

# Expectations of risk and return among household investors: Are their Sharpe ratios countercyclical?

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## Abstract

Data obtained from special questions on the Michigan Survey of Consumer Attitudes are used to analyze stock market beliefs and portfolio choices of household investors. We find that expected risk and return are strongly influenced by economic prospects. When investors believe macroeconomic conditions are more expansionary, they tend to expect both higher returns *and* lower volatility. This implies that household Sharpe ratios are procyclical, which is inconsistent with the view that stock market returns should compensate investors for exposure to macroeconomic risks. The finding of procyclical expected returns holds up when we instead condition on conventional business cycle proxies such as the dividend yield and the consumption-wealth ratio. We further find that perceived risk in equity returns (though not the expected returns themselves) is strongly influenced by household investor characteristics, consistent with documented behavioral biases. The relevance of investor expectations is supported by the finding that the proportion of equity holdings in respondent portfolios tends to be higher for those who report higher expected returns and lower uncertainty.

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## 1. Introduction

A growing body of research seeks to explain the apparent predictability of stock returns by tying systematic variation in returns to the business cycle. As summarized by Cochrane (2001, pg. 466), “most solutions introduce something like a ‘recession’ state variable [that] makes stocks more feared than pure wealth bets” because stocks do poorly at particularly inopportune times. Two popular elaborations of this asset-pricing paradigm are that the equity risk premium is higher in the recession state because effective risk aversion is unusually high – as in models with a slow-moving habit stock (Campbell and Cochrane, 1999) – or because individual household income risk is unusually high (Constantinides and Duffie, 1996).

Traditionally, empirical research on this question has explored the interaction between expected stock returns and macroeconomic conditions using realized returns and proxies for macroeconomic expectations. However, additional progress may require a more direct approach, which focuses on the measured expectations and actions of household investors, the agents presumably at the center of models with time-varying expected returns. This research strategy is employed, for instance, by Brunnermeier and Nagel (forthcoming), who evaluate the plausibility of time-varying risk aversion by analyzing the response of household portfolio allocations to fluctuations in wealth.<sup>1</sup> More generally, as emphasized in John Campbell’s AFA Presidential address (2006), the increasing participation in asset markets by individual investors makes it imperative to better understand the effects of their financial choices on asset prices.<sup>2</sup>

In this paper, we employ time-series and cross-sectional data from surveys of household investors to examine how these investors’ expectations of risk and returns on stocks are influenced by macroeconomic conditions. The survey data are drawn from two sources: (i) the UBS/Gallup poll of mutual fund investors, which provides a monthly snapshot of household

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<sup>1</sup> Other papers that study whether consumption or investment choices over time are consistent with habit-formation include Dynan (2000), Lupton (2003), and Ravina (2005).

<sup>2</sup> According to the 2004 Survey of Consumer Finances, U.S. households owned about \$9.6 trillion in equities, of which about \$3.8 trillion was held in household-directed pension accounts. The overall capitalization of the U.S. equity markets at the end of 2004 stood at \$16.3 trillion (World Bank, 2007).

stock market expectations from 1998-2007, and (ii) a special supplement to the Michigan Survey of Consumer Attitudes, included in twenty-two monthly surveys from 2000-2005. To our knowledge, the Michigan supplement is the first survey to provide household-level information on portfolio allocations along with expectations of both risk and returns on stocks. Since the Michigan survey also measures respondents' perceptions about current and future economic conditions, we can also gauge business cycle influences on expectations of stock market risk and return and, in turn, on household demand for equities.

We begin by examining the time series of the average household investor's expected return on stocks from the UBS/Gallup survey. We correlate these expectations with some key macro variables from the large literature on the predictability of equity returns – the aggregate dividend yield and the log consumption-wealth ratio (*CAY*). In that literature, both of these measures are found to explain a substantial amount of variation in future returns, with positive coefficients. As for interpretation, Lettau and Ludvigson (2001, p. 817), argue that *CAY* predicts asset returns because “when excess returns are expected to be higher, forward-looking investors will react by ... allowing consumption to rise above its common trend” with current asset wealth. In stark contrast, we document a strong *negative* effect of *CAY* (and of the dividend yield) on reported expectations of future returns. This result begs the question: how do household investors' perceptions of the macroeconomy affect their forecasts of market returns?

To tackle this question, we employ the household-level Michigan survey data. Although the data spans a period of only five years, it encompasses several significant events – the bursting of the Internet stock bubble, the terrorist attacks of September 2001, the spate of corporate scandals in 2002, the start of the Iraq war, and hurricane Katrina – which caused substantial swings in respondents' economic outlook. The fluctuations in average reported expectations are complemented by substantial cross-sectional heterogeneity in views, which together provide ample sources of variation for identification.

The Michigan survey supplement also contains a question that allows us to derive a measure of household perceptions of the risk in equity investments. We examine how investor

uncertainty regarding prospective equity returns is related to perceived macroeconomic conditions, while controlling for household demographic characteristics. This measure of risk is also used in our final exercise that tests whether self-reported portfolio shares allocated to equities vary systematically with expectations of stock market risk and return. This test provides a check on the relevance of respondents' reported beliefs to their own actions.

Similar to the time-series results from the UBS/Gallup data, the findings from the Michigan data provide a very different picture than the extant literature on time-varying expected returns. In particular, we find that when investors have a more favorable assessment of short- or medium-term macroeconomic conditions, they tend to expect higher returns. This does not appear to reflect an anticipated-news effect that could arise from cross-sectional disagreement among respondents. On the contrary, the consensus (monthly average) assessment of economic conditions has an even stronger positive effect on an investor's forecast of stock market returns.

Furthermore, the expectation of more favorable economic conditions is found to have a strong negative effect on the expected risk in equities. Taken together, these results suggest that, for most household investors, forward-looking Sharpe ratios are *higher* when the economy is expected to be strong – a finding that appears to fly in the face of the conventional view that stock returns should compensate investors for exposure to macroeconomic risks. Finally, we provide evidence that reported expectations influence households' actions by documenting that portfolio equity positions are significantly higher for those respondents who anticipate higher returns and lower uncertainty.

Taken as a whole, these findings lend support to a behavioral explanation for time-varying expected returns. In particular, while not necessarily ruling out time-varying risk aversion as a contributing factor, the results suggest that equity valuations are low during recessions – and the subsequent returns are high – because at such times household investors become unduly pessimistic about future returns. The converse occurs during an economic boom.

The rest of the paper is structured as follows. Section 2 summarizes some of the related research. Section 3 documents the relationship between the time series data on expectations

from the UBS/Gallup survey and the key conditioning variables from the literature on stock return predictability. Section 4 describes the Michigan survey instrument and data construction. Sections 5 and 6 focus on time-series and cross-sectional determinants of investors' expectation of risk and returns in the equity market, while section 7 analyzes the relationship between investors' reported beliefs and their portfolios. Section 8 concludes.

## **2. Previous Research**

Our findings add to a growing body of research on the determinants of investor expectations of prospective stock market returns and their asset-pricing implications. Fisher and Statman (2002) and Vissing-Jorgensen (2003) both analyze the first few years of data from the same UBS/Gallup survey of mutual fund investors. These studies find that respondents tend to forecast continuation of recent performance. Vissing-Jorgensen also documents that expected returns reported by wealthier respondents follow the same time-pattern as the expectations of less wealthy respondents, even though the former group's average expectations were consistently somewhat lower during the period under study (1998-2003).

Dominitz and Manski (2004, 2005) use data from the Michigan Survey of Consumer Attitudes to examine determinants of expected stock market performance, measured as 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. With this measure, they document a positive correlation between expected market returns and expected business conditions over the next year.<sup>3</sup> Their findings also suggest that many investors expect persistence in stock market performance. Finally, they report substantial cross-sectional heterogeneity in respondent beliefs that is systematically related to demographic characteristics such as gender and education.

Graham and Harvey (2003) and Ben-David, Graham, and Harvey (2007) analyze CFO responses to survey questions regarding the level of expected excess returns and the expected

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<sup>3</sup> The analysis in Dominitz and Manski (2004) is based on the twelve Michigan surveys fielded between June 2002 and May 2003.

volatility of returns, at both the one- and ten-year horizons. The first study finds evidence that CFOs extrapolate from the recent level of excess returns in making their one-year forecasts, but their longer-term return forecasts appear close to time-invariant. On the other hand, in the longer-term forecasts of CFOs, expected returns and expected volatility appear to be positively correlated but no consistent relationship is apparent in their shorter-term forecasts. The second study analyzes the determinants of CFOs' perceptions of market return risk in greater detail. It documents a strong correlation between the tightness of the CFO's imputed confidence interval for returns ("overconfidence") and the aggressiveness of corporate policies at their firms.

A few studies have explored the relationship between *actual* stock returns and the Index of Consumer Confidence (ICC), the composite measure of consumer sentiment built from Michigan survey data. Using the ICC as a measure of aggregate household investor sentiment, Qiu and Welch (2006) find that changes in the ICC play a robust role in explaining abnormal returns on small-decile stocks. They emphasize their finding that the index appears to dominate the closed-end fund discount, a more widely-used gauge of investor sentiment. Lemmon and Portniaguina (2006) decompose the ICC into a component related (via linear projection) to macroeconomic "fundamentals" and a residual component they interpret as a purer measure of "sentiment". They find that the *residual* component, as well as the fundamental component, predicts significantly negative abnormal returns for small-cap stocks, or stocks with low institutional ownership.<sup>4</sup>

In these latter two studies, the fundamental reason "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. We take the opposite tack:

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<sup>4</sup> 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), and also helps to explain valuation errors from a popular valuation model.

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 influence household investor portfolio holdings. To address the question of whether the investors we analyze are sub-marginal, we give extra attention to those households whose resources afford them greater weight in determining equilibrium prices.

### **3. UBS/Gallup Survey Expectations, Dividend Yield, and the Consumption-Wealth Ratio**

Our analysis begins with an examination of the time series characteristics of investors' expected equity returns as reported in the UBS/Gallup survey.<sup>5</sup> The survey is conducted on a nationally representative sample of individual investors that have at least \$10,000 in mutual fund holdings. The survey is undertaken monthly, with each wave consisting of interviews with roughly 1,000 respondents. Monthly summary statistics are available beginning in June 1998. Among other things, the survey asks investors for expected 12-month returns on (i) their own investment portfolios and (ii) on the overall stock market. Figure 1 depicts the time series of mean responses to these questions. The two series largely move in lock-step (correlation=0.97), though expected own-portfolio returns are nearly always a bit higher than expected market returns. Also shown in Figure 1 (by the dots) are the monthly means of the expected 3-year annual rate of return from the Michigan survey, which we will analyze in the sections to follow. For overlapping survey months, the correlation with UBS/Gallup series exceeds 0.85.

