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From the Horse's Mouth: Economic Conditions and Investor Expectations of Risk and Return

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

Keywords: investor sentiment; expected stock returns; portfolio choice; asset pricing
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1. Introduction

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

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

Although these survey-based findings are potentially very relevant to the study of time-varying aggregate expected returns, to our knowledge, little research has aimed toward reconciling observations on the subjective views of individual investors with key inferences in the mainstream asset-pricing literature.[2] There are few, if any, analyses of how actual

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

[2] There is a rapidly growing empirical behavioral literature on decisions of individual investors. In addition to extrapolation of

investors' expected returns relate to conditioning variables analyzed in the return predictability literature or more direct measures of macroeconomic conditions. Our paper attempts to bridge this gap using data on individual investor expectations of stock returns drawn from two separate but somewhat comparable surveys. One of these surveys brings new data to the table, including information on household investor perceptions of risk, their portfolio holdings, as well as their expectations of stock returns and assessments of macroeconomic conditions.

Our analysis proceeds in two stages. First, we examine some key time series properties of household investors' expected returns on stocks, as measured in the Gallup/UBS monthly survey of individual investors from 1998 to 2007. In particular, we analyze the relationship between the average respondent's 12-month-ahead expected return on stocks and two of the most prominent predictive variables from the empirical asset-pricing literature—the aggregate dividend yield (d/p) and the consumption–wealth ratio (*cay*) of Lettau and Ludvigson (2001). In that literature, when realized stock returns or realized excess returns, measured at various frequencies, are regressed on lagged values of d/p and/or *cay*, the coefficients are always positive and generally statistically significant.[3] Since both *cay* and d/p tend to be relatively high during recessions and low during expansions, this result is interpreted as evidence that investors demand higher returns to hold equities when economic conditions are poor, i.e., expected returns are countercyclical.

Indeed, we do find a very strong association between survey investors' subjective expected returns and these two variables, which jointly explain as much as 65% of the variation in expected returns over the 10-year survey period. However, the association between respondents' subjective expectations and each of these variables is *negative*—precisely the opposite of results in the asset-pricing literature. These results hold for both nominal and real returns, as well as excess return measures. This suggests that the conditional expected returns inferred from regressions in the asset-pricing literature are negatively correlated with the average expected return reported by investors in the Gallup/UBS survey.

We further explore the time series of the Gallup survey expected returns by correlating them with more direct measures of economic conditions, such as the unemployment rate, the growth rate of industrial production (IP), and household perceptions of economic conditions. Here again, the results support the interpretation that the average respondent's expected return is procyclical.

These findings raise the question: *whose* expectations are represented in the equilibrium asset-pricing models that aim to explain predictability of equity returns? Since the leading theories in this literature are elaborations on the consumption capital asset-pricing model (CAPM) framework, they require the existence of at least some influential subset of household investors whose beliefs are consistent with the theory. Clearly, the Gallup/UBS data suggest that the average household investor—who is at the center of the narrative in both Campbell and Cochrane (1999) and Lettau and Ludvigson (2001), for instance—does not fit this paradigm. One plausible rejoinder is that expectations of wealthier households might look quite different and more consistent with the theoretical models and inferences of the asset-pricing literature.[4] Alternatively, it is possible that survey answers are not relevant to household investment behavior if survey responses are more glib than thoughtful, or if rational institutional managers of household assets can counteract their clients' beliefs.

To address these considerations, the second part of this paper draws upon a different and as yet unexploited data source on household investor expectations, gathered through a supplement to the Michigan Surveys of Consumer Attitudes and Behavior (Michigan Survey) between 2000 and 2005. This supplement contains information not only on expected stock returns, but also on risk perceptions and household investment portfolio allocations—a unique constellation of data on individual investors. Moreover, the associated Survey of Consumers also collects data on respondents' demographic characteristics, which allows us to overweight more wealthy households. The survey also contains information on respondent perceptions of current and future economic conditions, so we can examine how economic conditions affect subjective views of returns and risk and, in turn, household portfolios.

In summary, our findings indicate that subjective expected stock returns, over both the medium term (3 years) and long term (10 years), are strongly and positively correlated with perceptions of both current and future business conditions, in the cross section

past performance, it documents numerous deviations from rational asset-pricing models such as investor overconfidence, lack of portfolio rebalancing, reluctance to sell underperforming assets, insufficient diversification, etc. This literature is summarized in Barberis and Thaler (2003) and Subrahmanyam (2007).

[3] The dominant empirical approach in the asset-pricing literature has been to use *realized* returns as a noisy but unbiased proxy of *expected* returns. A notable exception to this approach is found in Brav et al. (2005), who use a long panel of analysts' target returns for a large sample of individual stocks to study the cross-sectional implications of factor-based asset-pricing models.

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

and over time. These results are robust to a number of specifications. Perhaps most importantly, among the robustness checks, we find no attenuation when we overweight the wealthier investors in our sample, suggesting that these views are indeed representative of those household investors whose expectations are more likely to influence market prices.

At the same time, we find that perception of risk in longer-term stock returns is quite negatively related to expected economic conditions, but unrelated to perceptions of current conditions. Together with the results on expected returns, these findings suggest that, for the average household investor, forward-looking Sharpe ratios tend to be higher when the economy is expected to be strong, and are largely unrelated to current conditions. This conclusion appears to be at odds with the canonical view that variation in the conditional equity premium reflects an equilibrium where household investors' are being compensated for perceived exposure to macroeconomic risks. Rather, our results suggest that households' desire to have smaller exposures to stocks during recessions is driven by their subjective expectations, and not necessarily by countercyclical risk aversion.

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

In light of these findings, it seems unlikely that survey responses focus on an inconsequential segment of the investor universe or that they have little bearing on investor asset allocation. One approach to reconciling the contradictory cyclical properties of subjective expectations and realized returns is to consider theoretical models populated by two investor classes, only one of which forms expectations rationally. A number of papers (DeLong et al. 1990, Cutler et al. 1990, Greenwood and Shleifer 2013) propose behavioral models in which one class of investors extrapolates future returns from past performance, whereas a second class forms expectations on the basis of objective fundamentals, including the behavior of extrapolative investors. The latter group charges a time-varying premium that reflects the amount of risk they bear to accommodate the time-varying demands of extrapolative investors. Procyclical expectations of extrapolative investors induce them to disgorge equities when economic conditions worsen, whereas fundamental investors absorb a larger share of equities at such times, compensated by higher expected returns going forward.

Dumas et al. (2009) propose a model that retains a fully rational general equilibrium framework save for an assumption that one group of investors overreacts to public information about economic prospects. These investors give rise to a "sentiment premium" that influences equilibrium prices even when rational investors account for a lion's share of assets in the economy. If overreacting investors are the type that gets surveyed, an econometrician could observe subjective expected returns that are procyclical, while the equilibrium returns remain countercyclical.

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

2. Previous Research

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

2.1. Survey-Based Studies of Investor Beliefs and Behavior

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

Several more recent studies on subjective investor expectations were spurred by the Gallup/UBS monthly surveys of investors, which began in 1998. Using the aggregated survey results, Fisher and Statman (2002) document a strong positive correlation between recent stock market performance and the average forecast for year-ahead returns. Employing the investor-level data, Vissing-Jorgensen (2003) similarly shows that expected year-ahead portfolio returns are strongly positively related to the investors' past-12-month (self-reported) own portfolio performance, although this effect is somewhat attenuated among wealthier respondents. Furthermore, she finds that expectations of the wealthier respondents tended to be lower—or less exuberant around this period (the tech stock boom)—compared with others. Still, the expected returns exhibit a very similar trajectory for all respondents between 1998 and 2002.

Although our analysis also confirms investor extrapolation of past returns, our aim is to explore the potential link between expected returns and economic conditions, and also to incorporate uncertainty into the analysis. Several survey-based papers have touched upon these aspects. Dominitz and Manski (2004) use the special questions on the 2002–2004 Michigan Surveys to examine investors' market return expectations. In particular, they analyze responses on the probability that a typical diversified stock mutual fund will increase in value over the coming year, a metric that conflates risk and expected return. They find a positive relationship between the probability of positive returns and expected year-ahead business conditions and show systematic effects of gender and education on beliefs.[5] Graham and Harvey (2003) analyze chief financial officer (CFO) responses to survey questions regarding the expected level and volatility of excess stock returns, both at the 1-year and 10-year horizons. Although arguably more sophisticated than the average household investor, CFOs also extrapolate the recent level of excess returns in their one-year forecasts. In contrast, CFOs' longer-term return forecasts look roughly time invariant. Moreover, although there is no apparent risk–return relationship in CFOs' shorter-term forecasts, expected returns and expected volatility are positively correlated in the longer-term forecasts.[6] Most recently, in a parallel study, Greenwood and Shleifer (2013) used data from five different investor surveys to demonstrate that investor expectations are strongly positively correlated with past returns. Similar to our results, they also show that investor expectations are negatively correlated with realized returns.

