashed line depicts respondents' assessment of current conditions relative to those a year ago. This assessment is measured as a diffusion index, whose value is equal to the percentage that respond "better" less the percentage that respond "worse". The solid line depicts the cumulative sum of this index, starting in January 1978 when Michigan data became available. The final series on this panel is the diffusion index of responses to the five-year outlook of business conditions, described more fully in text. All of these series are constructed on the basis of responses from college-educated households -- the group with high stock market participation rate that accounts for the majority of equity market exposure.

Table 1. Time Series of Gallup/UBS Survey Expected Returns and Business Cycle Indicators

Panel A shows regressions of expected return (survey average) on lagged values of the consumption-wealth ratio *cay* and the dividend-price ratio *d/p*. Expected real return is computed by subtracting 12-month expected inflation from Michigan survey. Excess return is computed by subtractiving the one-year Treasury bond. yield. Statistical significance of estimated coefficients is unaffected by incorporating Newey-West adjustments for serial correlation (not shown). Panel B presents pairwise correlation coefficients between various indicators of macroeconomic conditions and perceptions of economic conditions as measured by Michigan survey, described in section 3.B. Correlations are computed using data back to 1978, when the Michigan survey first began. Panel C shows correlations between the Gallup/UBS expected return measures and the various indicators of economic conditions . In all panels, *** and ** denote statistical significance at the 1 and 5 percent levels, respectively.

Panel A. Regressions of Expected Returns on Conditioning Variables

June 1998 - December 2007

	Expected return					
	Survey mean	Survey mean	Survey mean	Real	Excess	Share expecting nominal returns > 10%
Log consumption-wealth ratio (*cay*)	-1.746***		-1.399***	-0.956***	-0.511**	-4.836***
	(0.165)		(0.184)	(0.191)	(0.202)	(0.610)
Log dividend yield (*d/p*)		-0.194***	-0.093***	-0.141***	-0.055*	-0.967***
		(0.028)	(0.027)	(0.028)	(0.028)	(0.087)
Constant	0.090***	-0.238***	-0.074	-0.185***	-0.031	-1.466***
	(0.003)	(0.050)	(0.046)	(0.049)	(0.050)	(0.152)
N (obs.)	109	110	109	109	109	109
Measure of fit (adj-R^2)	0.497	0.312	0.548	0.495	0.165	0.746

Panel B. Correlations Among Indicators of Economic Conditions

(Jan 1978-December 2007)

	Inverse of Unemployment rate	Past 12-month IP growth	Current conditions (relative)	Current conditions (level)	Expected conditions
(−) Unemployment rate	1				
Past 12-month IP growth	0.27***	1			
Current conditions (relative)	0.17***	0.71***	1		
Current conditions (level)	0.90***	0.06	0.03	1	
Expected conditions	0.42***	0.32***	0.63***	0.44***	1

Panel C. Correlations between Gallup/UBS Expected Returns and Indicators of Economic Conditions

(June 1998-December 2007)

	Inverse of Unemployment rate	Past 12-month IP growth	Current conditions (relative)	Current conditions (level)	Expected conditions
Expected return (nominal)	0.66***	0.50***	0.72***	0.47***	0.61***
Expected return (Real)	0.56***	0.37***	0.65***	0.47***	0.68***
Share expecting nominal returns > 10%	0.67***	0.40***	0.66***	0.65***	0.76***

Table 2. Summary Statistics on Supplemental Survey Questions

These tables summarize the basic data on investor stock market expectations and portfolio choices obtained from a series of special supplements to the Surveys of Consumer Sentiment between September 2000 and October 2005. The top panel reports the distribution of investor expectations of average returns on their own stock portfolio and on the aggregate market over different horizons. The middle panel reports statistics on the assessed likelihood that returns fall in various ranges, or gauges of expected risk. The bottom panel describes self-reported portfolio allocations and stock holdings of survey respondents. Note that portfolio allocation question did not appear on the first six surveys. All tables exclude observations that fail the data quality filter as described in text.