While covering only a decade, the UBS/Gallup survey provides the longest available time series on stock market returns expected by a representative sample of individual investors. We correlate these expectations with measures of macroeconomic conditions from the large literature on return predictability. Two of the most important conditioning variables in this literature are the log dividend yield and *CAY*, the log of the consumption-wealth ratio. Historically, the dividend yield has received most attention, although the robustness of its predictive power has

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<sup>5</sup> The survey is described in detail in Vissing-Jorgensen (2003), which is the first study to utilize the individual data collected by UBS/Gallup.

been the subject of some debate (Stambaugh, 1999)<sup>6</sup>. *CAY*, on the other hand, was introduced relatively recently by Lettau and Ludvigson (2001); its predictive power is relatively large and its statistical significance is unambiguous. Both of these variables are *positive* predictors of actual quarterly, annual and long-horizon stock returns; thus, they are normally interpreted as indicators of (rational) countercyclical variation in expected returns.

Figure 2 shows that, on the contrary, the survey-based expected returns are strongly negatively correlated with both *CAY* (panel A) and the S&P 500 log dividend yield (panel B) over the sample period at hand. This suggests that conditional expected returns inferred from regressions of *realized* returns on the dividend yield or *CAY* are extremely poor – in fact, contrary – measures of household investor expected returns. One might be tempted to discount this finding with the argument that these expectations might not be representative of the views from households that matter – those with a substantial stake in the market. However, with data from the first half of the UBS/Gallup sample, Vissing-Jorgensen (2003) finds that the time series behavior of expected returns is practically identical for the subset of households with more than \$100,000 in financial assets. Below, we corroborate this with the Michigan survey data.<sup>7</sup>

Another potential rationalization for the contradiction is the limited and very recent sample period. To check this, using overlapping quarterly observations, we estimate simple annual return (prediction) regressions on the dividend yield and *CAY* in the 1998-2007 sample.

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<sup>6</sup> The statistical significance of the dividend yield is not entirely robust to sample period in that literature, but Boudoukh, et al. (2007) find that this owes to the rising importance of stock repurchases as a payout tool between 1984 and the mid-1990s.

<sup>7</sup> It should be noted that this contradiction may come as little surprise to many researchers. A decade ago, Elton (1999) argued that the “logical explanation for [a large body of] anomalous results in the asset pricing literature is that realized returns are a very poor measure of expected returns and information surprises [are correlated with conditioning] factors”. Fama and French (2002) also suggest that time-variation in expected returns works against the convergence of average *realized* return to *expected* return. Recently, the resulting complexities have been formally modeled by Pastor and Stambaugh (2007). Also, a variety of approaches for estimating expected returns that do not use actual returns or investor surveys have been considered. These approaches rely on ex ante forecasts of fundamentals, which, in conjunction with the *level* of stock prices or dividend yields, are used to construct ex ante estimates of expected long-run returns. Claus and Thomas (2001) and Gebhardt, Lee and Swaminathan (2001) use analysts’ earnings forecasts, whereas Fama and French (2002) use macroeconomic forecasts of earnings and dividends. Other examples include Welch (2000); Brav, Lehavy, and Michaely (2005), and Campello, et.al. (2004).

The univariate regressions yield significantly positive coefficients on the dividend yield (0.63), and on CAY (5.01), similar to that found in longer samples.<sup>8</sup>

This exploration thus leaves us with the impression that there needs to be some reconciliation between inferences drawn from directly observed expectations and those based on realized market outcomes. Unless one were to dismiss household investors' views and actions as inconsequential for asset pricing, this contradiction underlines the importance of developing a better understanding of how household expectations of risk and return on stocks are related to their assessments of the economy. To do so, we turn to the micro-level data from the Michigan Survey of Consumer Attitudes.

#### **4. Michigan Survey Data and Variable Construction**

##### **A. Survey description**

Our 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 macroeconomic conditions, such as the Index of Consumer Sentiment. A special supplement with questions pertaining to respondents' views about the stock market was added to 22 of the surveys conducted between September, 2000 and October, 2005.<sup>9</sup> These questions were asked only of those households that reported having at least \$5,000 in stock or stock mutual fund holdings. Between 35 and 45 percent of the survey respondents in

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<sup>8</sup> When estimated on the post-war data, the coefficient on the dividend yield in such regressions is traditionally found to be around 0.33 (Campbell, Lo, MacKinlay, p.269), while the coefficient on CAY reported by Lettau and Ludvigson (2001) ranges between 4 and 5.

<sup>9</sup> 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 section evolved somewhat over this time.

any given month satisfied this selection criterion.<sup>10</sup> Among these households, which form the basis of our study, the median equity-owner held about \$75,000 in stocks and stock funds.

The first two pages of Appendix A detail the supplementary questions, which elicit the following information: (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 choices. Also shown are some key questions from the standard monthly Survey used by the SRC to gauge consumer attitudes. These questions ask for respondents' assessments of macroeconomic conditions and their own economic prospects. We also use basic demographic information collected by the survey on respondents' age, education, income, and family status.

We examined the issue of survey data quality and, as described in more detail in appendix B, we devised an *ex ante* filter to exclude observations likely to contain low quality responses. In sum, we excluded respondents that provided incomplete answers on market return expectations, which reduced the sample size from 4,012 to 3,340 observations. We further excluded respondents judged by the interviewer as having a low "level of understanding" or a relatively poor "attitude" toward the survey. Finally, we dropped those who responded "50 percent" to all three questions that solicited probability assessments. The latter two filters together eliminated 207 observations.

## **B. Measuring Expected Returns, Perceived Risk and Equity Holdings**

We measure expected stock market returns from responses to the question: "*looking forward, with next month as the starting point, what annual percentage rate of return would you expect a broadly diversified portfolio of U.S. stocks to earn, on average, over the next 3 years?*" In addition, we gauge longer-term expected returns from a follow-up question, which asks for the average annual return they expect over the "next 10 to 20 years". A third measure of expected

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<sup>10</sup> By this measure, the equity ownership profile of Michigan survey participants was consistent with that in the population-weighted data from the Survey of Consumer Finances (SCF), which indicates that 40 percent of U.S. households owned at least \$5,000 in equities.

returns, focused on their own equity portfolio, is drawn from an analogous question about “own holdings of stocks; both individual stocks and stocks in mutual funds or retirement accounts”.

The top panel of Table 1 reports summary statistics of these three measures of expected returns. A median investor expects the market and their own portfolio to earn an average return of 10 percent over the long-term horizon, and about 8 percent over the shorter horizon. The interquartile range of responses to all three expected returns questions spans 5 percentage points. The distribution of expected returns is right-skewed, in part reflecting the fact that there are almost no negative responses. This is not necessarily an anomaly, since the special survey section was only administered to households that were holding equities at the time.<sup>11</sup>

Perceptions about the risk in stock returns are inferred from the question that asks respondents to assess the likelihood that stock market outcomes will fall within a specific range. In particular, the survey asks “what do you think the chance is that the average return over the next 10 to 20 years will be within two percentage points of your guess, that is between  $R^e-2$  and  $R^e+2$  percent per year?” where  $R^e$  is their previously reported expected return. The responses thus provide an estimate of the perceived probability mass in the four percent band centered on the respondent’s expected return. It is more convenient to refer to the complement, or the probability 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. In fact, about five percent of respondents report extreme beliefs – that is, either a zero or 100 percent chance. There is a large density of responses at 50 percent, a common feature of survey questions that elicit probabilistic assessments. As argued by Bruin, et al. (2002), and studies cited therein, a 50/50 response to open-ended probabilistic survey questions can indicate epistemic uncertainty – a self-perceived lack of knowledge.<sup>12</sup> If so, the frequency distribution

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<sup>11</sup> Nonetheless, we are cognizant of strong evidence that predictions of stock performance are influenced by how the question is framed. In particular, 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*.

<sup>12</sup> 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’. In their view, respondents often answer questions by starting from an initial value, or anchor, and adjusting insufficiently from that value to arrive at a response. Tversky and Kahneman

exaggerates the true weight on 50 percent. There is no easy way to correct for this bias though, as mentioned above, our data quality filter eliminates observations in which the respondent gave “50 percent” answers to all questions soliciting outcome probabilities.<sup>13</sup>

This measure of the perceived equity return risk can be transformed into the more conventional metric, standard deviation, under some standard distributional assumptions. In particular, we assume annual stock market returns to be lognormally distributed, so that expected annual returns have finite second moments and time averages of annual market returns are asymptotically normal. Standard deviation can then be backed out from the inverse of the standard normal cdf. In particular, with *Uncertainty* defined as  $Prob |R - R^e| > .02$ , we can compute the perceived standard deviation of average returns over a 10-20 year period as  $\sigma_{10-20} = -0.02 / \Phi^{-1}(0.5 * \textit{Uncertainty})$ , where  $\Phi^{-1}(\cdot)$  is the inverse of standard normal cdf.<sup>14</sup> The implied *annual* standard deviation of returns can be imputed by taking a stand on the horizon (between 10 and 20 years) that respondents have in mind.

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

The third key variable drawn from the special survey questions is our measure of the respondent’s share of financial wealth invested in stocks or stock mutual funds. Question AA5b

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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”.

<sup>13</sup> In addition to indicating the influence of epistemic uncertainty, giving a 50/50 response to all probabilistic questions probably likely signals a propensity to give lower-quality responses.

<sup>14</sup> Under this assumption, we cannot impute  $\sigma_{10-20}$  for respondents that give values of 0 or 100 percent for *Uncertainty*.

in Appendix A (added to the surveys beginning June 2001) asks survey respondents to pick one of five responses to describe the weight of equities in their portfolio of financial assets: (i) less than 10 percent, (ii) 10 to 25 percent, (iii) 25 to 50 percent, (iv) 50 to 75 percent, or (v) over 75 percent. Responses, summarized in panel C of Table 1, are fairly evenly distributed, with about a fifth of investors holding less than 10 percent in equities, and 0.27, 0.23, 0.20, and 0.12 falling into categories (ii)-(v), respectively. Finally, using the mid-point of their chosen range, we construct a cardinal measure of equity portfolio share. By this measure, the average equity position in respondents' portfolios is 37 percent.<sup>15</sup>

### **C. The time pattern of household investors' expected returns and volatility**

Figure 3 summarizes changes in the reported distribution of expected returns across survey months, from September 2000 through October 2005. Although the time series dimension of the data is somewhat limited, the 22 observations do reveal a very suggestive pattern. The squares depict the within-survey mean annual rate of return expected over the next three years, with vertical lines showing the interquartile range of responses. The mean expected 3-year return is highest (about 12 percent) in the first two surveys, gradually slides lower during the next two years, bottoms out below 8 percent in 2002 and subsequently rebounds. As shown by the solid circles, a similar pattern is also evident for the expected 10-20-year return, though the long-horizon forecasts appear to be less variable, as found by Graham and Harvey (2003). Consistent with previous findings on survey expectations, our measures appear strongly correlated with past returns realizations. The line in the chart shows the average annual return realized on the S&P500 over the previous 10 years.<sup>16</sup>

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<sup>15</sup> 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.