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

A final pair of studies that informs our analysis focus on the relationship between *actual* stock returns and the Index of Consumer Confidence (ICC), the composite measure of consumer/investor sentiment built from Michigan Survey data. Qiu and Welch (2006) find that changes in the ICC play a robust role in explaining abnormal returns on small-decile stocks. Lemmon and Portniaguina (2006) decompose the ICC into a "fundamentals" component, correlated with macroeconomic news, and a residual interpreted as a measure of "sentiment." They find that increases in *both* the residual and the fundamental component of the ICC predict significantly negative abnormal returns for stocks with low institutional ownership.[7]

In these two studies, the fundamental reason that "sentiment" explains or predicts asset-price movements is unknown; that is, sentiment might represent investors' expected returns, or their risk perceptions, or their tolerance of risk, or all three. In essence, the household investor class is treated as a residual influence, which might push conditional

[5] A follow-up study (Dominitz and Manski 2011) categorizes respondents into three groups—those expecting persistence, mean reversion, or serial independence in future 12-month returns. The focus of this paper is on the intrapersonal stability in expectations captured in surveys six months apart, and not on the relationship between expectations of returns and economic conditions.

[6] Ben-David et al. (2013) further show a strong correlation between the tightness of the CFO's confidence interval for returns ("overconfidence") and the aggressiveness of corporate policies at their firms.

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

expected returns away from some equilibrium level determined by macroeconomic conditions. In some sense, we take the opposite tack: first, we isolate the component of sentiment that best measures expectations for real economic activity. Then, we attempt to identify the path—expected return or risk—through which macroeconomic conditions may influence household investor portfolio holdings.

2.2. Time-Varying Returns in the Canonical Asset-Pricing Framework

Although there may be broad consensus in the asset-pricing literature that the expected returns on stocks are tied to the business cycle, there exist a variety of models of the underlying mechanism, along with a range of empirical predictions. Consider the formula for the equity premium in the canonical consumption CAPM model with power utility

$$E_t(R^e_{t+1}) \approx \gamma(t)\mathrm{cov}_t(R^e_{t+1}, \Delta c_{t+1}).$$

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

Broadly speaking, one set of theories focus on the idea that time variation in expected returns owes to fluctuations in the *expected* covariance of consumption growth and returns. In an influential paper, Constantinides and Duffie (1996) show that, in the absence of complete markets, persistent idiosyncratic shocks to consumption growth generate an additional term in the pricing kernel that reflects the cross-sectional variance of consumption growth rates. Because this variance is higher during bad economic times, equities are regarded as a poor hedge against fluctuations in the consumption growth rates. The theory thus implies that, in equilibrium, investors require (and expect) stock returns to be higher when they are expecting the economy to enter or remain in a recession.

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

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

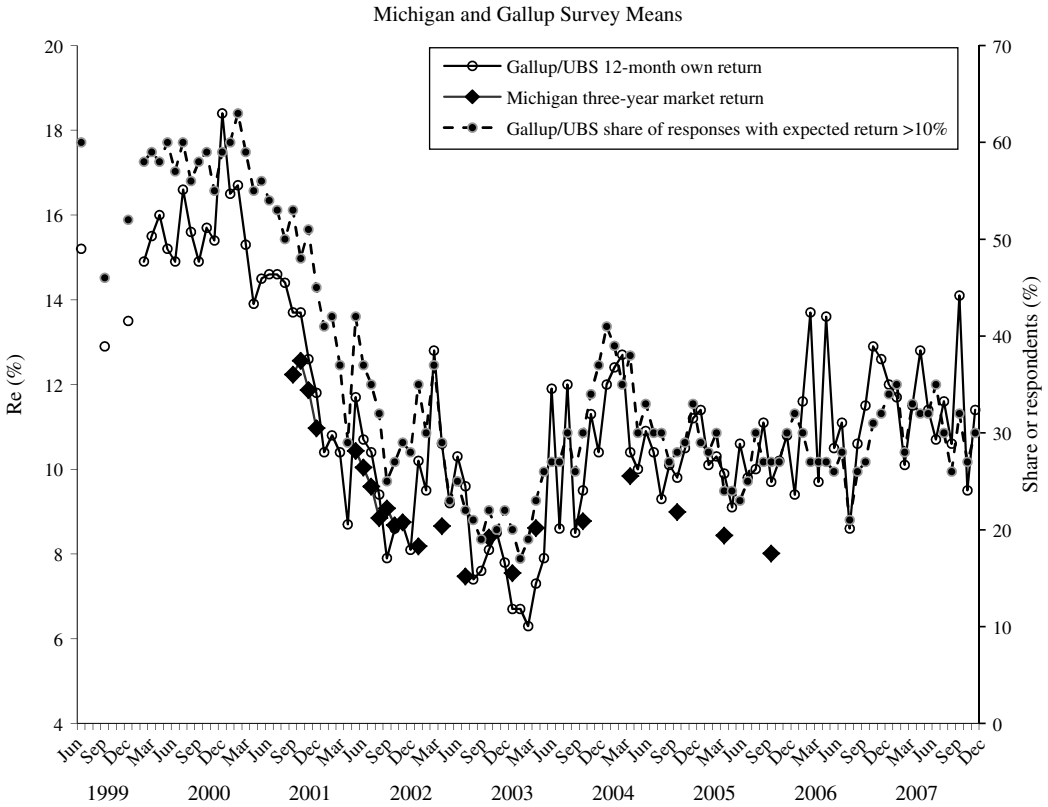
3. Time Variation in Survey Expected Returns

Our empirical analysis starts with an examination of the time series behavior of investors' expected equity returns reported in the UBS/Gallup survey. That survey is conducted on a nationally representative sample of individual investors having at least $10,000 in direct or indirect holdings of stock, with roughly 1,000 respondents interviewed per month. The survey began in June 1998, first running quarterly, and then monthly from February 1999 through December 2007. The survey asks investors for the 12-month-ahead returns they expect on their own investment portfolios. The solid line in Figure 1 depicts the time series of survey mean expected returns.[8]

In addition to means and medians, Gallup published statistics on the proportion of responses within various ranges, which we use to construct a nonparametric measure of expected returns that is robust to the presence of outlier responses. The dashed line in the figure plots the proportion of respondents expecting returns of 10% or higher, which is highly correlated with the means but less volatile. Finally, for later reference, the diamonds in Figure 1 plot monthly means of the expected annual return on stocks (over the three-year horizon), reported by respondents to

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

Figure 1 Measures of Expected Near-Term Stock Market Performance



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

the Michigan Survey supplement, which we later analyze at the individual investor level. Their correlation with UBS/Gallup means exceeds 0.85.

