Long-term Beliefs and Financial Choices

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Abstract

We hypothesize that long-term (10-year) expectations will help explain individuals' choices even after accounting for near-term (1-year) expectations due to cognitive uncertainty associated with near-term signals. Consistent with our hypothesis: (1) variation in long-term expected returns is more important than variation in near-term expected returns in explaining heterogeneity in both the fraction of wealth invested in equity and stock market participation, (2) long-term beliefs help explain trading decisions, (3) long-term beliefs exhibit (proportionally) less heterogeneity than near-term beliefs, and (4) respondent characteristics better explain variation in long-term than near-term beliefs.

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1 Introduction

Variation in individuals' subjective beliefs regarding the distribution of equity returns plays a central role in both theoretical and empirical household finance and asset pricing. A fast-growing empirical and experimental literature, however, establishes a number of puzzling stylized facts. For example, inconsistent with traditional models, subjective expected returns differ from objective measures of expected returns, vary greatly across individuals, and these individual differences persist over time. Moreover, although variation in expected returns exhibits a statistically meaningful relation with (1) the fraction of wealth held in equity, (2) stock market participation, and (3) trading decisions, these relations are surprisingly weak. That is, inconsistent with the vast majority of both traditional and behavioral asset pricing models, there is only weak transmission from beliefs to behavior (known as the "attenuation puzzle"). For example, Giglio, Maggiori, Stroebel, and Utkus (2021) estimate that the empirical relation between heterogeneity in expected returns and the fraction of wealth held in equity accounts for only about 10% of the theoretical value from a standard Merton (1969) model.

Extant evidence, however, is largely based on respondents' near-term expectations (primarily over a 1-year horizon) and most models of household finance or behavioral asset pricing assume an individual perceives a single, horizon-independent, return distribution.[1] In this study, we posit that forecast horizon will impact these relations. Specifically, we hypothesize that an individual's near-term expected return comprises both an expected return absent any signal (their "prior") and a temporary noisy signal. For example, an individual may believe stocks usually have an expected annual 5% return, but forecast, given current economic conditions, next year's market return will be 7%. Recent experimental evidence (discussed in the next section) suggests, however, that if individuals have subjective uncertainty about their signal, their decision will be a function of both their prior and their signal and this uncertainty can help explain the weak transmission between beliefs and actions. Moreover, given signals are temporary deviations from priors, heterogeneity in long-term (near-term) expected returns will better capture variation in priors (signals) than heterogeneity near-term (long-term) expected returns. As a result, individuals' long- and near-term expected returns may both play a role in explaining their behavior and the relative importance of these components will be a function of the uncertainty associated with each component. For example, individuals may have greater confidence in their long-term forecast of market returns than their near-term forecasts, and as a result, heterogeneity in long-term forecasts may help explain

[1] For instance, in Merton (1969), both excess returns and variance increase linearly with time resulting in a horizon-independent optimal risky share.

respondents' choices—including risky share, equity market participation, and trading—even when controlling for near-term expectations.

Employing a seven-year representative panel of Americans (the American Life Panel, ALP) that collected respondents' perceived likelihoods markets rise, rise at least 20%, and fall at least 20% over both the next year and decade, our empirical analysis provides substantial support for our hypotheses.[2] First, we find evidence that temporary signals help explain heterogeneity in subjective expectations. Specifically, if temporary signals played no role in expectations then expected returns over the next decade are simply 10 times (continuously compounded) expected returns over the next year and, as a result, the cross-sectional standard deviation of long-term expected returns will be 10 times the cross-sectional standard deviation of near-term expected returns. In contrast, if temporary signals contribute to heterogeneity in beliefs, then the cross-sectional variation in near-term expected returns will be (proportionally) greater than the cross-sectional variation in long-term expected returns. Consistent with the hypothesis that heterogeneity in temporary signals play an important role in explaining heterogeneity in near-term expected returns, cross-sectional variation in expected returns over the next year averages 370% of the value implied by variation in long-term beliefs in a model where signals play no role in explaining expected return heterogeneity.