<sup>16</sup> In unreported analysis we corroborate the apparent extrapolation from past returns by regressing expected returns on various measures of past market performance. We find that expectations are strongly influenced by realized returns over similar horizons, but not the recent past. That is, recent returns have no effect on 10-year forecasts, but past 10-year returns do. Qualitatively, these findings are consistent with previous survey-based studies (Fisher and Statman, 2002, Vissing-Jorgensen, 2003, and Graham and Harvey, 2003). Furthermore, we find that the wealthy investors (those with above median stock holdings) have the same tendency to extrapolate as the less wealthy ones.

Unlike the time series of expected returns, the average level of return uncertainty exhibits fairly little variation over time, as shown in Figure 4. Although the dispersion of these assessments is substantial in every survey, the time pattern appears quite flat. In contrast, widely followed benchmarks of short-term volatility such as the VIX index fluctuate substantially between 2000 and 2005, spiking in late 2002 and declining steadily thereafter. Of course, this comparison is very tenuous to begin with, since the survey measure pertains to long-horizon risk, whereas the VIX only tracks options-implied volatility over the month ahead.

## **5. Expected returns and macroeconomic conditions**

The broad consensus interpretation of predictability in stock market returns, first proposed by Fama and French (1989), presumes that conditioning variables are closely tied to the business cycle. In this section, we examine the relationship between households' expectations of economic conditions and their forecasts of stock returns.

### **A. Measuring economic expectations**

While our special survey data are inadequate for conducting a definitive time series analysis of expected returns and its relation to the business cycle, the Michigan Survey does solicit respondents' views about current and prospective economic conditions. The resulting cross-sectional variation facilitates an analysis of the relation between expected returns and *perceived* economic conditions. We use these data to construct three measures of expected economic conditions – the first two are focused on the macroeconomy, while the third relates to household income prospects.

Our primary measure of expected conditions is drawn from the following 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 answers are placed into five categories by the survey-giver: (i) bad times, (ii) bad times, qualified (not good), (iii) pro-con, (iv) good times, qualified (not bad), or (v) good times. We

single out this question in particular because it focuses on real economic activity, rather than “financial” conditions. The top panel of Table 2 summarizes the distribution of responses for selected dates in our sample. Clearly, there are periods with a good deal of disagreement about macroeconomic prospects. For instance, following the attacks of September 11, over 40 percent of respondents expressed pessimism about future economic prospects, while the same share expected continuously strong economic performance. In October 2005, in the wake of Hurricane Katrina and soaring energy prices, more than half of the respondents were gloomy about the 5-year outlook, but about a third were solidly optimistic.

The coded responses are used to construct an ordinal measure of the respondent’s outlook, *Good Times-5yrs*, which takes integer values running from -2 (bad) to 2 (good).<sup>17</sup> This variable is thus interpreted as a measure of the perceived likelihood of a strong economy over the next few years. Taken at face value, under the conventional interpretation of business cycle conditionality, expected stock returns should be negatively related to *Good Times-5yrs*. In particular, investors are presumed to require – and expect – lower returns during good economic times and higher returns during bad times.

Arguably, however, the heterogeneity in investor beliefs allows an alternative interpretation of *Good Times-5yrs* that could justify a *positive* relation with expected stock returns. Suppose respondents (rationally) associate a positive economic outlook with high dividend growth and/or low stock return volatility. Then respondents who have a more favorable outlook than the average investor (at any point in time) might rationally anticipate positive dividend *surprises* and/or a surprise drop in perceived risk that lowers required returns. In this case, more optimistic respondents might expect such forthcoming news to cause the level of stock prices to jump, which would boost returns over the period in question.

To distinguish between the “idiosyncratic” and “consensus” components of *Good Times-5yrs*, we subtract the survey-month mean response from the individual's response. The deviation

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<sup>17</sup> Alternatively, we experimented with the use of dummy categories for the most optimistic and pessimistic households and found that this decomposition had no qualitative effect on results and their interpretation.

from the average respondent gauges the idiosyncratic component, whereas the average itself is interpreted as the consensus view of the economy. Under the conventional hypothesis of countercyclical expected returns, the level of the consensus outlook ought to be negatively related to expected returns, while the idiosyncratic component could have a positive effect.

We further attempt to control for expected *changes* in economic conditions using the responses from a different survey question on economic expectations. That question asks:

*“And how about a year from now, do you expect that ... business conditions will be better or worse than they are at present, or just about the same”*

The responses are coded: worse, better, or the same. We quantify them with a single variable, *Better Conditions-12 mos*, with a value of -2 (worse), 0 (same), or 2 (better). As a measure of sentiment, *Better Conditions-12 mo.* differs from *Good Times-5yrs* in two ways that makes a “news-surprise” interpretation somewhat more plausible.<sup>18</sup> First, the question focuses on *change*, which is more suggestive of a news interpretation. Second, it pertains to a short horizon, where it seems more plausible that household investors would have some conviction about their own views of economic conditions.

The third and final measure of perceived economic conditions focuses on the respondent’s expectations for their own economic prospects. It asks:

*“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 (chances own income outpaces inflation), run from 0 to 100. If the first two proxies adequately control for respondents’ expectations of the macroeconomy, then a rational investor’s response to this question would not have incremental explanatory power for expected stock market returns (or risk). On the contrary, if this variable does convey additional information on their views of the business cycle, then the presumption of countercyclical stock returns would predict a negative relationship.

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<sup>18</sup> Aside from the news-surprise interpretation of this variable, its predicted correlation with expected returns is ambiguous.

Correlations among the three measures of expected economic conditions, and their correlations with expected returns, are shown in Panel B of Table 2. Not surprisingly, the three measures are related. However, none of the correlations between the proxies exceeds 50 percent, suggesting that each contains some independent information.

The bottom half of the table shows correlations between the measures of expected economic conditions and expected stock returns, which foreshadow some of our main results. The first number in each pair is the correlation in the pooled microdata, while the second represents the correlation between the time-series of survey means. The latter could indicate whether correlations are at least partly driven by variation in average views over time, rather than just cross-sectional variation in optimism. As shown, each measure of expected conditions is positively correlated with both the 3- and 10-year expected returns in the microdata. Moreover, in the case of *Good times next 5-yrs*, the correlations are much higher in the time-series means at both forecast horizons, suggesting strong procyclicality. In contrast, the time series correlations for *Better conditions-12 mo* – our measure of expected news – are insignificant.

## **B. Regression results**

In addition to these survey-based measures of expected economic conditions, the expected return regressions include past actual returns on the S&P 500 over a similar horizon. We also include several controls for demographic characteristics, namely age, education, gender, and years of investment experience. Columns (1) and (4) in Table 3 show regression results for 3-year and 10-year expected returns, respectively. To minimize the influence of outliers, these regressions are estimated using Hamilton’s (1991) “robust regression” algorithm.<sup>19</sup>

As shown by the first two coefficient estimates, both measures of expected macroeconomic conditions have positive and statistically significant effects on expected returns

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<sup>19</sup> This algorithm (referred to as “robust regression” in the standard Stata package) is an iterative GLS regression that applies progressively smaller weights to outliers in order to minimize their influence on the results. It consists of performing Huber iterations (Huber, 1964) on the starting values until convergence, followed by biweight iterations (Beaton and Tukey, 1974). Alternative approaches included quantile (median) regression or truncation of the top and bottom percentile responses in each survey with subsequent OLS estimation, both of which produced results that are qualitatively similar to robust regression.

over both horizons. We note in particular the positive coefficient on *Good Times-5yrs*, which suggests that expected returns are “procyclical”: expectations of better economic performance are associated with higher expected stock market returns.<sup>20</sup> The difference in expected 3-year returns between optimistic and pessimistic respondents is about 1 percentage point ( $0.28 \times 4$ ). Although not shown, we find virtually identical coefficients when regressions are estimated on the subsample of respondents with greater than average stock market wealth.

Similarly, investors’ expectations of their own income prospects have a consistently positive effect on their stock market outlook. The magnitude and the statistical precision of this effect are about the same for the two horizons. A coefficient of 0.012 implies that investors with responses at the top of the interquartile range (75 percent chance of real income growth) expect the market to return 0.6 percentage points more than respondents at the bottom of the range (20 percent chance). Taken at face value, this result suggests that investors’ views about their own income prospects influences their expectations for market returns. Arguably, this variable might convey information about macroeconomic expectations not captured by the first two variables.

As suggested earlier, our measure of macroeconomic conditions (*Good Times-5 yrs*) might also serve as an indicator of the news that respondents believe the market will learn over time. This caveat is addressed in columns (2-3) and (5-6) of Table 3, which show regression results when *Good Times-5yrs* is decomposed into an idiosyncratic (expected news) component, *Good Times-5yrs Deviation*, and a consensus component, *Good Times-5yrs Mean*. Not surprisingly, the coefficient on the idiosyncratic component of expected economic conditions remains positive and significant in each case. The more interesting result is that the coefficient estimate on *Good Times-5 yrs Mean* is also consistently positive; in fact, it is always larger than

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<sup>20</sup> 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 coefficient on the idiosyncratic component.<sup>21</sup> Thus, household investors expect higher returns when the consensus expectation calls for economic expansion.

Another interesting finding, shown in columns (3) and (6), is that excluding past returns from the regression boosts the coefficients on *Good Times-5yrs Mean*. This reflects a strong positive correlation between past returns and the consensus forecast of economic conditions. Hence, extrapolation from past returns may derive in part from expectations of persistence in economic conditions, together with an association of good (bad) conditions with high (low) returns. In any case, the regression results appear to contradict the standard view on the cyclicity of expected returns.<sup>22</sup>

These conclusions are insensitive to the choice of demographic controls, most of which have little explanatory power. In fact, gender is the only such characteristic with a substantial and highly significant effect on expected returns, though only for the shorter horizon. Perhaps more surprising is the finding that investor experience and age do not influence expected returns. This contrasts with Vissing-Jorgensen (2003), where more experienced and older investors in the UBS/Gallup polls were consistently found to be less optimistic about both 1- and 10-year expected returns over the 1998-2002 period. As we shall see below, demographic characteristics play a much larger role in determining investor perceptions of uncertainty.<sup>23</sup>

## 6. Determinants of perceived risk

As described earlier, our measure of perceived risk is constructed from respondents' assessments of the likelihood that market returns will fall outside the 4 percentage point band

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<sup>21</sup> Standardized coefficients (not shown) also imply that the magnitude of the consensus effect is greater than that of the idiosyncratic component. For example, a one standard deviation shock to *Good Times - Mean* results in medium-term expected returns that are 0.72 percentage points higher, while an analogous similar shock to *Good Times - Deviation* increases expected returns by 0.47 percentage points.