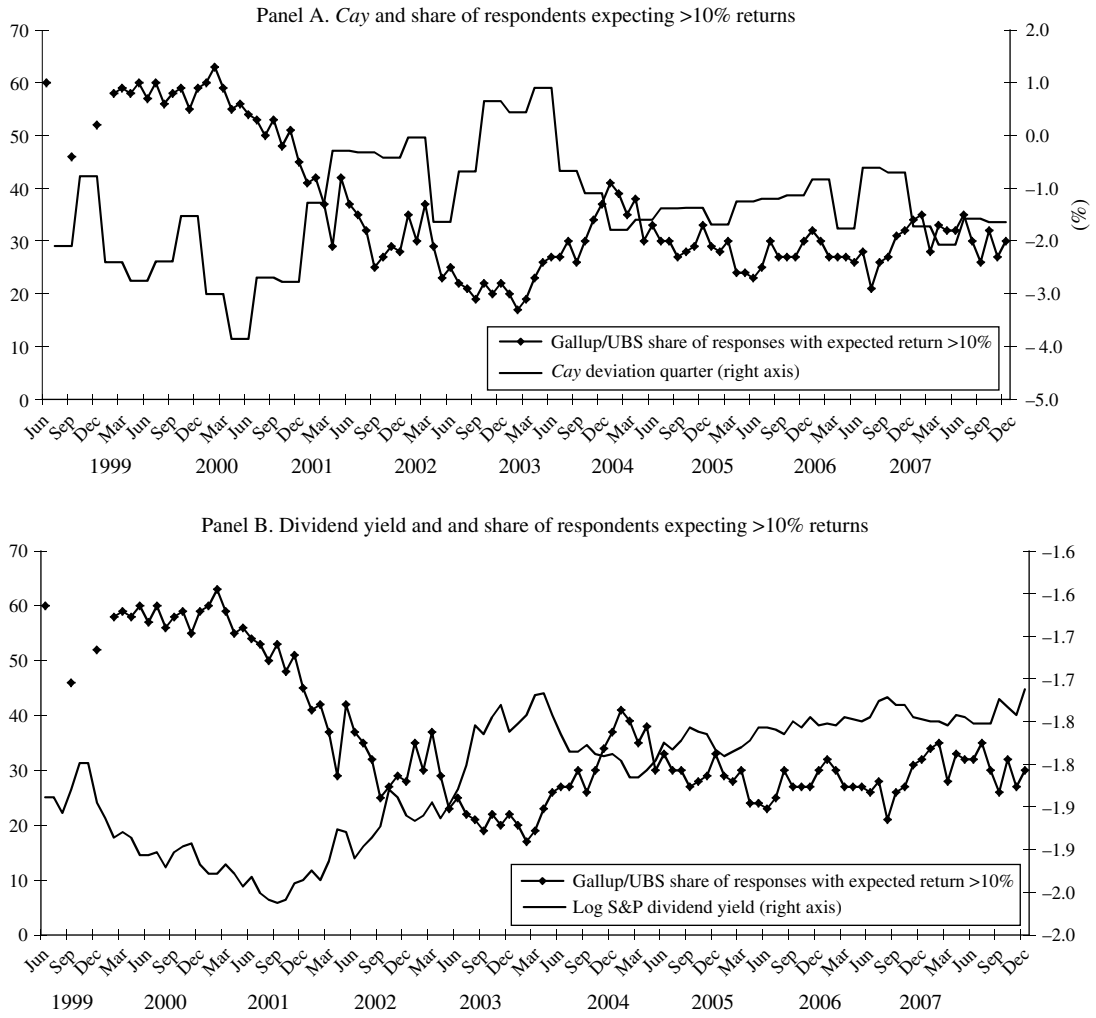
3.1. Expected Returns, the Dividend Yield, and the Consumption–Wealth Ratio

Although covering only a decade, the UBS/Gallup survey provides the longest available time series on expected stock market returns reported by individual investors. We begin by correlating the subjective survey expectations with key variables found to predict returns in the asset-pricing literature. Arguably, two of the most important variables in this literature are the log of the aggregate dividend–price ratio (d/p) and the log consumption–wealth ratio (*cay*). Historically, d/p has garnered the most attention, though its robustness as a predictor has been the subject of much debate (Stambaugh 1999).[9] Lettau and Ludvigson (2001) proposed *cay* as an alternative measure, and its predictive power and statistical significance were found to be quite strong. In the literature, both of these variables have *positive* coefficients in regressions predicting quarterly, annual, and longer-horizon stock returns. Since both variables tend to be relatively high during recessions and low during expansions, their predictive power is normally interpreted as indicating that equilibrium expected returns are countercyclical, i.e., higher when economic conditions are poor.

Figure 2 plots our nonparametric measure of subjective expected returns—the share of UBS/Gallup respondents expecting greater than 10% annual return—alongside the log dividend yield on U.S. stocks (panel B) and *cay* (panel A), scaled so that its standard deviation is one. Clearly, survey-based expected returns are strongly negatively correlated with both of these measures over the sample period at hand, a striking contrast with the positive coefficient these variables have in standard predictive regressions. The statistical relationship among d/p, *cay*, and survey expectations is established in panel A of Table 1. The first three columns show regressions of the Gallup/UBS expected 12-month return on the one-month lag of the *log dividend yield* and the most recent quarterly value of *cay*, separately, and then together. The next three columns consider alternative

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

Figure 2 Survey Expected Returns and Conventional Macro Conditioning Variables



Notes. The subjective return expectations in UBS/Gallup surveys are represented by the share of respondents that expect 12-month returns in excess of 10% (the dotted line). This measure is highly correlated with the mean reported return expectations, but is less volatile as it downplays the influence of positive outlier values. This expected returns measure is 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 Quarter 4, 2007.

measures of respondent expectations: expected real returns (subtracting the mean expected 12-month inflation, as reported in the same month by the Michigan Survey for a similar cohort of respondents), expected excess returns (subtracting current one-year Treasury note yield), and the share of respondents expecting at least 10%. In all cases, explanatory variables are strongly statistically significant, but their coefficients are negative. The last column in panel A replaces subjective return expectations with the actual 12-month returns, confirming in our short data sample the longstanding positive relationship among actual returns, d/p, and *cay*. This suggests that conditional expected returns inferred from regressing *realized* returns on the dividend yield and/or *cay* are a very poor, indeed contrary, measure of the average household investor's subjective expectations.

3.2. Subjective Expected Returns and Measures of Economic Conditions

Before moving to the household-level analysis, we briefly examine the relationship between Gallup/UBS time series means of expected stock returns and some measures of economic conditions. The coefficients on the dividend–price ratio and *cay* provide only an indirect perspective on how return expectations vary with economic conditions, as they are really just proxies for economic fundamentals. As outlined earlier, some asset-pricing theories focus on *time variation in risk aversion* and link the expected equity premium to the *current level* of consumption or economic activity, relative to the past. Other theories focus on *time variation in risk* and tie the expected equity premium to the *expected risk* of future growth. We look at five measures of economic conditions, each of which

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

Panel A. Regressions of expected returns on conditioning variables (June 1998–December 2007)

	Subjective expected 12-month returns						Actual returns
	Survey mean	Survey mean	Survey mean	Real	Excess	Share expecting nominal returns >10%	SPTR
Log consumption–wealth ratio (*cay*)	−1.746*** (0.209)		−1.399*** (0.223)	−0.956*** (0.245)	−0.511* (0.277)	−4.836*** (0.867)	1.549 (3.201)
Log dividend yield (d/p)		−0.194*** (0.046)	−0.093** (0.036)	−0.141*** (0.040)	−0.055 (0.042)	−0.967*** (0.132)	0.912* (0.479)
Constant	0.090*** (0.003)	−0.238*** (0.082)	−0.074 (0.063)	−0.185*** (0.070)	−0.031 (0.073)	−1.466*** (0.231)	1.699** (0.844)
N (observations)	109	110	109	109	109	109	109
Measure of fit (adjusted R^2)	0.497	0.312	0.548	0.495	0.165	0.746	0.199

Panel B. Correlations between Gallup/UBS expected returns and indicators of economic conditions (June 1998–December 2007)

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

Notes. Panel A shows regressions of 12-month subjective expected returns (survey average) on lagged values of the consumption–wealth ratio *cay* and the dividend–price ratio d/p. Expected real return is computed by subtracting 12-month expected inflation from the Michigan Survey. Excess return is computed by subtracting the one-year Treasury bond yield. The last column in panel A replaces subjective return expectations with the actual total realized 12-month returns on the S&P 500 index (SPTR). Newey–West standard errors (with three monthly lags) are shown in parentheses. Panel B shows correlations between the Gallup/UBS expected return measures and the various indicators of economic conditions.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

would be predicted by popular asset-pricing theories to be negatively related to expected equity returns:

(i) *Current employment rate* (inverse of unemployment rate);

(ii) *Past 12-month IP growth*;

(iii) *Current conditions, relative to a year ago* (Michigan Survey);

(iv) *Current business conditions, level* (Michigan Survey, imputed);

(v) *Expected business conditions* (Michigan Survey).

The *Employment rate* (one minus unemployment rate) is among the most fundamental measures of economic conditions. Popular theories would suggest that, when the employment rate is low, marginal utility and risk aversion tend to be high, thereby boosting the required equity risk premium. The second basic measure of actual economic conditions we consider is *Past 12-month IP growth*, which gauges the growth in the manufacturing component of industrial production. Again, asset-pricing theories such as that of Campbell and Cochrane (1999) predict that higher risk aversion and thus higher expected returns would follow unusually low growth.