Second, if respondent characteristics are related to priors (e.g., individuals with greater education have higher expected returns) and signals are mean zero temporary deviations from priors, then characteristics will better explain heterogeneity in long-term expected returns than near-term expected returns. That is, in this framework, temporary signals add "noise" and weaken the relation between the characteristic and near-term (relative to long-term) expected returns. Further consistent with the hypothesis that signals play a more important role in near-term (relative to long-term) expected return heterogeneity, a standard set of respondent characteristics (e.g., gender, race, income, education, retirement status, employment status, age, and health) explains 11% of the variation in long-term expected returns versus 2% of the variation in near-term expected returns.

Third, long-term expectations are a much more important determinant of the fraction of wealth allocated to equities than near-term beliefs. Our baseline tests (when the sample includes all respondents including those with no equity exposure) suggest long-term expected returns are 10 times as important as near-term expected returns in explaining variation in the fraction of wealth

[2] This study focuses on the cross-sectional relations between risky share, participation, trading, and respondent characteristics for near- versus long-term beliefs. In related studies, we use the American Life Panel data to examine the time-series patterns in near- and long-term perceived return distributions (Sias, Starks, and Turtle (2024a)) and how question structure influences the estimation of perceived variance ratios (Sias, Starks, and Turtle (2024b)).

invested in equity. Moreover, the economic magnitude associated with long-term beliefs is much closer to theoretical values than that found when examining near-term beliefs. For example, consistent with previous work, the coefficient associated with expected returns for the next year is only about 7% of a plausible theoretical value (when ignoring long-term expectations). In contrast, the coefficient associated with expected returns for the next decade is 67% of the corresponding theoretical value. Even in cases where the relations are weaker (e.g., when excluding individuals with no wealth invested in equities), long-term expectations remain much more important than near-term expectations in explaining heterogeneity in the fraction of wealth invested in equity.

Fourth, consistent with the risky share evidence, long-term beliefs are much more important than near-term beliefs in explaining equity market participation. In a regression of stock market participation on both 1- and 10-year expected returns, for example, a one-standard deviation larger long-term expected return has five times the impact of a one-standard deviation larger near-term expected return in explaining which individuals hold equities.

Fifth, despite near-continuous adjustments to their near- and long-term reported expectations, respondents rarely adjust their portfolios (consistent with previous evidence of both inertia and cognitive uncertainty). For instance, the typical American with direct (i.e., non-retirement account) equity holdings reports a change in near-term or long-term expectations in 94% of the quarterly trading windows we examine. These investors, however, only adjust their equity exposure in 27% of the trading windows. The inertia is even stronger in retirement accounts, as investors rebalance retirement accounts or adjust contributions in less than 15% of the investor-trading window observations. Despite the weak transmission from beliefs to trading, we find evidence that both near- and long-term beliefs are associated with trading. In particular, relative to non-traders, buyers tend to exhibit more bullish long-term expected returns consistent with the hypothesis that respondents slowly incorporate their expectations into choices. In contrast, relative to non-traders, sellers tend to hold more bearish near-term beliefs, but more bullish long-term beliefs. That is, individuals appear more likely to sell when their near-term beliefs (negatively) deviate more from their long-term expectations.

Our study has implications for understanding both investor behavior and asset pricing. First, our results suggest there is a significantly stronger relation between behaviors and heterogeneity in long-term expectations than behaviors and near-term expectations. For instance, depending on the sample and model, the relation between the fraction of wealth invested in equity and long-term expectations results in an 800% increase in our ability to match empirical estimates with theoretical values (i.e., long-term expected returns explain 67% of the theoretical value relative to the 7%

explained by near-term expected returns). Beyond helping to understand the attenuation puzzle, our results have implications for understanding why other variables can explain participation and risky share choices. For example, evidence suggests that individuals who experience lower returns over their lifetime tend to hold lower (future) expected return and this can help explain why these individuals are less likely to participate in equity markets (Malmendier and Nagel (2011)). Once again, however, extant evidence is limited to near-term expected returns. Our work suggests the mediating role of heterogeneity in expected returns in explaining the relation between lifetime experience returns and behaviors may be substantially stronger if examining long-term expected returns rather than (or in addition to) near-term expected returns.