Panel A. Expected returns

	N	Mean	2nd pct	10th pct	Median	90th pct	98th pct
Market, 3-years	3,221	9.1	2	4	8	15	25
Market, 10-years	3,221	10.6	3	5	10	17	30
Own stock portfolio, 10-years	3,221	10.1	3	5	10	16	25

All reported returns are annual averages over the stated investment horizon.

Panel B. Perceived Risk in 10-year Market Returns

	N	Mean	10th pct	25th pct	Median	75th pct	90th pct
Prob $\lvert R - R^e \rvert > 2\%$	3,189	43.7	20	25	50	50	80
Implied $\sigma_{10\text{-}20}$ (in percent)	3,189	5.52	1.56	1.73	2.96	2.96	7.88

Uncertainty is defined as the reported likelihood that realized returns will fall outside the four percentage point band centered on respondent's expected long-term market return. From this measure we impute a standard deviation of mean returns ($\sigma_{10\text{-}20}$) assuming asymptotic normality: $\sigma_{10\text{-}20} = -0.02 / \Phi^{-1}(0.5*\textit{Uncertainty})$.

Panel C. Stock Holdings and Portfolio Shares

			fraction of respondents with stock shares of				
	N	Mean share	< 10%	10%−25%	25%−50%	50%−75%	> 75%
Share in equities	2,468	37%	0.19	0.27	0.23	0.20	0.12

	N	Mean	10th pct	25th pct	Median	75th pct	90th pct
Stock holdings	3,220	204,977	10,000	25,000	75,000	200,000	450,000

	min	1st pct	99th pct	99.9th pct	max
Stock holdings - extreme percentiles	5,000	5,000	2,000,000	10,000,000	14,000,000

Mean portfolio share is computed assuming mean observation within each range equals the midpoint of that range.

Table 3. Expectations of Medium-Term Stock Market Returns

The dependent variable is the respondents' expected annual stock market returns over the next 2-3 years. Regressors include respondent assessment of current conditions relative to a year ago (better=1, same=0, worse=−1) and their perceptions of macroeconomic conditions *during* the next 5 years (good=1, neutral=0, poor=−1). Specifications (3)-(5) also include an aggregate measure of the current "level" of economic conditions, constructed by cumulating monthly survey-level diffusion index of relative conditions. Contorl variables also include investor's gender and assessment of own income prospects, as well as past realized returns over a horizon corresponding to investor's years of stock market experience. The past returns are assigned linearly declining weights, following Malmendier and Nagel (2010). Column (4) shows results of weighted least squares regressions where the weights are equal to the log of imputed financial wealth. Column (5) reports regression estimated on subsample limited to the half of respondents in each survey with above-median imputed financial wealth. Regression samples exclude observations with outlier values of the dependent variable (above the 98th percentile). All specifications are estimated using OLS with standard errors adjusted for heteroskedasticity and clustered at the survey level. ***, **, and * denote statistical significance at 1, 5, and 10 percent levels, respectively. Education category dummies are included in each regression, but their coefficient estimates are suppressed for brevity.

	OLS full sample	OLS full sample	OLS full sample	Wealth weighted	Above-median wealth
Regressors	(1)	(2)	(3)	(4)	(5)
Current conditions, relative		0.146	0.216**	0.243**	0.402**
		(0.123)	(0.102)	(0.110)	(0.180)
Current conditions, level (aggregate)			0.385*	0.433**	0.605***
			(0.191)	(0.185)	(0.185)
Expected business conditions		0.496***	0.392***	0.396***	0.501***
		(0.082)	(0.076)	(0.081)	(0.152)
Expected business conditions (aggregate)			2.214**	2.062**	2.048*
			(0.821)	(0.819)	(1.024)
Past market returns, experience-weighted	0.098***	0.095***	0.050***	0.049***	0.039
	(0.022)	(0.020)	(0.015)	(0.015)	(0.024)
Gender (1=male)	0.526***	0.249	0.283	0.310*	0.412
	(0.160)	(0.169)	(0.169)	(0.174)	(0.245)
Own income prospects		1.105***	0.806**	0.909**	0.974***
		(0.364)	(0.326)	(0.322)	(0.310)
Constant	7.279***	7.070***	7.315***	7.249***	7.024***
	(0.249)	(0.311)	(0.285)	(0.258)	(0.467)
N (obs.)	2,962	2,855	2,855	2,784	1,361
Measure of fit (adj-R^2)	0.035	0.061	0.078	0.083	0.125