The last three measures gauge *perceived* economic conditions and are based on responses to the Michigan Survey questions about the economy.[10] To measure investors' views of current economic conditions, we use the following question (A5):[11]

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

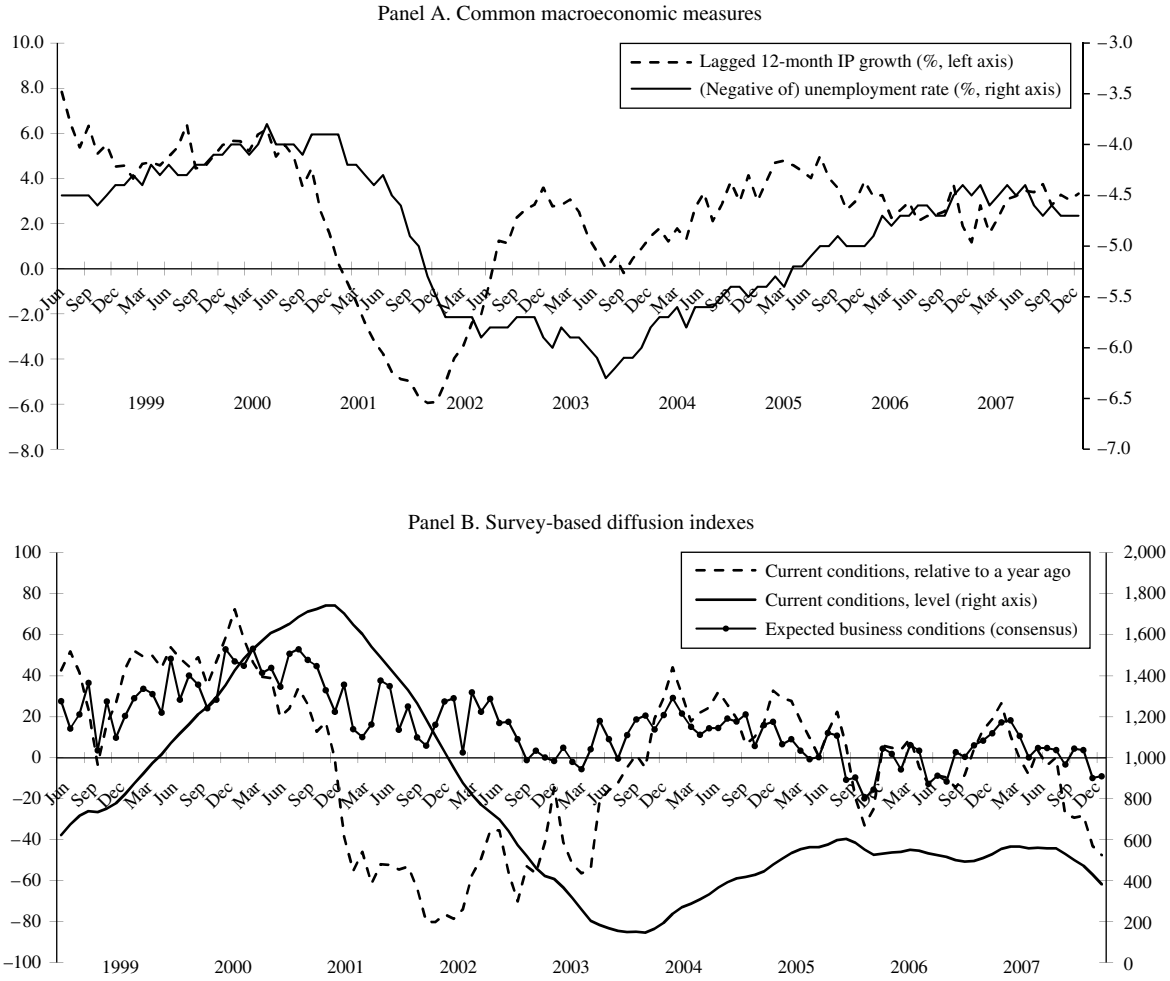
Responses are classified as (i) better now, (ii) about the same, or (iii) worse now. The variable *Current conditions, relative* is a diffusion index equal to the percentage that respond "better" minus the percentage that respond "worse." This variable ought to be highly positively correlated with measures of recent economic growth, such as *Past 12-month IP growth*. To get a proxy for the perceived "level" of current business conditions, we calculate the cumulative sum of *Current conditions, relative*. The resultant variable, *Current conditions, level*, is shown in Figure 3, panel B, along with *Current conditions, relative*.

To gauge investors' forward-looking views of economic conditions, we use the diffusion index

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

[11] The survey instrument is available at http://www.sca.isr.umich.edu/survey-info.php.

Figure 3 Alternative Measures of Economic Conditions



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

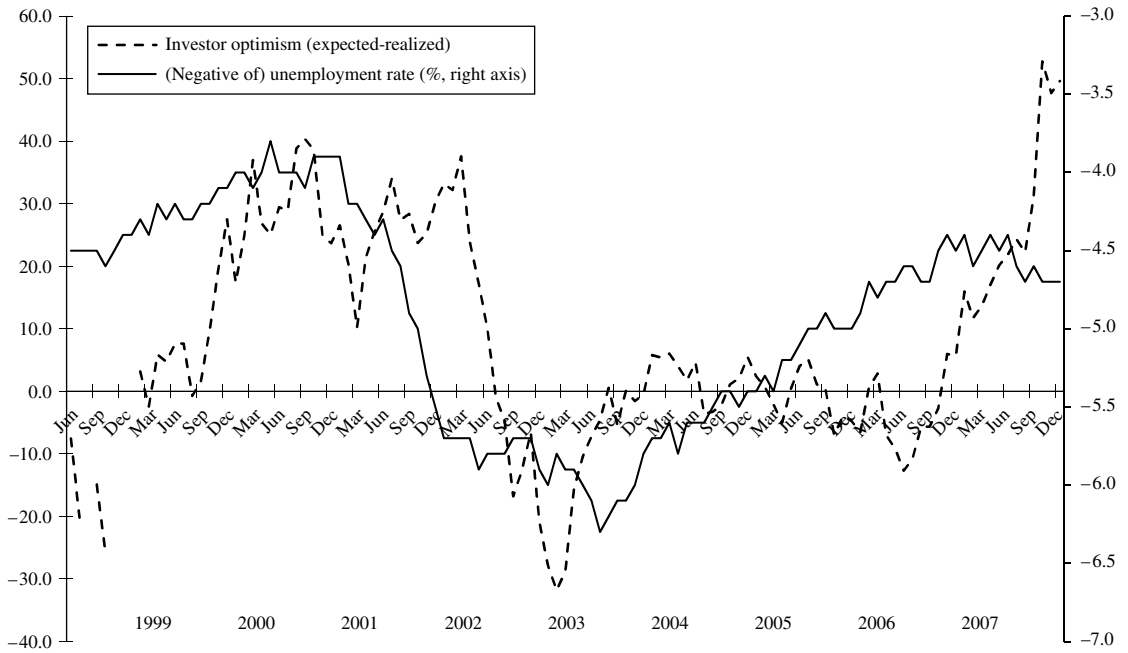
constructed by Reuters/Michigan from responses to the following question (A8; see Footnote 11):

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

The variable *Expected business conditions, consensus* is equal to the difference in shares of respondents expecting "good" and "bad" times ahead. Absent any link between expected economic performance and expected risk, theories tend to suggest at most a weak relationship between economic growth expectations and expected returns. But a model such as that in Constantinides and Duffie (1996), in which favorable economic conditions coincide with lower variance in idiosyncratic shocks to consumption growth, would predict lower expected stock returns in the face of more favorable *Expected business conditions*.

A simple visual comparison of panels A and B in Figure 3 suggests a fairly tight link between our two measures of actual conditions and household views of current and prospective economic conditions. Indeed, the pairwise correlations among these five variables from 1978 to 2007 are generally strongly positive, with a ρ of 0.90 between the employment rate and *Current conditions level* and a ρ of 0.71 between the *lagged IP growth rate* and *Current conditions, relative*. Interestingly, *Expected business conditions* is significantly positively correlated with all four measures of current conditions, actual or perceived.

Figure 4 Investor Optimism and the Business Cycle



Notes. The dashed line represents the difference between the mean of 12-month expected returns in the UBS/Gallup survey and the actual realized 12-month returns. This difference, labeled "investor optimism," is positive when investors overestimate the eventual returns, and negative when they underestimate them. The solid line shows one of the common measures of the business cycle: the (negative of the) unemployment rate. High values of this series represent benign labor market conditions at the time of the survey.

A general sense of how Gallup/UBS expected stock returns vary with these measures of economic conditions is provided by the matrix of correlation coefficients in panel B of Table 1. Each column corresponds to a measure of economic conditions, whereas the rows contain the alternative measures of expected returns examined in the earlier regressions. Again, without delving into the details, the broad implication of the plethora of *positive* correlations is unambiguous: the average investor's subjective expected return is decidedly procyclical, at least over the 10-year period covered by the Gallup/UBS data.