Our results also provide guidance for development of theoretical models of both household choice and macro finance. For example, most theories of stock market participation model investors' expected market return as horizon-invariant implicitly assuming the investor's h-horizon expected (continuous) return is h times their 1-period expected return (e.g., Guiso, Sapienza, and Zingales (2008), Gomes and Michaelides (2005)). Similarly, our work provides insights for the voluminous literature on the important role of dispersion in beliefs in explaining, for instance, asset pricing bubbles, excessive turnover, wealth effects, and shocks to the real economy. Specifically, our work provides empirical support for models that incorporate dispersion in priors (e.g., Martin and Papadimitriou (2022)), models that incorporate dispersion in signals (e.g., Barberis, Greenwood, Jin, and Shleifer (2018)), and models that incorporate dispersion in both priors and signals (e.g., Giacomini, Skreta, and Turen (2020)). For example, our evidence suggests that although both differences in priors and differences in signals play an important role in explaining heterogeneous beliefs, variation in priors play a larger role in explaining how beliefs relate to actions. Future models may better explain household choices and macro finance by allowing individuals to (1) have long-term expectations that differ from (scaled) near-term expectations, and (2) consider both near- and long-term expectations in decision making.

Our work also provides empirical support for the hypothesis that the relation between beliefs, actions, and cognitive noise identified in the laboratory (e.g., Charles, Frydman, and Kilic (2024), Enke and Graeber (2023)) plays an important role in the field and can help explain the weak transmission from near-term beliefs to action. Moreover, our evidence is consistent with the hypothesis that long-term expected returns reflect, at least in part, cross-sectional variation in cognitive default values (for expected returns) potentially allowing for further tests of these models.

From a normative perspective, stock market participation and risky share decisions are critical factors in explaining wealth inequality (e.g., Zumbrun (2023), Bhamra and Uppal (2019), Favilukis (2013)) and these choices have become more important over time given the secular shift from defined benefit to defined contribution plans. Our work suggests a promising new avenue for encouraging stock market participation by focusing on long-horizon equity returns in financial literacy programs. For example, White race is associated with more optimistic near-term expectations but race plays an even larger role in explaining heterogeneity in long-term expectations. Because the relation between equity ownership and beliefs is stronger for long-term versus near-term expectations, focusing financial education on long-term beliefs could potentially help mitigate the stock market participation race gap.

In short, beyond understanding the important role of long-term beliefs in stock market participation, risky share decisions, and trading, our analysis provide exciting avenues for both theory and empirical household finance and asset pricing work.

2 Hypotheses

Following the intuition of Patton and Timmermann (2010), we consider a simple model where, absent any signal, each individual i has a prior belief, μ_i, regarding the continuously compounded annual market return.[3] Each individual i, at time t, also receives a signal for year h denoted $\eta_{i,t,h}$, that is uncorrelated with priors, and is independently and identically distributed across individuals, and over horizons (i.e., $E(\mu_i \eta_{i,t,h}) = 0$, $\eta_{i,t,h} \sim iid(0, \sigma_\eta^2)\, \forall\, i, t, h$). The individual's expected return at time t for the next year is the sum of their prior and year 1 signal:

$$E_{i,t}(r_1) = \mu_i + \eta_{i,t,1}. \tag{1}$$

Similarly, the individual's time t expected return for the next decade is given by 10 times their annual expected return absent any signals (i.e., $10\mu_i$) and the sum of their signals for each of the next 10 years:

$$E_{i,t}(r_{10}) = 10\mu_i + \eta_{i,t,1} + \eta_{i,t,2} + ... + \eta_{i,t,10} \tag{2}$$

where, for example, $\eta_{i,t,2}$ is the investor's signal for the *annual* return beginning 1 year from today.