Table 4. Expectations of Long-Term Stock Market Returns

The dependent variable is the respondents' expected annual stock market returns over the next 10-20 years. Regressors include respondent assessment of current conditions relative to a year ago (better=1, same=0, worse=−1) and their perceptions of macroeconomic conditions *during* the next 5 years (good=1, neutral=0, poor=−1). Specifications (3)-(5) also include an aggregate measure of the current "level" of economic conditions, constructed by cumulating monthly survey-level diffusion index of relative conditions. Contorl variables also include investor's gender and assessment of own income prospects, as well as past realized returns over a horizon corresponding to investor's years of stock market experience. The past returns are assigned linearly declining weights, following Malmendier and Nagel (2010). Column (4) shows results of weighted least squares regressions where the weights are equal to the log of imputed financial wealth. Column (5) reports regression estimated on subsample limited to the half of respondents in each survey with above-median imputed financial wealth. Regression samples exclude observations with outlier values of the dependent variable (above the 98th percentile). All specifications are estimated using OLS with standard errors adjusted for heteroskedasticity and clustered at the survey level. ***, **, and * denote statistical significance at 1, 5, and 10 percent levels, respectively. Education category dummies are included in each regression, but their coefficient estimates are suppressed for brevity.

	OLS	OLS	OLS	Wealth-	Above-median
	full sample	full sample	full sample	weighted	wealth
Regressors	(1)	(2)	(3)	(4)	(5)
Current conditions, relative		0.014	0.048	0.030	0.090
		(0.125)	(0.121)	(0.114)	(0.138)
Current conditions, level (aggregate)			0.090	0.139	0.482*
			(0.170)	(0.176)	(0.236)
Expected business conditions		0.433***	0.355***	0.355***	0.306*
		(0.115)	(0.106)	(0.112)	(0.153)
Expected business conditions (aggregate)			2.310**	2.292**	1.931**
			(0.914)	(0.924)	(0.897)
Past market returns, experience-weighted	0.053**	0.053***	0.027*	0.024	-0.004
	(0.021)	(0.018)	(0.015)	(0.016)	(0.032)
Gender (1=male)	-0.127	-0.344	-0.313	-0.330	-0.345
	(0.202)	(0.207)	(0.204)	(0.217)	(0.299)
Own income prospects		1.170***	0.987***	1.104***	1.110**
		(0.323)	(0.303)	(0.330)	(0.421)
Constant	9.759***	9.437***	9.418***	9.445***	9.939***
	(0.315)	(0.334)	(0.366)	(0.329)	(0.534)
N (obs.)	2987	2879	2879	2808	1371
Measure of fit (adj-R^2)	0.007	0.022	0.028	0.031	0.043

Table 5. Perceived Risk in 10-year Market Returns

This table reports regressions of investor's anticipated risk in long-term stock returns on their perceptions of macroeconomic conditions and a vector of demographic characteristics. The dependent variable, *Uncertainty* is defined as the likelihood that realized future returns will be outside the four-percentage point band centered on their reported expected return. Column (3) shows weighted least squares regression where weights are equal to the log of imputed financial wealth. Estimation in column (5) is restricted to a subsample that excludes those reporting *Uncertainty* values of 50 percent. The regressions are estimated on available monthly Michigan surveys (between September 2000 and October 2005), exlcuding observations where response was 0 or 100 percent. Specifications (1),(2), (4) and (5) are estimated using OLS, with standard errors (reported in parentheses) clustered at the survey level and adjusted for heteroskedasticity. ***, **, and * denote statistical significance at 1, 5, and 10 percent levels, respectively.