3.3. Do Subjective Expectations Forecast Returns?

Having established the procyclicality of subjective expected returns in the survey data, we turn to a direct test of whether subjective expectations forecast realized returns by regressing 12-month-ahead realized stock market returns on subjective survey expectations. Subjective beliefs consistent with the rational expectations framework would be indicated by an intercept term of 0 and a slope coefficient of 1. The results for nominal stock returns (on the S&P 500 index) are shown below with Newey–West adjusted standard errors in square brackets:

$$\begin{aligned} &\textit{Realized returns}_{t+12} \\ &\quad = \underset{[0.12]}{0.186} - \underset{[1.01]}{1.423} * \textit{Subjective expected returns}_t, \\ &N = 110, \ \text{adjusted} - R^2 = 0.04. \end{aligned}$$

Consistent with the indirect implications of the results in Table 1, the coefficient on subjective expectations is actually negative. We obtain very similar results with real or excess return realizations. Indeed, the results are virtually identical to those reported by Greenwood and Shleifer (2013), who use five different data sources for subjective investor expectations spanning various time periods.[12]

Although limited by the short sample, we can also examine how the gap between subjective expectations and realized returns varies over the business cycle. Figure 4 plots the survey forecast error, that is, the difference between the mean of subjective expected returns and realized 12-month returns, against the (negative of the) unemployment rate. This difference is positive when investors overestimate the eventual returns and negative when they underestimate them. Figure 4 suggests that this proxy for investor overoptimism tends to be high when labor market conditions are favorable ($\rho = 0.48$).

Reflecting on our observations on mean survey expectations, one may be tempted to dismiss *all*

[12] Greenwood and Shleifer (2013) use data from the Gallup survey (1996–2012), the Graham–Harvey CFO survey (2000–2012), the AAII survey (1987–2011), the Investors' Intelligence newsletter survey (1963–2011), and the Shiller survey of individual investor confidence (1999–2011). The longest of these surveys (II) contains 588 monthly readings. AAII and II surveys only collect data on shares of respondents that report "bullish" or "bearish" attitudes.

household investors' perceptions as a mere sideshow for asset pricing, in effect dismissing the relevance of the consumption CAPM framework for explaining asset prices. Instead, the second half of this paper uses investor-level data to address some key questions raised by these findings: (i) Do the expectations of wealthier household investors, who presumably wield disproportionate market influence, mimic the pattern of the average household's expectations, or are they more consistent with the assumptions of the asset-pricing literature? (ii) How do investor perceptions of risk vary with economic conditions? (iii) Is there evidence that the expected returns from the surveys are action relevant, i.e., are they related to respondents' portfolio allocations, and do they play a role distinct from perceptions of risk?

4. Michigan Survey Data and Variable Construction

4.1. Survey Description

Our household-level data are obtained from the Michigan Surveys of Consumer Attitudes and Behavior, conducted by the Survey Research Center (SRC) at the University of Michigan. Each month, the SRC conducts a minimum of 500 phone interviews, the data from which are used to compute a number of commonly cited gauges of economic conditions, such as the Index of Consumer Sentiment. A special supplement with questions pertaining to respondents' views about stock returns was added to 22 of the surveys conducted between September 2000 and October 2005.[13] These questions were asked only of households that reported at least $5,000 in stock or stock mutual fund holdings. Such households accounted for between 35% and 45% of the respondents in any given survey month.[14] Among these households, the median size of investments in equities was about $75,000.

The supplements contained questions on (i) expected average stock market returns over various horizons, (ii) the likelihood that particular *ranges* of outcomes would be realized, and (iii) the respondents' portfolio holdings.[15] In addition, we use individual data from the standard monthly survey that measures subjective assessments of macroeconomic conditions and of own economic prospects. We also use demographic information on respondents' age, education, income, and family status. Finally, we drop observations in which respondents did not reply to some of the key questions on stock market expectations, which reduced the sample size from 4,012 to 3,340 observations. We also excluded observations where the interviewer denoted the respondent as having a low "level of understanding" or a relatively poor "attitude" toward the survey, which trimmed another 116 observations from the sample.

4.2. Measuring Expected Returns, Perceived Risk, and Equity Holdings

We measure expected market returns from the question that asks, "Looking forward, what is the annual rate of return that you would expect a broadly diversified portfolio of U.S. stocks to earn, on average, over the next three years?" A follow-up question then asks if they would "expect the average returns over the next 10 to 20 years to be much different" and, if so, then what would they would expect. The respondent is similarly asked for their expected long-term returns on their *own* equity portfolio. Panel A of Table 2 reports summary statistics of these three measures of expected returns. Over the span of 22 surveys, the median investor reported expected annual returns of 10% over the long-term horizon, on both the market and their own portfolio, and about 8% over the shorter horizon. The interquartile range of responses runs from 7% to 12% for the longer horizon and from 5% to 10% for the shorter horizon. The returns distribution is right skewed, reflecting the presence of some upside outliers and the near absence of responses below zero. To minimize the potential influence of outlier responses, the regression results shown below are estimated on a censored sample where we have excluded observations in which the expected return is above the 98th percentile of responses in any given month.[16]

Perceptions about the risk in stock returns are inferred from a question that asks for the likelihood that the average return over the next 10 to 20 years will be close to their expected average return: "Since no one knows future stock returns for sure, on a scale

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

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

[15] The survey document is available upon request.

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

Table 2 Summary Statistics on Supplemental Survey Questions

Panel A. Expected returns

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

Panel B. Perceived risk in 10-year market returns

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

Panel C. Stock holdings and portfolio shares

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

	N	Mean	10th pct.	25th pct.	Median	75th pct.	90th pct.
Stock holdings	3,220	204,977	10,000	25,000	75,000	200,000	450,000
			min	1st pct	99th pct	99.9th pct	max
Stock holdings—extreme percentiles			5,000	5,000	2,000,000	10,000,000	14,000,000

Notes. This table summarizes the basic data on investor stock market expectations and portfolio choices obtained from a series of special supplements to the Michigan Survey between September 2000 and October 2005. Panel A reports the distribution of investor expectations of average returns on their own stock portfolio and on the aggregate market over different horizons. All reported returns are annual averages over the stated investment horizon. Panel B reports statistics on the assessed likelihood that returns fall in various ranges, or gauges of expected risk. *Uncertainty* is defined as the reported likelihood that realized returns will fall outside the four-percentage-point band centered on respondent's expected long-term market return. From this measure we impute a standard deviation of mean returns ($\sigma_{10\text{–}20}$) assuming asymptotic normality: $\sigma_{10\text{–}20} = -0.02/\Phi^{-1}$ ($0.5 * \textit{Uncertainty}$). Panel C describes self-reported portfolio allocations and stock holdings of survey respondents. Note that the portfolio allocation question did not appear on the first six surveys. Mean portfolio share is computed assuming mean observation within each range equals the midpoint of that range. All panels exclude observations that fail the data quality filter as described in text.

of 0 to 100, where 0 means absolutely no chance and 100 means absolutely certain, what do you think the chance is that the average return . . . will be within two percentage points of your guess, that is, between $(X - 2)$ and $(X + 2)$ percent per year [where X is the respondent's expected 10- to 20-year return]?" The responses thus provide an estimate of the perceived probability mass in the four-percentage-point band centered on the reported expected return. It is more convenient to discuss the complement of this measure—the probability that average annual returns will fall *outside* the band—which we call *Uncertainty*. As shown in panel B of Table 2, the empirical distribution of *Uncertainty* spans a wide range, though there is a large density of responses at 50%, a common feature of survey questions that elicit probabilistic assessments. As argued by Bruine de Bruin et al. (2002), a 50/50 response to open-ended probabilistic questions can indicate epistemic uncertainty—a self-perceived lack of knowledge.[17] Finally, for the analysis that follows, we drop the small fraction of observations in which the response was either a 0% or a 100% chance, which are logically problematic and cannot be mapped to an implied standard deviation.

For the vast majority of observations, this measure of the return risk can be translated into the conventional standard deviation if we assume annual returns to be lognormally distributed, resulting in asymptotically normal time averages. Defining *Uncertainty* as Prob$\lvert R - R^e \rvert > 0.02$, the implied standard deviation of average returns is given by $\sigma_{10\text{–}20} = -0.02/\Phi^{-1}(0.5 * \textit{Uncertainty})$. The *annual* standard deviation then requires an assumption on the horizon in the 10- to 20-year range specified in the question.