2.1 Horizon and cross-sectional variation in beliefs

Patton and Timmermann (2010) point out that because signals are, by their nature, temporary deviations from expected values, the relative importance of signals in explaining cross-sectional

[3]The model's intuition also follows that of the Lahiri and Sheng (2010) model.

variation in expectations will decline with time. As a result, signals will have a larger relative impact on dispersion in near-term beliefs than dispersion in long-term beliefs and, correspondingly, priors will have a larger relative impact on dispersion in long-term beliefs. Specifically, letting ψ denote cross-sectional standard deviation (to differentiate it from the standard deviation of an individual's perceived distribution of returns, σ_i) and dropping the t subscript (given we are focusing on cross-sectional variation in expected returns), the ratio of the cross-sectional variance of long-term (Equation 2) to near-term (Equation 1) expected returns is given by:

$$\begin{aligned} \frac{\psi^2(E_i(r_{10}))}{\psi^2(E_i(r_1))} &= \frac{\psi^2(10\mu_i) + \psi^2(\eta_{i,1} + \eta_{i,2} + ... + \eta_{i,10}) + 2cov(10\mu_i, \eta_{i,1} + \eta_{i,2} + ... + \eta_{i,10})}{\psi^2(\mu_i) + \psi^2(\eta_{i,1}) + 2cov(\mu_i, \eta_{i,1})} \\ &= \frac{\psi^2(10\mu_i) + \psi^2(\eta_{i,1} + \eta_{i,2} + ... + \eta_{i,10})}{\psi^2(\mu_i) + \psi^2(\eta_{i,1}))}, \end{aligned} \tag{3}$$

where the covariance terms in Equation 3 are zero because signals are independent of priors. The importance of signals and priors in explaining cross-sectional variation in expected returns can be easily seen by considering limiting cases. If temporary signals play no role in explaining expected return heterogeneity (i.e., all η terms are zero), then the cross-sectional variance of 10-year expected returns is simply 100 times the cross-sectional variance of 1-year expected returns, or, equivalently, the cross-sectional standard deviation of long-term expected returns is 10 times the cross-sectional standard deviation of 1-year expected returns:[4]

$$\frac{\psi(E_i(r_{10}))}{\psi(E_i(r_1))} = \frac{\psi(10\mu)}{\psi(\mu)} = 10. \tag{4}$$

In contrast, if all individuals held identical priors (and therefore priors play no role in explaining cross-sectional variation in beliefs), then given independence of signals across investors, the ratio of the cross-sectional standard deviations of expected 10-year returns to the cross-sectional standard deviation of expected 1-year returns is $\sqrt{10}$:[5]

$$\frac{\psi(E_i(r_{10}))}{\psi(E_i(r_1))} = \frac{\sqrt{10}\,\sigma_\eta}{\sigma_\eta} = 3.2. \tag{5}$$

Of course, our model is a simplification and, in practice, signals are likely to be correlated across investors and horizons. Even if signals are correlated across investors and time, however, the

[4]More generally, this result holds if signals are identical across individuals (which includes, of course, the case where all signals are zero).

[5]In this case, the cross-sectional variance of the sum of the signals over the next 10 years is, given independence across investors, the variance of annual signals times 10, i.e., $\psi^2(\eta_{i,1} + \eta_{i,2} + ... + \eta_{i,10}) = \psi^2(\eta_{i,1}) + \psi^2(\eta_{i,2}) + ... + \psi^2(\eta_{i,10}) = 10\psi^2(\eta_{i,h}) = 10\sigma_\eta^2$. Taking square roots yields the numerator in Equation 5.

key implications of the model hold. That is, if signals impact beliefs, then (1) the cross-sectional standard deviation in long-term forecasts will be less than 10 times the cross-sectional standard deviation in near-term forecasts, and (2) the relative importance of signals in explaining cross-sectional variation in expected returns will decline with horizon—holds as long as investors' signals are anything less than perfectly correlated across horizons.[6]