<sup>22</sup> As an aside, these findings suggest a potential rationalization of the high historical average equity premium. As argued by Shefrin (2005, p. 436), if investors overestimate the positive relation between the stocks and the economy, as household investors appear to do in our data, then they probably overestimate the covariance between equity returns and consumption. If so, then they will tend to underweight equities and boost required returns.

<sup>23</sup> When we allow for time-varying experience (and age) effects, we still fail to detect a moderating influence of experience on market expectations in our earlier surveys.

centered on their long-term return forecast. We label this probability measure “*Uncertainty*”, and interpret higher values as indicating higher perceived return volatility.<sup>24</sup>

### **A. Economic outlook and demographic characteristics**

Of primary interest is the relationship between perceived risk and expected business conditions. The research on time-varying volatility, while not conclusive, leans toward the view that conditional volatility in stock market returns is countercyclical (see, for example Schwert, 1989 and Hamilton and Lin, 1996). Most recently, Brandt and Kang (2004), using a latent VAR approach on data from 1946-98, infer that “whenever the economy comes off the peak of a cycle, the conditional volatility rises immediately” (p. 220). The strongly negative correlations between respondents’ business cycle views and market returns volatility (bottom row of Table 2, panel B) are consistent with this conjecture.

To gauge how perceptions of risk change with business cycle conditions, we regress *Uncertainty* on the measures of expected macroeconomic conditions analyzed in the previous section.<sup>25</sup> These regressions also control for the potential influence of several demographic factors. As shown in the Column 1 of Table 4, the coefficient on *Good times-5 yrs* is negative and significant, implying that respondents expecting favorable economic conditions over the next few years are less uncertain about longer-run equity returns. On the other hand, the expected near-term change in conditions, *Better conditions-12 mos.*, has no marginal effect on *Uncertainty*.

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<sup>24</sup> 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 (2007). The relative importance of these two interpretations presents a difficult and interesting question, which is left for future research.

<sup>25</sup> We use raw probability responses instead of imputed standard deviations on the left-hand side to minimize sample attrition stemming from purely mechanical imputation problems discussed earlier. This also 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 between a covariate and an implied standard deviation for any underlying distribution.

Finally, the respondent's belief that their own household income is more likely to outpace inflation has a significant negative effect on *Uncertainty*. This finding can be interpreted as implying that investors' own personal economic security distorts their perceptions of stock market risk. Alternatively, this variable might serve as an additional proxy for expected macroeconomic growth, which has a negative effect on perceived risk.

In contrast with our findings for expected returns, it appears that *Uncertainty* is also influenced by several demographic characteristics. Gender, the only such characteristic that mattered for expected return, also influences perceived risk: males tend to report substantially lower *Uncertainty*. But we also find that *Uncertainty* is negatively related to higher education and years of investment experience – characteristics that are presumably correlated with the financial market knowledge of the respondent. These results suggest that this measure contains an element of subjective uncertainty in addition to perceived objective risk. In other words, increased financial sophistication boosts the respondent's confidence in their own forecast, which induces a tighter subjective distribution for expected returns.

The negative coefficient on *Good times-5 yrs*, while consistent with the view that stock market volatility is countercyclical, poses a conundrum when viewed in conjunction with our finding of procyclical expected returns. Specifically, it implies that respondents associate economic expansion or its likelihood 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, which presents obvious problems for rational asset pricing models. Put bluntly, equity risk premiums do not appear to compensate for these investors' exposure to macroeconomic risks.

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 generally positively related to respondents' economic outlook. For the 3-year horizon, both the consensus and idiosyncratic macroeconomic expectations (*Good Times-5 yrs*) have significant positive effects on Sharpe ratios. For the 10-year horizon, the consensus expectation has no effect, while idiosyncratic views remain strongly positive, mirroring the pattern of results for expected returns in Table 3. In either case, there is no evidence of countercyclicality in forward-looking Sharpe ratios.

## **B. Representativeness heuristic**

While the apparent procyclical pattern of Sharpe ratios is difficult to reconcile with finance theory, the result does accord with research on cognitive biases in financial decision-making.<sup>26</sup> In particular, the pairing of higher expected return with lower risk and a stronger economy is consistent with what behavioral theorists have labeled the *representativeness heuristic* (Tversky and Kahneman, 1974). An investor influenced by this heuristic tends to assess the probability of an event by the degree to which it: (i) is “representative” of the available evidence; and (ii) reflects the salient features of the process by which it is generated. Here, the widespread expectation of a *good* economy seems to have salient features consistent with prospects for a “*good*” stock market, that is, high expected returns and low risk.

Indeed, this “good-good” association between the economy and stock returns is similar to the Shefrin and Statman (1995) finding that investors expect higher returns from stocks they also view as safer. They suggest that this positive association is due to the linking of characteristics that appear salient in some cognitive sense. If low risk and high returns are each associated with a “good” firm, this cognitive bias can lead an investor to believe that the stock of a “good” firm will have both low risk and high expected return.

Our survey data allow a more direct test of the role of the representativeness heuristic. In particular, respondents are probably more certain about their own 10-year return forecast when

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<sup>26</sup> The study of systematic deviations in human thought processes from rational precepts, which has a rich history in social and cognitive psychology, has become increasingly influential in financial economics (see Hirshleifer (2001) and Barberis and Thaler (2003) for a review).

those forecasts are more similar, or "representative", of their recent experience -- the "available evidence". One survey question asks respondents for their recollection of the average return on the S&P 500 over the previous 10 years.<sup>27</sup> We propose to gauge the "representativeness" of their forecast by the absolute discrepancy between their 10-year expected return and their recollection of the past average returns. We hypothesize that, when the discrepancy is larger, the respondent will tend to perceive greater *Uncertainty*. Column (2) shows the results from adding this proxy of representativeness as a regressor. The positive coefficient on the discrepancy is highly significant and economically sizable, which we interpret as evidence for the representativeness heuristic.

Finally, to test the robustness of our *Uncertainty* regressions, we re-estimate (2) on a subsample that excludes investors with reported *Uncertainty* equal to 50 percent. As noted earlier, some of those respondents may simply have been expressing ignorance or lack of opinion, rather than a specific probability of 50 percent. In that case, including such responses could weaken the estimated relationships. The results in column (3) are consistent with this interpretation. The estimated coefficients on nearly all the variables increase in magnitude; moreover, they retain statistical significance despite the drop in sample size. With regard to the central question at hand, in both (2) and (3), the addition of behavioral controls does not eliminate the estimated inverse relationship between *Uncertainty* and expected (longer-term) business conditions, as reflected in *Good Times-5 yrs*.

## **7. 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 examines evidence of a relationship using data on respondents' reported portfolio equity allocations

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<sup>27</sup> The survey question read: "thinking about a diversified portfolio of stocks, what would you guess was the average annual return earned over the past 10 years?" This question (AA7) was asked between September 2000 and January 2003 and then again from October 2004 through October 2005 surveys.

(described in section 4.B). The most succinct test of the value-relevance of reported beliefs involves comparing (expected) Sharpe ratios across respondents reporting different portfolio exposures to equities. Here, Sharpe ratios are measured using expected 10-year returns on respondents' own equity portfolios divided by the implied standard deviation of returns on the broad market. As shown in Table 5, there is a monotonic upward progression in median (and mean) Sharpe ratio 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 (less than 25 percent), middle (between 25 and 50 percent), and high (more than 75 percent) equity exposures are all statistically significant.

To test whether both factors that comprise 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 expected variance times the coefficient of relative risk aversion:  $share_i = (R_i^e - R^f) / \gamma_i E[\text{Var}_i(R)]$ . Taking logs on both sides yields a linear regression specification:

$$\log (share_i) = \beta_0 + \beta_1 \log (R_i^e - R^f) + \beta_2 \log (E[\text{Var}_i(R)]) + \varepsilon_i , \quad (1)$$

Here,  $share$  is measured as the midpoint of the portfolio equity share buckets and  $R^f$  is measured by the yield on the 10-year Treasury bond at the time of survey. Because risk aversion is unobservable, the idiosyncratic component of risk aversion is in the regression error term, while the average level of (log) risk aversion is reflected in the constant. Finally, to control for life-cycle effects abstracted from in this static model, regressions also include age-group dummies. To check the robustness of our results to the log transformation implied by (1), we also estimate a reduced-form linear specification, where portfolio share is regressed on expected excess return,  $R_i^e - R^f$ , and *Uncertainty*.

After excluding observations with extreme values of the two key explanatory variables in the extreme 2 percentiles, we estimate the log-log specification (1) using OLS.<sup>28</sup> The results are reported in the bottom panel of Table 5. 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.

One disadvantage of the log-log transformation is that the log of excess expected return is undefined for observations in which excess return is negative. To avoid losing those observations, we estimate a modified version of (1) in which the first term is simply the log of expected stock returns. Here, time dummies implicitly control for time-variation in the risk-free rate. As shown in the panel's second column, both coefficients are again significant – with that on the log expected return being larger.

While these results are statistically strong, one might be concerned that the coefficients are so small compared to the predictions of the theoretical model. One reason could be the very coarse measure of equity portfolio share, the dependent variable. For example, investors with equity shares of 26 and 45 percent are observationally equivalent in our data. Another likely factor is measurement error in our expectations variables (particularly perceived risk), which could result in attenuation bias that pushes both  $\beta$ 's towards zero. To address this concern, we also estimate an IV specification (not shown) in which expected volatility and excess returns are instrumented by their respective ranks.<sup>29</sup> In this variant, the coefficient on instrumented volatility variable rises to -0.13, while that on expected excess returns is virtually unchanged. An economic rationale for the low portfolio sensitivity to expectations is that it might be muted by inertia arising from transaction costs or inattention. This is consistent with existing empirical evidence on very infrequent portfolio rebalancing (Ameriks and Zeldes, 2001).

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<sup>28</sup> Since our dependent variable is discrete and follows a clear ordinal ranking, we also estimated the reduced-form version using ordered logit, which produced qualitatively similar results. As the OLS estimator is consistent and is easier to interpret, we focus on the least-squares results.