Panel B of Table 2 reports the distribution of $\sigma_{10\text{–}20}$. The midpoint and the interquartile range of

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

these imputed standard deviations are somewhat lower than historical averages, though not unreasonable. For instance, assuming a 20-year horizon, the median implied standard deviation of 2.96% represents an annual return volatility of $2.96 * \sqrt{20}$ or 13.2%, about two-thirds of the historical average of 18% (Campbell et al. 1997). A 10-year horizon implies an annual volatility of 9.4%, at the low end of historical experience.

The third key variable drawn from the survey supplement is the respondent's share of financial wealth invested in equities. In all but the first four survey months, respondents were asked to indicate one of five buckets, or ranges, that best approximates the share of their financial assets invested in stocks or stock mutual funds. Responses, summarized in panel C of Table 2, are fairly evenly distributed, with about a fifth of the respondents having less than 10% invested in equities, and a third having over 50% in equities. We impute a cardinal measure of equity portfolio share using the midpoint of the reported range; by this measure, the sample average equity share is 37%.[18] In addition, based on a question that asks for the value of total stock holdings, panel C shows the distribution of the absolute size of respondents' equity holdings, which span the range from \$5,000 to \$14 million.

4.3. Perceived Economic Conditions, Past Returns, and Demographics

To exploit the cross-sectional variation across investors, we make use of individual responses to questions on perceived economic conditions. In particular, we gauge the respondent's views of current conditions from question (A5) defined in §3.2. We code the variable *Current conditions* as 1, 0, or −1 depending on whether the individual responds that conditions are better, the same, or worse. Similarly, we use question (A8) asking if it is more likely that "we'll have continuous good times during the next 5 years . . . or . . . periods of widespread unemployment . . .?" to define the variable *Expected conditions*. It is set to 1 or −1 for responses of "good times" or "bad times," respectively, or to 0 when the response was ambiguous.[19]

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

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

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

4.4. Household Wealth

Last, but quite central to our cross-sectional analysis, we use several alternative methods to gauge respondent wealth. This enables us to examine whether the beliefs of more wealthy investors, who presumably have a greater collective bearing on asset prices, differ from those of the less wealthy. In particular, if wealthier households are on average more sophisticated financially, they might also have systematically different views on the relationship between economic conditions and future equity returns.

The special survey module provides one rough but straightforward estimate of respondent wealth: the approximate dollar value of the equity holdings divided by the share of their financial assets invested in equities (the latter being available in all but the first four survey months). This estimate has some drawbacks. Notably, it may be subject to large approximation errors because the ranges of both the size and the share buckets are quite wide. Also, given the huge swings in equity prices over the 1990s and early 2000s, it is possible that the respondents' financial wealth is endogenous to their choice of portfolio allocation

[18] This distribution is qualitatively similar to that reported by equity owners in the 2001 Survey of Consumer Finances. 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%. About 18% of equity owners report shares of more than 75%.

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

(and thus their beliefs). Finally, one might believe that broader measures of wealth are more indicative of potential household influence on asset prices.

To impute alternative estimates of respondent wealth, we use the Survey of Consumer Finances (SCF). In particular, using the sample of stock owners in the 2004 SCF, we regress the log of wealth (defined in several different ways) on a set of covariates available in both data sets. These include household income, home ownership status, age, education, marital status, and the number of children. Our primary estimate of imputed wealth includes all household financial assets, defined as the sum of household-controlled retirement and nonretirement assets held in financial instruments (including cash), but we also consider broader wealth measures for robustness. After estimating wealth regressions on the SCF data, coefficient estimates are used to impute wealth values for the Michigan Survey respondents.[20] The log of imputed wealth is then used to define weights in weighted-least-squares specifications.

5. Regression Results for Expected Returns and Perceived Risk

5.1. Determinants of Expected Returns

Results from regressing respondents' 3-year (medium-term) and 10-year (long-term) expected returns on their perceptions of economic conditions and past returns are presented in Tables 3 and 4, respectively. Of the two horizons, the three-year horizon should provide the better measure of business-cycle-related variation in expected returns, whereas the responses for the longer-term horizon should serve as a useful comparison. As mentioned earlier, to minimize outlier influence, the regressions exclude respondents whose expected returns were above the 98th percentile response in each survey.[21] In every specification, the set of covariates includes gender and education level indicators.

The baseline specification in column (1) focuses on gauging the effect of *Past market return*, the factor analyzed most extensively in previous survey studies of subjective expected returns. Similar to the measure proposed by Malmendier and Nagel, *Past market returns* is constructed as a weighted average of historical returns, but with the extent of look-back determined by the respondent's self-reported years of investment experience (from the survey), rather than age. As in previous studies, the results here suggest that past performance has a significant positive effect on expected returns. In particular, the coefficient estimate of 0.098 implies that a 10-percentage-point increase in past annual returns raises expected annual returns nearly 1%. This effect is about one-sixth the magnitude found by Malmendier and Nagel (2011), a discrepancy that might reflect the different sample period or perhaps our question's longer horizon—three years rather than 12 months.[22] The other result worth noting is the positive coefficient on the gender dummy, suggesting men are on average more optimistic about stock returns, a result that also generally accords with the literature.

Specification (2) adds our survey-based measures of individual economic perceptions. As can be seen, consistent with aggregate correlations, the coefficient estimates on the respondent's own view of *Current conditions* and *Expected conditions* are both positive, with the latter being highly statistically significant. The coefficient of 0.496 implies a modest effect: for instance, a change in expected business conditions from poor to neutral (from -1 to 0) raises expected annual three-year returns by about a half percentage point. In any case, as in the aggregate survey analysis, by either measure, there is no evidence here that expected returns vary negatively, or countercyclically, with perceptions of economic conditions.[23] Finally, the positive coefficient on *Own income prospects* suggests that a respondent's assessment of their own chances of seeing real income growth is positively associated with their return expectations. For instance, an increase in perceived probability of real income growth of 50% raises expected returns about a half percent. At the same time, after controlling for this measure of individual optimism, gender is no longer statistically significant for explaining expected returns.

This regression conflates the time-series and cross-sectional relationship between perceived macroeconomic conditions and subjective return expectations. Given the observed level of stock prices at any point in time, investors that are more optimistic about economic conditions (and future news about cash flows) ought to have higher subjective expectations of market returns. This is a simple consequence of a

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

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

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

[23] 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."

Table 3 Expectations of Medium-Term Stock Market Returns

	OLS full sample	OLS full sample	OLS full sample	OLS full sample	Wealth weighted	Above-median wealth
Regressors	(1)	(2)	(3)	(4)	(5)	(6)
Current conditions, relative		0.146	0.051	0.216**	0.243**	0.402**
		(0.123)	(0.082)	(0.102)	(0.110)	(0.180)
Current conditions, level (aggregate)				0.385*	0.433**	0.605***
				(0.191)	(0.185)	(0.185)
Expected business conditions		0.496***	0.429***	0.392***	0.396***	0.501***
		(0.082)	(0.074)	(0.076)	(0.081)	(0.152)
Expected business conditions (aggregate)				2.214**	2.062**	2.048*
				(0.821)	(0.819)	(1.024)
Past market returns, experience weighted	0.098***	0.095***	0.030***	0.050***	0.049***	0.039
	(0.022)	(0.020)	(0.010)	(0.015)	(0.015)	(0.024)
Gender (1 = male)	0.526***	0.249	0.341*	0.283	0.310*	0.412
	(0.160)	(0.169)	(0.176)	(0.169)	(0.174)	(0.245)
Own income prospects		1.105***	0.875**	0.806**	0.909**	0.974***
		(0.364)	(0.321)	(0.326)	(0.322)	(0.310)
Constant	7.279***	7.070***		7.315***	7.249***	7.024***
	(0.249)	(0.311)		(0.285)	(0.258)	(0.467)
Survey fixed effects	No	No	Yes	No	No	No
N (observations)	2,962	2,855	2,855	2,855	2,784	1,361
Measure of fit (adjusted R^2)	0.035	0.061	0.095	0.078	0.083	0.125

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

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

present value identity that ties commonly observed current prices with heterogeneous expectations of future cash flows, and does not depend on the asset-pricing model. Hence, the cross-sectional component of expected economic conditions can be thought of as a test for internal consistency of investor beliefs.