In addition, our model is likely to overstate (relative to actual beliefs) the importance of signals in long-term beliefs as it is reasonable to expect that the magnitude of near-horizon signals is greater than magnitude of long-horizon signals (i.e., it is likely $\sigma^2_{\eta_{t,h}} > \sigma^2_{\eta_{t,h+1}}$). For instance, an unexpected inflation report today is likely to have a larger impact on heterogeneity in investors' expected 1-year return for the next year ($\eta_{i,t,1}$) than the variation in investors' expected 1-year return 9 years from now ($\eta_{i,t,10}$). If signal heterogeneity declines with horizon, then the ratio of long- to near-term cross-sectional standard deviations of beliefs may be less than $\sqrt{10}$.[7]

2.2 Horizon and respondent characteristics

Given that signals represent temporary deviations from priors, the model also predicts that respondent characteristics will better explain heterogeneity in long-term expected returns than heterogeneity near-term expected returns when evaluated in a pooled cross-sectional time-series regression. Consider, for example, the coefficient estimates from regressions of 1- and 10-year expected returns on characteristic x:

$$\beta_{1\ year} = \frac{cov(\mu_i, x_i) + cov(\eta_{i,t,1}, x_i)}{\psi^2(x_i)}, \tag{6}$$

[6]Consider the 2-period case where signals are perfectly correlated. The cross-sectional variance of signals is given by: $\psi^2(\eta_{i,1} + \eta_{i,2}) = \psi^2(\eta_{i,1}) + \psi^2(\eta_{i,2}) + 2\rho(\eta_{i,1}, \eta_{i,2})\psi(\eta_{i,1})\psi(\eta_{i,2})$. Given $\psi^2(\eta_{i,h}) = \sigma^2_\eta$, we can rewrite this as $\psi^2(\eta_{i,1} + \eta_{i,2}) = \sigma^2_\eta + \sigma^2_\eta + 2\rho\sigma_\eta\sigma_\eta$ which implies $\psi^2(\eta_{i,1} + \eta_{i,2}) = 4\sigma^2_\eta$ (and, taking square roots, $\psi(\eta_{i,1} + \eta_{i,2}) = 2\sigma_\eta$) only if $\rho = 1$. If $\rho < 1$, then $\psi(\eta_{i,1} + \eta_{i,2}) < 2\sigma_\eta$, i.e., the cross-sectional standard deviation of the sum of signals over two periods is less than twice the cross-sectional standard deviation in 1-period signals. Given, by definition, priors for individual i are identical at every horizon h (i.e., $\mu_{i,1} = \mu_{i,2} = ... = \mu_{i,\infty}$), the cross-sectional standard deviation of priors increases in direct proportion to horizon. Combined, the relative importance of priors increases with horizon. For instance, consider the the 2-period example but now assume signals are independent over horizons and from priors (as in our model). In this case, the cross-sectional variance of 1-period returns is $\psi^2(\mu_i + \eta_{i,1}) = \psi^2(\mu_i) + \sigma^2_\eta$, and the cross-sectional variance of 2-period returns is $\psi^2(2\mu_i + \eta_{i,1} + \eta_{i,2}) = 4\psi^2(\mu_i) + \sigma^2_\eta + \sigma^2_\eta$. Thus, the importance of signals in explaining 1-period expected return heterogeneity is given by $\sqrt{\frac{\sigma^2_\eta}{\psi^2(\mu_i)+\sigma^2_\eta}}$ which is strictly greater than the importance of signals in explaining cross-sectional standard deviation of 2-period expected returns: $\sqrt{\frac{\sigma^2_\eta}{2\psi^2(\mu_i)+\sigma^2_\eta}}$.