<sup>29</sup> 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.

As a final check on the robustness of these results, we also estimate a reduced-form linear specification (column 3), in which 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. As a nod toward potential dynamic effects, we augment the set of regressors with a measure of the duration of investor experience. As shown in column 4, the coefficients on the fundamentals are unaffected, but we find that the duration of investor participation in the stock market has a strong positive effect on portfolio share. One possible explanation for this could be investor inertia: those with longer market tenure built up more equity wealth during the bull market of the 1980s and 1990s; perhaps such investors “let winnings ride” rather than rebalance.

In any case, the portfolio regressions provide strong evidence that survey responses to questions about expected risk and return reflect the actionable views of respondents, and not just idle speculation. This provides additional credibility to our seemingly anomalous finding of procyclical Sharpe ratios.

## **8. Conclusion**

Using data obtained from a series of Michigan Surveys of Consumer Attitudes, we examine the stock market beliefs of household investors – an important subset of market participants by the sheer proportion of outstanding equities they hold. When an investor reports a more optimistic assessment of macroeconomic conditions for the coming years, he or she also tends to expect higher returns. That investor’s expected return tends to be even higher when most other respondents expect good economic times. These results seem to contrast sharply with inferences normally drawn from the conventional approach of regressing *realized* returns on macroeconomic conditioning variables, such as the dividend yield and CAY.

We also find that perceived risk, or uncertainty, is lower when favorable economic conditions are expected. Together these results imply that forward-looking Sharpe ratios are procyclical, a seeming contradiction of the predictions of rational asset-pricing models. The credibility of these findings is bolstered by robustness of the cross-sectional estimates, the ability

to control for response quality and, perhaps most of all, and by the finding that respondents' equity exposures 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 uncertainty.

All told, these results lend support to a behavioral explanation for time-varying stock returns. In particular, equity valuations are lower during recessions – and subsequent returns are higher – because at those times individual investors are pessimistic about future stock market performance. This explanation might be reconciled with the contradictory inferences from the existing literature in a scenario like the following: households 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. At such times, household investors must on average have unduly optimistic expectations; thus, going forward, the “inflated” stock valuations create the conditions for low realized returns.

Of course, the rejoinder to this conclusion is that professional investors are likely to be much more rational; therefore, they could take positions that counter the influence of household investors. While this is plausible, it is not at all clear that rational investors as a group would or could entirely offset systematic irrational trading by household investors. Not only do they have limited capital, but many of them might see greater profitability in trying to “ride the bubble” (Brunnermeier and Nagel, 2004, Nofsinger and Sias, 1999). The final verdict on the importance of household investor beliefs thus rests with the identity of the “marginal investor”, a subject that lies beyond the scope of this paper.

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EXACT TIME NOW: \_\_\_\_\_

AA5. INTERVIEWER CHECKPOINT:

1.	IF AA3 LESS THAN \$5,000, OR AA3e=5 --> GO TO AA15
2.	IF AA3 \$5,000 OR MORE, OR AA3a=1, OR AA3d=1, OR AA3e=1



AA5a. Approximately how many years have you (and your family living there) owned stocks or stock mutual funds?

\_\_\_\_\_ NUMBER OF YEARS

AA5b. Roughly speaking, what fraction of your (family's) financial assets, including any savings in retirement plans, is invested in stocks or stock mutual funds: less than a tenth, between a tenth and a quarter, between a quarter and a half, between a half and three quarters, or more than three quarters?

1. LESS THAN A TENTH	2. BETWEEN A TENTH AND A QUARTER	3. BETWEEN A QUARTER AND A HALF	4. BETWEEN A HALF AND THREE QUARTERS	5. MORE THAN THREE QUARTERS
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AA6. Thinking about the overall rate of return on your (family's) stock investments, including individual stocks and stocks in mutual funds and retirement accounts, can you give a rough guess as to the percentage gain or loss over the past twelve months?

1. GAIN	3. UNCHANGED GO TO AA7	5. LOSS
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AA6a. (What percentage (gain/loss) would that be for the past twelve months?)

\_\_\_\_\_ PERCENT GAIN/LOSS

AA7. Now think about a broadly diversified portfolio of U.S. stocks, such as the S&P 500. What would you guess was the average annual rate of return earned during the past ten years?

\_\_\_\_\_ PERCENT PER YEAR

AA8. Now, looking forward, with next month as a starting point, 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?

\_\_\_\_\_ PERCENT PER YEAR

AA8a. Would you expect the average return over the next ten to twenty years to be much different than this?

1. YES	5. NO GO TO AA9
--------	--------------------



AA8b. What annual percentage rate of return would you expect such a stock portfolio to earn, on average, over the next ten to twenty years?

\_\_\_\_\_ PERCENT PER YEAR

AA9. 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 over the next ten to twenty years will be within two percentage points of your guess, that is, between (AA8b/AA8 - 2) and (AA8b/AA8 + 2) percent per year?

\_\_\_\_\_ SCALE 0 TO 100

AA10. Again, on a scale of 0 to 100, what do you think the chance is that the annual return on this broad portfolio of U.S. stocks will average less than 5 percent over this ten to twenty year period?

\_\_\_\_\_ SCALE 0 TO 100

AA11. Now thinking about a shorter horizon, what do you think the chance is that the average annual return on this broad portfolio of U.S. stocks will be less than 5 percent over the next three years?

\_\_\_\_\_ SCALE 0 TO 100

AA12. For the purposes of the next few questions, let's assume that 5 percent is a reasonable expectation for the annual rate of return one can expect low-risk investments, such as money market funds or CDs, to earn, on average, over the next ten to twenty years. Does this seem like a plausible assumption?

1. YES  
GO TO AA13

5. NO  
↓

AA12a. What annual rate of return, or interest rate, would you expect these types of low risk investments to earn, on average, over the next ten to twenty years?

\_\_\_\_\_ PERCENT PER YEAR

AA13. Now, thinking about your (family's) own holdings of stocks, including individual stocks and stocks in mutual funds or retirement accounts, what is the annual rate of return that you expect to earn, on average, over the next ten to twenty years?

\_\_\_\_\_ PERCENT PER YEAR

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | 1. IF AA13 IS LESS THAN OR EQUAL TO 12 PERCENT --> GO TO AA14a |
| <input type="checkbox"/> | 2. IF AA13 IS GREATER THAN 12 PERCENT --> GO TO AA14b          |

AA14a. Suppose you received persuasive information that the more likely average annual return you could expect over the next ten to twenty years was (AA13 - 2) percent per year, with some chance that average returns would be higher or lower. Would you sell some portion of your stock holdings and put the resulting funds into a low-risk investment, such as money market funds or CDs?

1. YES  
GO TO AA15

5. NO  
GO TO AA14c

AA14b. Suppose you received persuasive information that the more likely average annual return you could expect over the next ten to twenty years was 10 percent per year, with some chance that average returns would be higher or lower. Would you sell some portion of your stock holdings and put the resulting funds into a low-risk investment, such as money market funds or CDs?

1. YES  
GO TO AA15

5. NO  
↓

AA14c. How low would your expectation of the next ten to twenty years' rate of return on these stocks have to be before you would shift some portion of your portfolio out of stocks?

\_\_\_\_\_ PERCENT

EXACT TIME NOW: \_\_\_\_\_

AA15. Although no one can be sure about how the stock market will perform, do you think that during the next twelve months stock market prices will generally go up, go down, or remain about the same?

1. GO UP  
↓

3. SAME  
GO TO AA15b

5. GO DOWN  
↓

8. DON'T KNOW  
GO TO AA15b

AA15a. By what percent do you expect stock market prices to be (higher/lower) twelve months from now?

\_\_\_\_\_ PERCENT

SRC/UM  
VAR#

October 2002

- PEXP (106) A3. Now looking ahead--do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now?
- 
1. WILL BE BETTER OFF  
3. SAME  
5. WILL BE WORSE OFF  
8. DK  
9. NA
- BUS12 (108) A4. Now turning to business conditions in the country as a whole--do you think that during the next 12 months we'll have good times financially, or bad times, or what?
- 
1. GOOD TIMES  
2. GOOD WITH QUALIFICATIONS  
3. PRO-CON  
4. BAD WITH QUALIFICATIONS  
5. BAD TIMES  
8. DK  
9. NA
- BAGO (109) A5. Would you say that at the present time business conditions are better or worse than they were a year ago?
- 
1. BETTER NOW  
3. ABOUT THE SAME  
5. WORSE NOW  
8. DK  
9. NA
- NEWS1 (110/1) A6. During the last few months, have you heard of any favorable or unfavorable changes in business conditions?
- NEWS2 (110/1) A6a. What did you hear? (Have you heard of any other favorable or unfavorable changes in business conditions?)

FAVORABLE CHANGESGOVERNMENT, DEFENSE (any reference to defense, code 11 or 12)

10. Recent or upcoming elections; new administration/Congress/President
11. More defense/military spending or production; worsening international situation/prospects; acceleration of war/tensions; more uncertainty about world peace
12. Less defense/military spending or production; better international prospects; fewer international tensions; less uncertainty about world peace
13. Specific government spending programs reformed/changed/improved--NA whether increase or decrease in spending
14. Specific government spending programs, begun or increased/continued (other than defense) (e.g., employment, foreign aid, space, welfare) (incl. programs "modified"/"improved" if increased spending is stated or implied--otherwise code 13)