On the other hand, the time-series component can serve to discriminate between asset-pricing models. Whether the surveyed investors' optimism about future cash flows translates into optimistic subjective returns depends on who prices assets in equilibrium. In an economy populated by identical extrapolative investors with constant risk aversion, subjective expected returns would be *flat* over the business cycle, because these investors jointly bid up prices until their expectations match the required rate of return. On the other hand, in an economy with a mix of extrapolative and rational expectations investors, the extrapolative investors can still have procyclical return expectations in equilibrium, whereas objective expected returns would be countercyclical (Greenwood and Shleifer 2013). Finally, in a benchmark asset-pricing model with countercyclical risk aversion, expected returns—both objective and subjective—would be countercyclical.

The simplest way to isolate the cross-sectional variation in beliefs is by introducing time dummies, as done in specification (3). There, we see that the effects of business conditions, which are now purely cross-sectional, remain strongly positive, suggesting internal consistency of respondents' beliefs. An alternative approach that allows us to separate and directly gauge the time-series variation in the Michigan Survey is to replace the time dummies with two survey-level factors—the consensus view of future economic conditions (the diffusion index measure of *Expected conditions*) and our consensus measure of the level of current conditions (the cumulative sum of *Current conditions, relative*).

As can be seen in column (4), the coefficients on both of the time-series measures of economic conditions are positive and significant, consistent with procyclical subjective beliefs. What is more, after controlling for the consensus view of current conditions,

Table 4 Expectations of Long-Term Stock Market Returns

	OLS full sample	OLS full sample	OLS full sample	OLS full sample	Wealth weighted	Above-median wealth
Regressors	(1)	(2)	(3)	(4)	(5)	(6)
Current conditions, relative		0.014	0.028	0.048	0.030	0.090
		(0.125)	(0.104)	(0.121)	(0.114)	(0.138)
Current conditions, level (aggregate)				0.090	0.139	0.482*
				(0.170)	(0.176)	(0.236)
Expected business conditions		0.433***	0.339***	0.355***	0.355***	0.306*
		(0.115)	(0.105)	(0.106)	(0.112)	(0.153)
Expected business conditions (aggregate)				2.310**	2.292**	1.931**
				(0.914)	(0.924)	(0.897)
Past market returns, experience weighted	0.053**	0.053***	0.030**	0.027*	0.024	−0.004
	(0.021)	(0.018)	(0.012)	(0.015)	(0.016)	(0.032)
Gender (1 = male)	−0.127	−0.344	−0.281	−0.313	−0.330	−0.345
	(0.202)	(0.207)	(0.204)	(0.204)	(0.217)	(0.299)
Own income prospects		1.170***	1.040***	0.987***	1.104***	1.110**
		(0.323)	(0.295)	(0.303)	(0.330)	(0.421)
Constant	9.759***	9.437***		9.418***	9.445***	9.939***
	(0.315)	(0.334)		(0.366)	(0.329)	(0.534)
Survey fixed effects	No	No	Yes	No	No	No
N (observations)	2,987	2,879	2,879	2,879	2,808	1,371
Measure of fit (adjusted R^2)	0.007	0.022	0.041	0.028	0.031	0.043

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

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

the estimated coefficient on the respondent's own view of current conditions becomes larger and statistically significant. Finally, adding the aggregate measures of economic conditions reduces the estimated marginal influence of the still significant *Past market returns*. Presumably, past market returns contain much of the same times series information as aggregate economic conditions.

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

The bottom line from this exercise is unambiguous. In both of these regressions, all of the variables measuring perceived economic conditions remain positive and significant. Even more striking, the coefficients on most of those regressors are larger in these regressions. Also somewhat interesting is that the R^2 of these regressions, particularly (5), are higher (and root-mean-square errors are lower) than that for the unweighted full sample (3). The somewhat stronger estimated effects for the wealthier investors are plausibly rationalized by the presumption that they are more attuned to, or have stronger convictions on, the stock market and economic conditions.

Table 4 shows results from repeating this analysis for expected 10- to 20-year annual returns. The qualitative pattern of results is quite similar, though with the long-term expected returns some of the variables have more attenuated effects, as one might expect.

For instance, *Past returns* has a coefficient of about half the size compared with the Table 3 regressions. To the extent that individual investors extrapolate from their historical experience of stock returns, they apparently do not expect persistence to last over the long term. Perhaps the biggest difference we find in Table 4 is that the coefficient on current economic conditions, although positive, is never significant; in addition, aggregate *Current conditions* are marginally significant in only one specification. Here again, it seems quite reasonable that investors expect current conditions to matter over a 3-year horizon, but not a 10- to 20-year horizon. In contrast, the effects of the forward-looking variables (*Expected conditions*, individual and consensus, and *Own income prospects*) have roughly the same coefficients as in the three-year return regressions. Finally, we again find little or no difference between equal-weighted and wealth-weighted results.

5.2. Determinants of Perceived Risk

As described earlier, we measure perceived risk from a respondent's assessment of the likelihood market returns will fall outside the four-percentage-point band centered on their expectation for long-term (10- to 20-year) annual stock returns. We call this probability *Uncertainty*, with higher values indicating higher perceived risk.[24] To gauge how perceived risk varies with perceptions of business conditions, we regress *Uncertainty* on the respondent's view of both *Current conditions* (relative to 12 months ago) and *Expected conditions*.[25] The regressions control for the potential influence of several demographic factors, including gender, self-reported years of investment experience, and level of education. We also consider time dummies that control for survey month.

As shown in column (1) of Table 5, the coefficient on *Expected conditions* is negative and statistically significant, implying that respondents expecting favorable economic conditions over the next few years are less uncertain about equity returns. On the other hand, *Current conditions* has no statistical effect on *Uncertainty*, which is perhaps unsurprising since uncertainty is being measured with respect to 10-year-ahead returns. Interestingly, the respondent's *Own income prospects* has a highly significant and large negative coefficient. On its face, this suggests that investors who feel more optimistic about their personal economic prospects also perceive stock market returns to be less risky. Alternatively, this regressor may convey quantitative information about economy-wide growth prospects that the more qualitative *Expected conditions* fails to pick up. If so, it provides further evidence that perceived equity risk is countercyclical.

In contrast with our findings for expected returns, *Uncertainty* is strongly influenced by demographic characteristics. Gender, the only such characteristic that influenced expected return, has a large effect on perceived risk: the coefficient implies that males tend to report a value for *Uncertainty* that is 10 percentage points lower than that of females. This result is consistent with Barber and Odean (2001), which finds that males hold riskier portfolios and trade more often. The authors attribute these results to greater overconfidence in own trading abilities among male investors, pointing out that male overconfidence is a well-established finding in a substantial literature in psychology.[26] Our result is also consistent with the broader behavioral literature (e.g., Weber et al. 2002), which finds that women tend to report higher risk assessments than men in many domains.

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

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

[24] 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 et al. (2013). The relative importance of these two interpretations presents a difficult and interesting question, which is left for future research.

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

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

Table 5 Perceived Risk in 10-Year Market Returns

Regressors	Full sample (1)	Full sample (2)	Wealth weighted (3)	Above-median wealth (4)	Excluding 50% responses (5)
Current conditions, relative	0.757	0.243	0.725	0.429	1.115
	(0.508)	(0.590)	(0.499)	(0.654)	(0.742)
Expected conditions	−1.813***	−1.802***	−1.836***	−2.045***	−2.707***
	(0.428)	(0.417)	(0.470)	(0.612)	(0.641)
Years of investment experience (log)	−1.281***	−1.213***	−1.212***	−1.128	−1.737***
	(0.388)	(0.401)	(0.413)	(0.804)	(0.580)
Gender (1 = male)	−10.679***	−10.280***	−10.367***	−9.744***	−14.353***
	(1.472)	(1.436)	(1.459)	(1.675)	(2.340)
Own income prospects	−4.046***	−3.903***	−4.040***	−3.778***	−5.730***
	(0.728)	(0.756)	(0.765)	(1.160)	(1.073)
Education (some college)	−2.791**	−2.603*	−3.069**	−7.816***	−3.912*
	(1.276)	(1.315)	(1.340)	(2.714)	(2.060)
Education (college)	−6.675***	−6.562***	−7.138***	−11.185***	−9.503***
	(1.181)	(1.197)	(1.194)	(2.832)	(1.772)
Education (graduate)	−6.895***	−6.968***	−7.632***	−12.180***	−10.188***
	(1.088)	(1.094)	(1.087)	(2.383)	(1.706)
Constant	61.190***		61.199***	64.740***	65.552***
	(1.833)		(1.835)	(3.451)	(2.893)
Survey fixed effects	No	Yes	No	No	No
N (observations)	2,898	2,898	2,827	1,394	1,912
Measure of fit (adjusted R^2)	0.075	0.080	0.076	0.077	0.102

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

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

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

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

The remaining columns in Table 5 document the robustness of the column (1) results to the inclusion of time dummies (survey fixed effects) and to overweighting wealthier respondents. As in the previous section, we estimate using weighted least-squares, with log (imputed) financial wealth as the regression weight (3), or using OLS on the wealthier half of the sample (4). Either way, we find no attenuation in any of the key findings; if anything, coefficients tend to increase in magnitude. As a final robustness test of our *Uncertainty* regressions, we reestimate (1) on a subsample that excludes households with the (most popular) response of 50% to the *Uncertainty* question. As noted earlier, some of those respondents may have

been expressing lack of opinion, rather than a specific probability of 50%. If so, excluding such responses could strengthen the estimated relationships. Indeed, in column (5) the coefficients on almost all of the variables increase in magnitude relative to those in column (1); moreover, they retain statistical significance despite the drop in sample size.