[7]Again, consider the extreme case where priors play no role (e.g., all individuals hold the same prior) and all signals beyond year 1 are zero, $\sigma^2_{\eta_1} > 0, \sigma^2_{\eta_2} = \sigma^2_{\eta_3} = ... = \sigma^2_{\eta_{10}} = 0$). Then the ratio of the cross-sectional standard deviation of long-term expected returns to the standard deviation of near-term expected returns (i.e., Equation 5) is one. More formally, our model can be adjusted to formally incorporate this property by writing signals with an exponential decay for longer horizons (i.e., $E(r_{i,t,10}) = 10\mu_{i,t} + \eta_{i,t,1} + \theta\eta_{i,t,2} + ... + \theta^9\eta_{i,t,10}$ with $|\theta| < 1$).

$$\beta_{10\ year} = \frac{cov(10\mu_i, x_i) + cov(\eta_{i,t,1}, x_i) + cov(\eta_{i,t,2}, x_i) + ... + cov(\eta_{i,t,10}, x_i)}{\psi^2(x_i)}. \tag{7}$$

Thus, the characteristic will be related to expected returns only if the characteristic helps explain heterogeneity in priors or heterogeneity in (time-varying mean-zero) signals. Although, in a given period t it is possible the characteristic relates to signals, on average (over time), the characteristic should be independent of signals. For example, assume individuals with larger values of x are more likely to interpret an unexpected inflation shock as a negative signal for next year's return. Thus, individuals with larger x values would exhibit higher expected returns when an inflation report is lower than expected, lower expected returns when an inflation report is higher than expected, and on average, characteristic x will be unrelated to signals.[8] Moreover, because (as detailed above and in Patton and Timmermann (2011)) priors play a larger role in long-term expectations than near-term forecasts, characteristics will better explain heterogeneity in long-term expectations.

2.3 Horizon, economic choices, and cognitive uncertainty

Absent frictions, once controlling for near-term beliefs, it is not clear that long-term expectations should have any influence on respondents' choices. For instance, if differences in near- and long-term expectations arise from perceived mispricing, then once accounting for near-term beliefs, long-term beliefs should not be associated with participation, risky share, or trading as one can always adjust their position based on their near-term beliefs. An investor, for instance, who expects the market will earn negative returns in the next year (either because the market is currently overvalued or because the investor believes the market will become even more undervalued in the near term) should avoid a long position in equities (assuming a risk-free alternative) regardless of the investor's perception of the market's long-term return distribution. That is, if $(\mu_i + \eta_{i,t,1}) < 0$ and $r_{f,t,1} > 0$, the investor should hold the risk-free asset (at least until $(\mu_i + \eta_{i,t,1}) > r_{f,t,1}$) regardless of their long-term expected equity returns.

On the other hand, there are at least three reasons to suspect that long-term expectations may play a role in explaining choices even when accounting for near-term expectations. First, reported expectations likely reflect a noisy measure of true expectations (see, e.g., Giglio, Maggiori, Stroebel, and Utkus (2021), Binswanger and Salm (2017)). Moreover, measurement error could be exacerbated when inferring expectations from reported distributional probabilities (e.g., the likelihood markets rise or fall at least 20% in the next year). If the measurement error in near-term

[8] Note also that Equation 7 can be written as $\beta_{10\ year} = \frac{cov(10\mu_i,x_i)+10cov(\overline{\eta_{i,t}},x_i)}{\psi^2(x_i)}$ where $\overline{\eta_{i,t}}$ is the average signal for each of the next 10 annual periods.

expected returns is less than perfectly correlated with the measurement error in long-term expected returns, then both near- and long-term expectations may help explain respondents' choices. In fact, if long-term expectations are simply another noisy measure of "expected returns" (i.e., the true expected 10-year return is simply the continuous 1-year expected return times 10) and near- and long-term measurement errors are of a similar magnitude, then standardized near- and long-term expectations will have similar relations with respondents' choices. If, on the other hand, true near- and long-term expectations differ (i.e., perceived 10-year expected returns are not 10 times perceived 1-year expected returns due to temporary signals), then, absent frictions, near-term returns should still dominate the explanatory power of long-term returns even if near- and long-term returns have similar measurement error distributions (i.e., the magnitude of the measurement errors are similar). That is, absent frictions, if near-term expectations differ from (scaled) long-term expectations, then near-term expectations should play a larger role than long-term expectations in explaining behaviors even if (similar magnitude) measurement error contaminates both measures because, as discussed above, an investor can always adjust their position based on their near term beliefs.