SRC/UM  
VAR#

October 2002

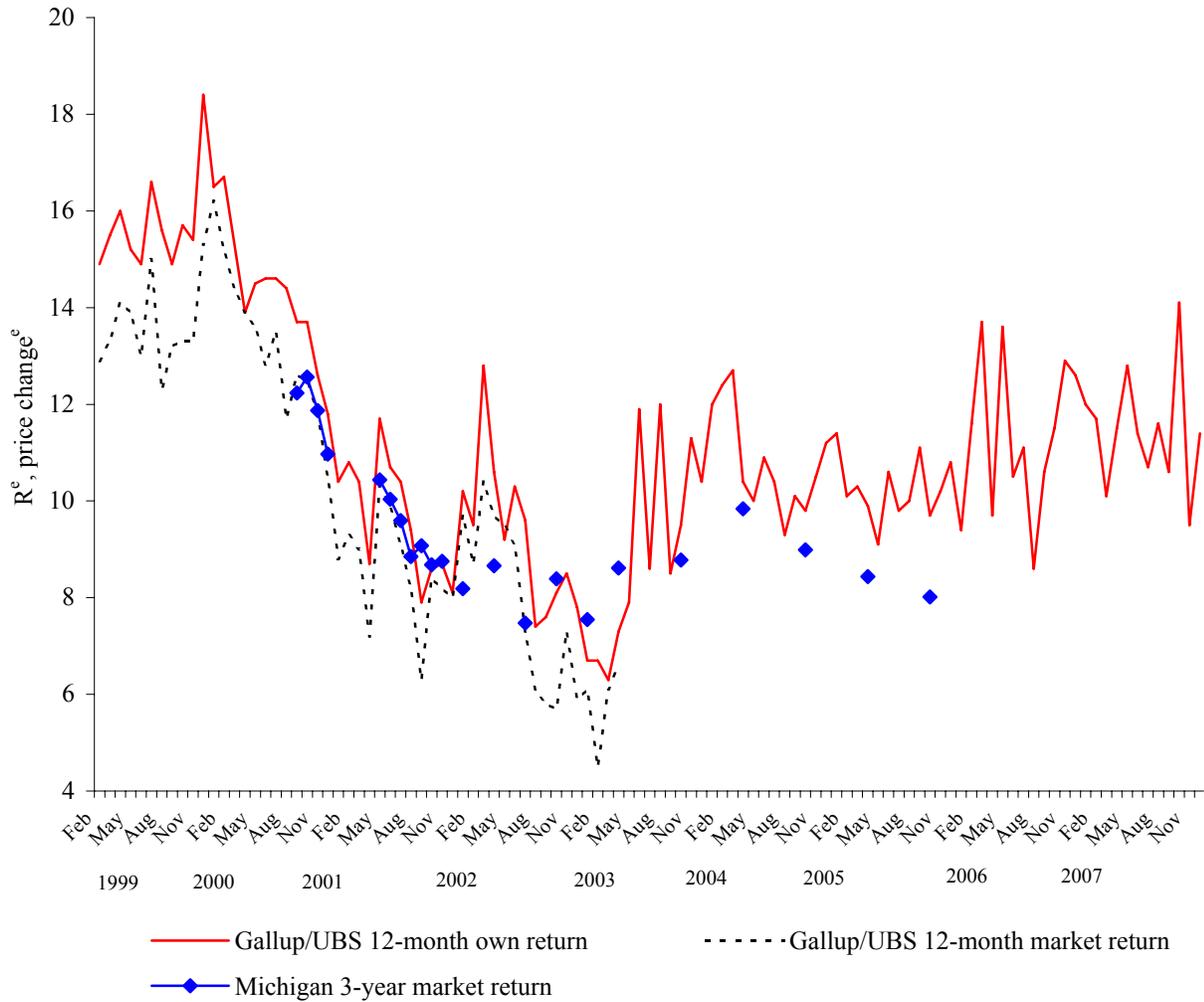
- BEXP (112) A7. And how about a year from now, do you expect that in the country as a whole business conditions will be better, or worse than they are at present, or just about the same?
- 
1. BETTER A YEAR FROM NOW  
3. ABOUT THE SAME  
5. WORSE A YEAR FROM NOW  
8. DK  
9. NA
- BUS5 (115) A8. Looking ahead, which would you say is more likely -- that in the country as a whole we'll have continuous good times during the next 5 years or so, or that we will have periods of widespread unemployment or depression, or what?
- 
01. (Continuous) good times; boom; prosperity; no recession  
02. Good times, qualified (not bad); pretty good, no unemployment, no depression  
03. Pro-con; some recession, some unemployment, periods of unemployment  
04. Bad times, qualified (not good); recession; bad at some times but not most of the time; periods of widespread unemployment; some depression; unemployment  
05. Bad times, depression; widespread unemployment
- DEPENDS (NOT CODEABLE ON SCALE)
06. Depends on defense program, aid to allies, international situation  
07. Depends on government economic policies; wage and/or price controls; tax rebates  
10. Depends on election  
11. Depends on other; depends on urban conditions; labor-management relations; strikes, labor conditions  
98. DK; can't tell  
99. NA; R speaks only of hopes and wishes; R gives only comparative or relative answer, "Better," "Same," "Worse"; "more/less unemployment or inflation"
- GOVT (116) A9. As to the economic policy of the government -- I mean steps taken to fight inflation or unemployment -- would you say the government is doing a good job, only fair, or a poor job?
- 
1. GOOD JOB  
3. ONLY FAIR  
5. POOR JOB  
8. DK  
9. NA
- UNEMP (117) A10. How about people out of work during the coming 12 months -- do you think that there will be more unemployment than now, about the same, or less?
- 
1. MORE UNEMPLOYMENT  
3. ABOUT THE SAME  
5. LESS UNEMPLOYMENT  
8. DK  
9. NA

## **Appendix B. Some tests of survey response quality**

A potential weakness of survey data lies in researchers' inability to verify respondents' replies or to control for the degree of effort that goes into answering the sometimes hypothetical or abstract questions. Yet, such data have been steadily gaining influence in the economics literature and a number of leading surveys (Survey of Consumer Finances, Panel Study of Income Dynamics, and Health and Retirement Survey, among others) have been widely used in empirical research on consumer behavior. Indeed, there is probably no better source for information on *individual* investors' expectations of market conditions. Still, in deference to the possible quality problems, we took some steps to examine response quality and to minimize potential noise in our data. The analysis was used to devise the filter for excluding data likely to be of lower quality.

We were able to gauge the extent of survey respondents' general knowledge about the stock market by comparing their *recollection* of average returns over the preceding ten-year period with actual historical return values. We examine whether the magnitudes of their recall errors were systematically related to respondent characteristics. In addition to demographic and stock ownership characteristics, we considered two measures of response quality constructed from the survey interviewers' coded assessments of a respondent's "level of understanding" (ranging from "excellent" to "poor") and "attitude" (ranging from "friendly and interested" to "hostile"). The results, available upon request, generally suggest the accuracy of a respondent's recall of past returns improves substantially with the size of their equity portfolio and education. The errors are also lower for those who identify themselves as primary investment decision-makers, as well as for those whom the questioner reported as having an excellent or good understanding of the survey question. The errors were also lower for those reported as having a more favorable attitude, but not significantly so. Finally, 13 percent of respondents declined to provide an estimate of past returns. We found that many of the above-reported characteristics that predict greater recall errors (i.e. lower-quality responses) also indicate a higher likelihood of declining to answer altogether.

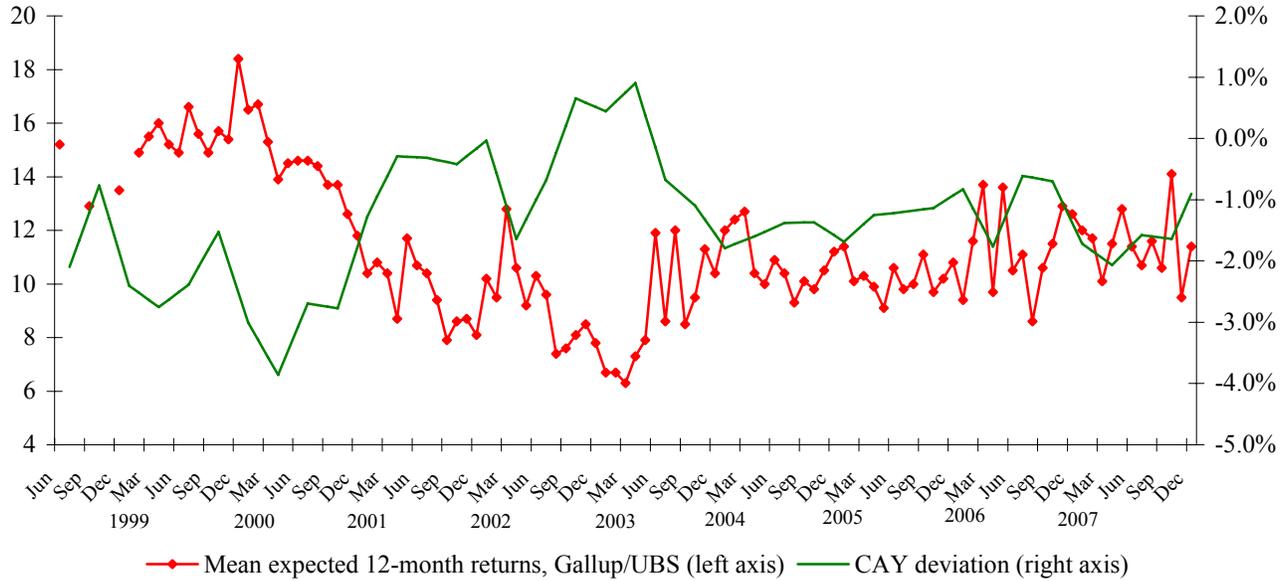
Figure 1  
 Measures of Expected Near-term Stock Market Performance  
 Michigan and Gallup Survey Means



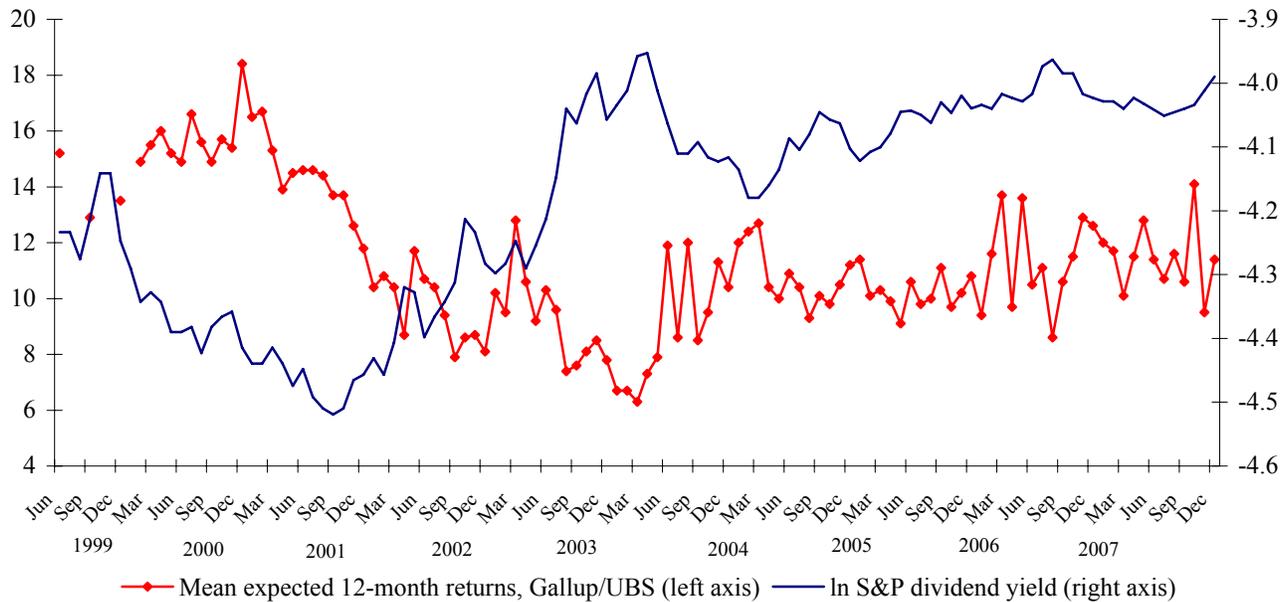
The series on expected 3-year market returns are survey-specific means of the Michigan survey respondents. The Gallup 12-month expected returns series are mean responses from the monthly surveys jointly sponsored by the Gallup Organization and UBS. The dotted line depicts mean responses to the question on *market* expected returns, which was discontinued in May 2003. The solid line presents the means of *own* equity portfolio return responses.