6. Portfolio Holdings: Do Investors' Actions Reflect Beliefs?

The relevance of our inferences about investor beliefs hinges on whether those beliefs, as measured in our data, actually influence portfolio allocation decisions. This section tests for such a relationship using data on respondents' self-reported shares of equity in their financial portfolios. The most succinct test of the relevance of reported beliefs involves comparing (expected) Sharpe ratios across respondents reporting different portfolio exposures to equities. Here, Sharpe ratios are measured using the respondents' expected 10-year returns on their own equity portfolios, less the 10-year Treasury bond yield in the survey month, divided by the implied standard deviation of returns on the broad market. As shown in panel A of Table 6, there is a monotonic upward progression in median and mean Sharpe ratios as we move from respondents in the lowest equity portfolio share bucket to those in the highest bucket. Moreover, differences in the median Sharpe ratios between households with low (<25%), middle (25% to 50%), and high (>75%) equity exposures are all highly statistically significant.

To test whether both components of the Sharpe ratio have explanatory power for portfolio holdings, we estimate a regression motivated by the classic portfolio choice model of Samuelson (1969). That model implies that the portfolio share invested in stocks should be proportional to the expected risk premium and inversely proportional to the product of expected variance and the coefficient of relative risk aversion: $share_i = (R_i^e - R^f)/\gamma_i \mathrm{Var}_i(R)$. Taking logs on both sides yields a linear specification:[27]

$$\log(share_i) = \beta_0 + \beta_1 \log(R_i^e - R^f) + \beta_2 \log(\mathrm{Var}_i(R)) + \varepsilon_i. \quad (1)$$

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

In estimating (1), a respondent's (equity) *share* is measured as the portfolio equity share bucket midpoint, whereas R^f is measured by the yield on the 10-year Treasury bond at the time of survey. Results from OLS regressions are reported in panel B of Table 6. To focus on the cross-sectional relationship between beliefs and portfolio choice, all regressions include survey-month dummies, though results without time dummies are similar.[28] In column (1), coefficient estimates on both expected returns and perceived risk are statistically significant and their signs are consistent with theory: equity portfolio shares increase with expected (excess) returns and decrease with expected risk. Column (2) presents near-identical coefficient estimates for wealth-weighted least-squares, with higher-wealth respondents receiving greater weights, as in Tables 4 and 5.[29]

Although these results are statistically strong, the coefficients are quite small compared to the predictions of the theoretical model, making a literal interpretation somewhat problematic. One plausible explanation for smaller coefficients is measurement error in our expectations variables (particularly perceived risk), which could cause attenuation bias that pushes both β's toward zero. In an attempt to address this concern, we examined an instrumental variable specification (not shown) in which expected volatility and excess returns are instrumented by their respective ranks.[30] In this variant, the magnitude of the coefficient on instrumented volatility variable rises to -0.13, whereas that on expected excess returns is virtually unchanged. Another, more economic, rationale for the low portfolio sensitivity to expectations is inertia arising from transaction costs or inattention, consistent with existing empirical evidence on infrequent portfolio rebalancing (Ameriks and Zeldes 2004).[31]

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

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

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

[30] 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.

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

Table 6 Investor Expectations and Portfolio Choice

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

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

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

Dependent variable:	Log portfolio fraction in stocks		Portfolio fraction of stocks	
Regressors	Baseline (1)	Weighted by financial wealth (2)	Baseline (3)	Weighted by financial wealth (4)
Log expected excess returns	0.045***	0.051***		
	(0.012)	(0.013)		
Log expected volatility (σ_i^2)	−0.094***	−0.092***		
	(0.013)	(0.014)		
Expected excess returns (%)			0.328**	0.346**
			(0.124)	(0.132)
Uncertainty (%)			−0.217***	−0.211***
			(0.027)	(0.028)
Survey fixed effects	Yes	Yes	Yes	Yes
N (observations)	2,044	2,044	2,243	2,243
Measure of fit (adjusted R^2)	0.042	0.043	0.046	0.045

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

**Significant at the 5% level; ***significant at the 1% level.

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

7. Conclusion

Using data from a Gallup/UBS survey of individual investors and from a supplement to the Michigan Surveys of Consumer Attitudes and Behavior, we examine the stock market beliefs of household investors. This is an important subset of market participants, not only because of their large holdings of equity, but also owing to their central role in asset-pricing models that have been fashioned to rationalize the observed pattern of conditional expected returns. We show that, over a period of about 10 years, subjective expectations of stock returns exhibit a strong negative correlation with both the dividend–price ratio and the consumption–wealth ratio. This contrasts sharply with the positive coefficients those ratios have in predictive regressions for actual stock returns. Indeed, as this contradiction intimates, we find that subjective expected returns have a negative coefficient (around *negative* one) in forecasting regressions for actual stock return, albeit with only marginal statistical significance. Moreover, we find that subjective expected returns are positively correlated with direct measures of macroeconomic strength, including the employment rate, recent growth, and household perceptions of current or future business conditions. Again, this

inference seems at odds with the behavior of expected returns inferred in the asset-pricing literature.

The microdata from the Michigan Survey corroborates this evidence on the procyclicality of subjective expected returns and establishes that this pattern holds both in the cross section of respondents and over time. We also find that respondents perceive lower risk in stocks when they expect favorable economic conditions, which is not inconsistent with much of the empirical and theoretical modeling of the time variation in return volatility. This result holds up even while we control for household investors' views on their own economic prospects as well as some demographic factors that are also found to have a strong influence on risk perceptions. Together, these results imply that forward-looking subjective Sharpe ratios are procyclical.

By exploiting the demographic information in the micro survey data, we establish that all of the results are robust to techniques that give greater weight to wealthier investors, that is, those with more financial assets. Perhaps just as importantly, the microdata also indicate that respondents' portfolio choices tend to be consistent with their reported beliefs. In particular, we find that equity exposures tend to increase with self-reported expected returns and decline with perceived risk. All told, our findings expose a fault with the key presumption of the standard asset-pricing models—that the subjective beliefs of individual investors are similar to, or even positively correlated with, objective expectations.

One implication of our findings is that at least part of the *realized* time-varying equity risk premium is due to the pattern of investor beliefs about the economy and prospective stock returns. Household investors tend to associate favorable business conditions with high and less volatile stock returns. They act on these expectations by shifting assets into equities and driving up equity prices, which also pushes down the dividend yield and the consumption–wealth ratio. At such times, household investors have unduly optimistic expectations, and the resultant boost to stock valuations produces the preconditions for lower-than-average returns going forward.

This story is most easily understood in the context of models populated by heterogeneous investor types, as proposed by Cutler et al. (1990), DeLong et al. (1990), Dumas et al. (2009), and Greenwood and Shleifer (2013). In such models, rational (professional-type) investors take positions that reflect knowledge of the current portfolio demands of nonrational (household-type) investors. However, owing to risk aversion and possibly some frictions (e.g., limited investment horizon or capital), rational investors do not entirely neutralize the influence of household investor beliefs, which affect asset prices in equilibrium. In some model settings, rational investors might even anticipate greater profitability in trying to "ride the bubble" (Brunnermeier and Nagel 2004, Nofsinger and Sias 1999). And studies such as Barber et al. (2009) have already shown that trading propensities of retail investors do indeed influence subsequent returns, particularly for small-cap stocks. In any case, our findings should provide some discouragement toward efforts aimed at modeling observed time-varying expected returns as the outcome from a fully rational representative agent consumption CAPM framework.

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