Empirical evidence suggests, however, that measurement error plays a relatively small role in the attenuation between beliefs and behaviors. For example, Giglio, Maggiori, Stroebel, and Utkus (2021) conclude that, "Some of the low estimated sensitivity can be attributed to various forms of measurement error, but this accounts for only a small part of the observed gap." Ameriks, Kézdi, Lee, and Shapiro (2020) similarly find measurement error only accounts for small portion of the attenuation, and conclude, "Instead, the attenuation puzzle exists because people behave in ways that deviate substantially from what people have in mind when choosing their portfolios."

Second, if most respondents have a long expected holding period horizon, then, in the face of trading frictions, they may consider long-term expectations as more relevant than near-term expectations in their decisions. In this case, long-term expectations may be associated with choices even when controlling for near-term expectations and the relation could be stronger for long-term expectations. For instance, if individuals face pecuniary and/or non-pecuniary transaction costs associated with these decisions (e.g., entering or exiting the market), they may not act on their near-term signal consistent with the well-documented inertia in investor behavior. Although work investigating this possibility is limited, Giglio, Maggiori, Stroebel, and Utkus (2021) find, consistent with the explanation that such frictions impact behavior, evidence that tax considerations, investor inattention, and default options in retirement accounts are significant factors in explaining the attenuation between near-term beliefs and the risky share choice.

Third, recent work demonstrates that, in contrast to most traditional and behavioral models, individuals recognize that they are uncertain about their utility maximizing choice.[9] As a result of this "cognitive noise," their decisions are a function of both a cognitive default value and a noisy signal. Moreover, the compression toward the cognitive default weakens the transmission from reported beliefs to actions. Both Enke and Graeber (2023) and Charles, Frydman, and Kilic (2024) find strong support for this explanation in controlled experimental settings.[10] Our model fits well within the Charles, Frydman, and Kilic (2024) framework where the individual's perception of the value of an asset is a weighted combination of their cognitive default value (i.e., "...the valuation she would report before drawing her noisy cognitive signal") and their noisy valuation signal. In our framework, the individual's prior (μ_i) acts as their cognitive default value (i.e., their expected return prior to their signal) and $\eta_{i,t,h}$ are noisy signals.[11] The relative importance of near- and long-term expectations would depend on the weights investors put on priors and signals. At an intuitive level, respondents may recognize they are uncertain about both their priors and their signals. Nonetheless, they may be more confident about predicting long-term market returns than near-term market returns and therefore fail to fully incorporate near-term signals in choices. That is, consistent with popular guidance, individuals may perceive that although stock returns are hard to forecast in the near-term, equity markets generally rise in the long-term. As Bodie (2021) notes, Morningstar tells investors, "While stock and bond markets can be risky in the short run, time has a moderating effect on market risk. The longer you hold a stock or bond investment, the lower your chances of losing money and the greater the odds of earning a return close to the long-term average."[12]

[9] As pointed out by Enke and Graeber (2023), for instance, traditional models assume individuals never doubt the "ex ante optimality" of their decisions and behavioral models typically assume individuals make systematic errors (e.g., return extrapolation) but fail to recognize that most individuals are aware that, "they may be committing errors."

[10] For recent reviews of the role of cognitive constraints see Gabaix (2019) and Woodford (2020).