Regressors	full sample (1)	full sample (2)	Wealth weighted (3)	above-median wealth (4)	Excluding 50% responses (5)
Current conditions, relative	0.757	0.243	0.725	0.429	1.115
	(0.508)	(0.590)	(0.499)	(0.654)	(0.742)
Expected conditions	-1.813***	-1.802***	-1.836***	-2.045***	-2.707***
	(0.428)	(0.417)	(0.470)	(0.612)	(0.641)
Years of invstmt experience (log)	-1.281***	-1.213***	-1.212***	-1.128	-1.737***
	(0.388)	(0.401)	(0.413)	(0.804)	(0.580)
Gender (1=male)	-10.679***	-10.280***	-10.367***	-9.744***	-14.353***
	(1.472)	(1.436)	(1.459)	(1.675)	(2.340)
Own income prospects	-4.046***	-3.903***	-4.040***	-3.778***	-5.730***
	(0.728)	(0.756)	(0.765)	(1.160)	(1.073)
Education (some college)	-2.791**	-2.603*	-3.069**	-7.816***	-3.912*
	(1.276)	(1.315)	(1.340)	(2.714)	(2.060)
Education (college)	-6.675***	-6.562***	-7.138***	-11.185***	-9.503***
	(1.181)	(1.197)	(1.194)	(2.832)	(1.772)
Education (graduate)	-6.895***	-6.968***	-7.632***	-12.180***	-10.188***
	(1.088)	(1.094)	(1.087)	(2.383)	(1.706)
Constant		62.349***	61.199***	64.740***	65.552***
		(1.662)	(1.835)	(3.451)	(2.893)
Survey fixed effects	No	Yes	No	No	No
N (obs.)	2,898	2,898	2,827	1,394	1,912
Measure of fit (R^2)	0.075	0.080	0.076	0.077	0.102

Table 6. Investor Expectations and Portfolio Choice

Panel A shows the mean and median investor-level 10-year Sharpe ratios for respondents grouped by their reported portfolio equity exposures. p-values are associated with tests of differences in median Sharpe ratios relative to the middle group (with equity exposure between 25 and 50 percent). The bottom panel reports regressions of respondents' portfolio equity shares on their expectations of long-run stock returns and volatility. Regressions (1) and (2) used a log-log specification of Samuelson (1969) optimal portfolio allocation rule as described in text, with σ imputed from *Uncertainty*. Regressions (3) and (4) uses ad hoc specification relating reported equity portfolio shares with expected market returns and *Uncertainty*. Regressions (2) and (4) check the robustness of results to assigning greater weight to wealthier respondents identified on the basis of imputed financial wealth, as described in text. By construction, regressions (1)-(2) are restricted to households with positive expected *excess* returns. Standard errors clustered at the survey level and adjusted for heteroskedasticity are reported in parentheses. ***, **, and * denote statistical significance at 1, 5, and 10 percent levels, respectively. Age range dummies (not reported for brevity) are jointly significant in all specifications.

Panel A. Forward-looking Sharpe ratios by portfolio exposure to equity

		forward-looking Sharpe Ratios		*p* -value
Share invested in equities	N	Mean	Median	(H_0: SR≠SR_{25-50})
Less than 10 percent	429	0.462	0.308	(0.000)
Between 10 and 25 percent	612	0.531	0.401	(0.003)
Between 25 and 50 percent	502	0.614	0.506	
Between 50 and 75 percent	445	0.644	0.521	(0.691)
More than 75 percent	260	0.697	0.604	(0.017)

Panel B. Regressions of portfolio composition on expected risk and return measures

Dependent variable:	log portfolio fraction in stocks		portfolio fraction of stocks	
	baseline	weighted by financial welath	baseline	weighted by financial wealth
Regressors	(1)	(2)	(3)	(4)
Log expected excess returns	0.043***	0.050***		
	(0.013)	(0.013)		
Log expected volatility (σ_i^2)	-0.101***	-0.099***		
	(0.013)	(0.014)		
Expected excess returns (in pct)			0.305**	0.332**
			(0.124)	(0.133)
Uncertainty (in pct)			-0.231***	-0.225***
			(0.026)	(0.027)
Constant	-1.991***	-1.963***	0.438***	0.432***
	(0.125)	(0.125)	(0.019)	(0.019)
N (obs.)	2,044	2,044	2,243	2,243
Measure of fit (adj-R^2)	0.031	0.031	0.035	0.034

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