Figure 2  
 Survey Expected Returns and Conventional Macro Conditioning Variables

Panel A. *CAY* and Survey Expected Returns

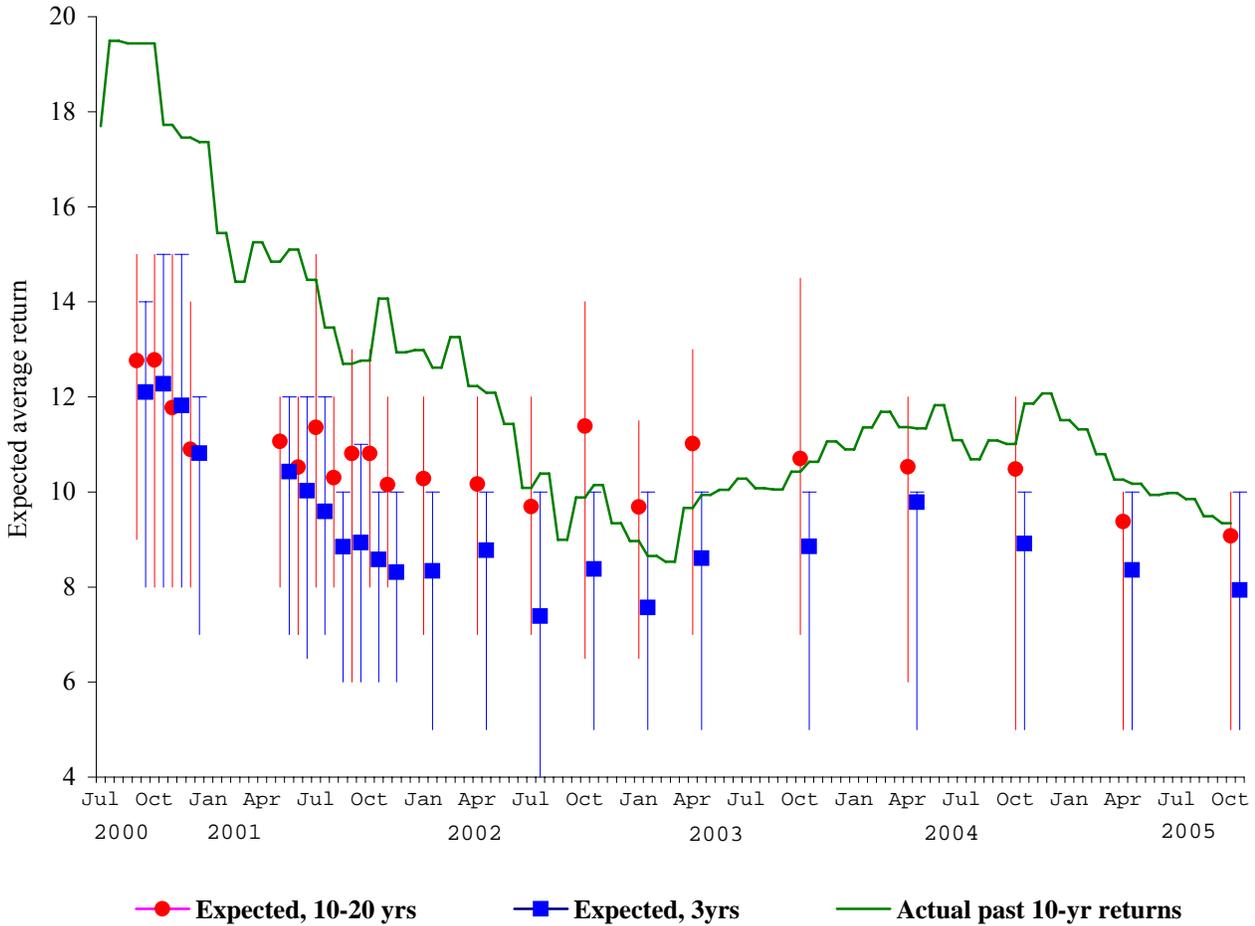


Panel B. Dividend yield and survey expected returns



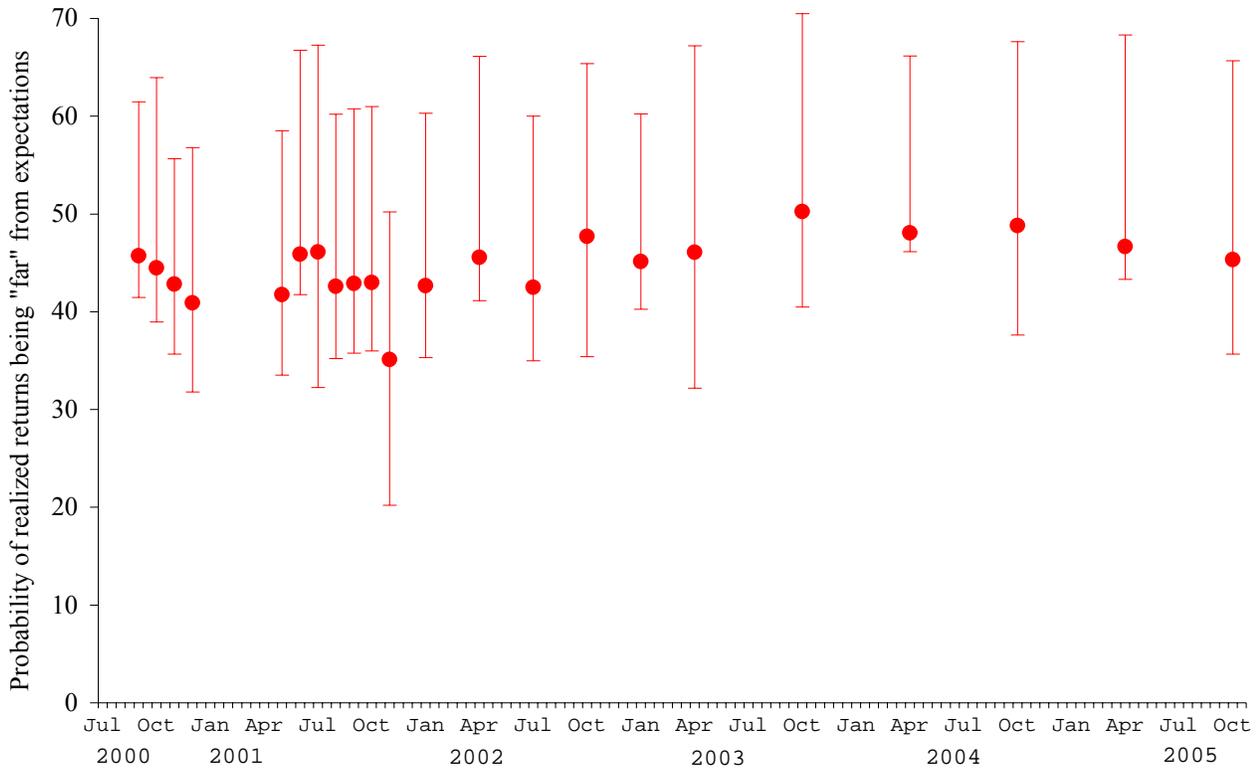
The means of 12-month expected own equity portfolio returns from Gallup/UBS surveys are plotted against the trend deviation of *CAY* series (panel A) and the log dividend yield series (panel B). The *CAY* series are constructed as in Lettau and Ludvigson (2001) and updated to cover the period through Q4, 2007. Since the *CAY* series are quarterly, the monthly series shown in this figure are constructed by linearly interpolating between quarterly nodes.

**Figure 3**  
**Expected Returns vs. Past Returns**  
 Michigan Survey, survey means and interquartile ranges



The means of expected long- and medium-term returns of Michigan survey respondents are plotted against realized average annual returns on the S&P500 total returns index (SPTR) over the 10-year period preceding the survey date. The vertical bars represent the interquartile range of the responses. The data exclude observations that fail the data quality filter (i.e. those with incomplete responses, extreme ratings on understanding and attitude, or 50/50 replies to all probabilistic questions).

Figure 4  
 Uncertainty about Expected Equity Returns  
 Michigan Survey, survey means and interquartile ranges



The graph depicts survey averages of respondents' estimated probabilities that realized returns will fall outside the four percentage point band centered on their expected 10-year market returns. Higher values correspond to higher implied volatility of expected equity returns. The vertical bars represent the interquartile range of the responses. The data exclude observations that fail the data quality filter (i.e. those with incomplete responses, extreme ratings on understanding and attitude, or 50/50 replies to all probabilistic questions). Responses of 0 and 100 percent are omitted.

**Table 1. 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 of survey respondents. All tables exclude observations that fail the data quality filter (i.e. those with incomplete responses, extreme ratings on understanding and attitude, or 50/50 replies to all probabilistic questions).

**Panel A. Expected returns**

	N	Mean	10th pct	25 pct	Median	75th pct	90th pct
Market, 3-years	3,046	9.0	4	5	8	10	15
Market, 10-years	3,046	10.4	5	7	10	12	16
Own stock portfolio, 10-years	3,046	10.0	5	7	10	12	15

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

**Panel B. Implied Risk: Likelihood of Returns within Specified Ranges**

	N	Mean	10th pct	25 pct	Median	75th pct	90th pct
<i>Prob</i> $ R - Re  < 2\%$	3,015	43.3	20	25	50	50	80
Implied $\sigma_{10-20}$ (in percent)	2,854	4.56	1.56	1.73	2.96	2.96	7.88
<i>Prob</i> (3-year returns $< 5\%$ )	2,527	35.8	5	20	30	50	75
<i>Prob</i> (10-year returns $< 5\%$ )	2,515	27.8	5	10	20	40	50

*Uncertainty* is defined as the reported likelihood that realized returns will fall outside the four percentage point band centered on respondent's expected 10-year market return. This measure is converted to an imputed standard deviation ( $\sigma_{10-20}$ ) assuming asymptotic normality:  $\sigma_{10-20} = -0.02 / \Phi^{-1}(0.5 * \text{Uncertainty})$ , where  $\Phi^{-1}(\bullet)$  is the inverse of the standard normal cdf. Responses of 0 and 100 percent are omitted in computations of  $\sigma$ .

**Panel C. Portfolio allocation to stocks**

	N	Mean share	<i>fraction of respondents with stock shares of</i>				
			< 10%	10%–25%	25%–50%	50%–75%	> 75%
Share in equities	2,339	37%	0.19	0.27	0.23	0.20	0.12

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

**Table 2. Heterogeneity in macroeconomic and own income growth expectations**

This table summarizes the distribution of investor responses to certain Michigan Survey questions on macroeconomic outlook. The top panel tabulates investor responses to questions on expected macroeconomic conditions over next 5 years, on expected changes in business conditions over the following year, and on chances of growth in household real income over the next 5 years for selected surveys. The surveys are chosen to coincide with some of the key events over the sample period: the peak of the bull market (September 2000), the 9/11 attacks (October 2001), the start of the Iraq war (April 2003), and hurricane Katrina (October 2005). The lower panel reports Spearman rank correlations for these measures of sentiment and expected stock market returns and volatility pooled across surveys, where observations with identical values are assigned average rank. The second set of correlation coefficients (separated by the semicolon) are based on survey-specific means of each of the variables of interest and thus reflect only time-series correlation.

**Panel A. Distribution of responses, select surveys**

	September, 2000	October, 2001	April, 2003	October, 2005
<i>Expected macroeconomic conditions over the next 5 years (fraction of respondents answering ...)</i>				
Continuous bad times	0.09	0.28	0.21	0.52
Bad times, qualified	0.04	0.14	0.12	0.08
Uncertain / Pro-con	0.04	0.07	0.05	0.06
Good times, qualified	0.10	0.09	0.10	0.02
Continuous good times	0.74	0.43	0.51	0.32

**Panel B. Correlation between various measures of expected conditions and expected returns, (pooled data ; times-series means)**

	Good times, next 5 years	Better conditions, next 12 mo.	Chance own income outpaces inflation
Good times, next 5 years			
Better conditions, next 12 mo.	0.42**		
Chance own income outpaces inflation	0.26**	0.23**	
Expected returns (2-3 years)	0.18** ; 0.66**	0.12** ; -0.39	0.11** ; 0.41
Expected returns (10-20 years)	0.11** ; 0.67**	0.11** ; -0.13	0.10** ; 0.44*
Uncertainty (10-20 years)	-0.11** ; -0.25	-0.08** ; -0.16	-0.21** ; -0.57**

\*\* and \* indicate statistical significance at the 1 and 5 percent level, respectively.

**Table 3. Macroeconomic Outlook and Investors' Expectations of Stock Market Returns**

This table reports regressions of respondents' expectations of annual stock market returns on their perceptions of macroeconomic conditions *during* the next 5 years and their expected *change* in conditions over next 12 months. These two variables take integer values in the [-2, 2] range, with positive values indicating favorable (better) expectations. In specifications (2-3) and (5-6), macroeconomic conditions during the next 5 years are decomposed into a survey-specific mean and respondent deviations from that mean. Conditioning variables also include demographic controls and past realized returns over a horizon matching that of expectations. The regressions are estimated on all available monthly Michigan surveys between September 2000 and October 2005 that pass the data quality filter. All specifications are estimated using the robust regression algorithm (iterative GLS of Hamilton, 1991), with t-statistics reported in parentheses. Age and education dummies were included in each regression, but their coefficient estimates are suppressed for brevity. The joint hypothesis of no education effects could not be rejected at the 5 percent level of significance in specifications (3) and (6), which exclude measures of past market returns. Age effects were jointly significant in explaining long-term expected returns. The constant term in each of the regressions represents the average expected of a female respondent with one year of investment experience, less than 35 years of age, did not attend college, and who holds a "neutral" view regarding future macroeconomic conditions.

Dependent variable:	medium-term <u>expected return (2-3 years)</u>			long-term <u>expected return (10-20 years)</u>		
	(1)	(2)	(3)	(4)	(5)	(6)
Regressors	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
Good times, next 5 years	0.281 (5.8)			0.099 (1.8)		
Good times, next 5 years survey mean		1.516 (8.2)	1.759 (9.8)		0.376 (1.2)	1.410 (6.9)
Good times, next 5 years, deviation from mean		0.225 (4.6)	0.262 (5.8)		0.096 (1.8)	0.117 (2.1)
Better conditions, next 12 mo.	0.186 (3.1)	0.170 (2.9)	0.068 (1.2)	0.239 (3.7)	0.230 (3.5)	0.177 (2.72)
Chance own income outpaces inflation (ppt)	0.012 (4.3)	0.011 (4.0)	0.011 (3.9)	0.012 (3.9)	0.012 (3.9)	0.012 (4.0)
Past S&P return over a matching horizon	0.083 (10.2)	0.076 (9.3)		0.215 (7.8)	0.187 (4.5)	
Gender (1=male)	0.400 (2.7)	0.436 (2.9)	0.433 (2.8)	-0.066 (0.4)	-0.061 (0.4)	-0.068 (0.4)
Log investmt experience yrs	0.008 (0.1)	0.071 (0.7)	0.081 (0.7)	-0.047 (0.4)	-0.041 (0.4)	-0.042 (0.4)
Constant	6.639	5.979	6.048	5.833	6.056	7.995
N (obs.)	2,834	2,834	2,834	2,834	2,834	2,834
Measure of fit (adj-R <sup>2</sup> )	0.079	0.097	0.065	0.046	0.046	0.039

**Table 4. Determinants of Ex Ante Volatility of Long-Term Average Market Returns**

This table reports regressions an investor's anticipated risk in long-term stock returns on their perceptions of macroeconomic conditions and a vector of demographic characteristics. The dependent variable in all regressions is defined as the likelihood that realized future returns will be more than 2 percentage points above or below their reported expected return. This variable, *Uncertainty*, can be mapped to standard deviation of expected returns under standard distributional assumptions. The set of regressors in (2) and (3) also includes the absolute difference between respondents' recall of past returns and expectations of future returns, as well as their outlook for real personal income growth. Regression (3) is estimated on a subsample that excludes those reporting *Uncertainty* values of 50 percent. The regressions are estimated on all available monthly Michigan surveys (between September 2000 and October 2005) that pass the data quality filter. All specifications are estimated using OLS, with standard errors clustered at the survey level and adjusted for heteroskedasticity. The corresponding *t*-statistics are reported in parentheses. Age category dummies are included in all specifications. In all specifications, the joint hypothesis of no age effects could be rejected at the 5 percent level of significance.

**Dependent Variable:  $Uncertainty = Prob | R - R^e | > 2$**

Regressors	(1) Coef.	(2) Coef.	(3) Coef.
Good times, next 5 years	-0.86 (3.3)	-0.70 (2.9)	-1.03 (3.0)
Better conditions, next 12 months	-0.04 (0.1)	-0.14 (0.3)	-0.25 (0.4)
Chance own income outpaces inflation (ppt)	-0.10 (7.0)	-0.10 (6.5)	-0.12 (5.3)
$  R^e - \text{Recalled S\&P returns}  $		0.61 (9.5)	0.94 (6.5)
Gender (male=1)	-4.32 (5.4)	-4.27 (5.1)	-5.69 (4.7)
Years of invstmt experience (ln)	-1.37 (2.5)	-1.54 (3.1)	-1.74 (2.4)
Education (some college)	-2.79 (2.1)	-2.20 (1.4)	-3.06 (1.1)
Education (college)	-6.80 (5.6)	-6.69 (6.0)	-9.06 (4.8)
Education (graduate)	-6.89 (5.4)	-6.61 (6.5)	-9.14 (5.1)
Constant	62.60	59.95	61.62
N (obs.)	2,804	2,069	1,413
Measure of fit ( $R^2$ )	0.080	0.106	0.143

### Table 5. Investor Expectations and Portfolio Choice

The top panel summarizes the distribution of investor-level Sharpe ratios grouped by self-reported portfolio equity exposure. The ratios are constructed as described in Table 6. Reported p-values are associated with tests of differences in median Sharpe ratios relative to the group with the middle level of equity exposure (between 25 and 50 percent). The bottom panel reports regressions of respondents' portfolio equity share on their expectations of long-run stock returns and volatility. Regressions (1) and (2) are log-log specifications of Samuelson (1969) optimal portfolio allocation as described in text, with  $\sigma$  imputed from *Uncertainty*. The regressions are estimated on all monthly Michigan surveys that included a question on portfolio composition, i.e. those running from June 2001 through October 2005. In all regressions we excluded observations that fail the data quality filter, as well as those with outlier values of either expected returns (at 2<sup>nd</sup> and 98<sup>th</sup> percentiles) or volatility (*Uncertainty* responses of 0 or 100 percent). By construction, regression (1) is restricted to households with positive expected *excess* returns. All specifications are estimated using OLS, with standard errors clustered at the survey level and adjusted for heteroskedasticity. The corresponding t-statistics are reported in parentheses. Time dummies (not reported for brevity) are jointly significant in all specifications, while age dummies are jointly significant in (1)-(3).

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

Share invested in equities	N	<i>forward-looking Sharpe Ratios</i>		<i>p</i> -value ( $H_0: SR \neq SR_{25-50}$ )
		Mean	Median	
Less than 10 percent	415	0.475	0.309	(0.000)
Between 10 and 25 percent	591	0.550	0.401	(0.007)
Between 25 and 50 percent	490	0.631	0.505	
Between 50 and 75 percent	430	0.654	0.525	(0.646)
More than 75 percent	256	0.701	0.623	(0.015)

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

Regressors	<i>log portfolio fraction in stocks</i>		<i>portfolio fraction in stocks</i>	
	(1)	(2)	(3)	(4)
Log expected excess returns	0.04 (3.4)			
Log expected returns		0.15 (2.9)		
Expected excess returns (in pct)			0.33 (2.7)	0.28 (2.1)
Log expected volatility ( $\sigma_i^2$ )	-0.09 (7.0)	-0.09 (7.3)		
<i>Uncertainty</i> (in pct)			-0.22 (8.1)	-0.20 (6.9)
Years of invstmt experience (ln)				0.07 (8.5)
Constant	-1.90	-1.84	0.41	0.27
N (obs.)	1,995	2,182	2,182	2,176
Measure of fit (adj-R <sup>2</sup> )	0.042	0.046	0.047	0.074