[11] Following the intuition in Patton and Timmermann (2010), we model beliefs as a function of priors and signals. In Charles, Frydman, and Kilic (2024), individuals take a Bayesian approach and recognize that their prior is drawn from a normal distribution and the signal contains error drawn from a normal distribution. Regardless, the intuition is straightforward—long-term expectations will matter, even when accounting for near-term expectations, if respondents apply a non-zero weight to their priors because they recognize they are uncertain about their signal. We do not assume investors have no uncertainty about their priors. Rather the cognitive constraints explanation only requires that individuals have some uncertainty about their signals and that (consistent with Patton and Timmermann (2010)) long-term expectations are more strongly correlated (relative to near-term expectations) with expectations prior to the signal.

[12] Similarly, the SEC tells investors, "The fact that stock prices can go up and down a lot in the short term makes them a very risky investment for short term savings goals" (https://www.sec.gov/rss/your_money/asset_allocation.htm). Bodie (2021) stresses that the Morningstar logic is invalid. Although the *average annual return* volatility declines with horizon, the standard deviation of *total returns* increases with horizon. Ignoring the popularly held view that stocks are somehow safer in the long run because average return volatility falls, whether the mean-reversion historically observed in market returns versus parameter uncertainty makes markets safer or riskier for investors with a longer horizon is a hotly debated topic (e.g., Siegel (2014), Pástor and Stambaugh (2012), Carvalho,

These factors, of course, are not mutually exclusive—all could play a role and, as a result, long-term expectations may be relevant even after accounting for near-term expectations. Ultimately, the role of long-term beliefs is an empirical question.

3 Data and Descriptive Statistics

Our data comes from the RAND American Life Panel (ALP), an ongoing nationally representative longitudinal panel that started in 2003. The initial sample of approximately 2,000 individuals has grown to more than 6,000 individuals over time (see Pollard and Baird (2017) for additional details regarding the ALP). Because respondents are compensated, completion rates—typically around 70% to 80%—are much higher than most surveys.[13] During the financial crisis in late 2008, ALP began surveying participants regarding the "Effects of the Financial Crisis." The first "wave" of data collection began in November 2008 and the final wave occurred 87 months later in January 2016. ALP executed this survey for a total of 61 waves (i.e., there are 61 data collection points) in either long-form (29 waves) or short-form (32 waves) formats.

3.1 Beliefs

The long-form wave questionnaires include six questions regarding both near- and long-term perceived stock market return distributions. Specifically, respondents are asked three questions about near-term beliefs:

> *We are interested in how well you think the economy will do in the future. By next year at this time, what is the percent chance that mutual fund shares invested in blue chip stocks like those in the Dow Jones Industrial Average will be worth more than they are today?*

> *By next year at this time, what is the percent chance that mutual fund shares invested in blue-chip stocks like those in the Dow Jones Industrial Average will have*
> *-gained in value by more than 20 percent compared to what they are worth today?*
> *-fallen in value by more than 20 percent compared to what they are worth today?*

> *Now please think about how the stock market will change over the next 10 years: What are the chances that mutual fund shares invested in blue chip stocks like those in the Dow Jones Industrial Average will be worth more in 10 years than they are today?*

Lopes, and McCulloch (2018)).

[13] See https://www.rand.org/education-and-labor/survey-panels/alp/about.html.

What are the chances that mutual fund shares invested in blue-chip stocks like those in the Dow Jones Industrial Average will have

-increased in value by more than 20 percent in 10 years compared to what they are worth today?

-fallen in value by more than 20 percent in 10 years compared to what they are worth today?

The short-form wave questionnaires ask the three return probability questions for near-term returns, but only the first question (the likelihood equity markets are worth more in 10 years) for long-term returns.[14] Roughly, between 2009 and 2013, surveys were monthly with two short-form waves followed by a quarterly long-form wave. Between 2013 and 2016, ALP eliminated the short-form waves and simply executed quarterly long-form waves.

We consider both imputed return distribution moments (the perceived market return mean and standard deviation) as well as raw probability beliefs (e.g., the perceived likelihood markets rise in the next year). Following previous work (e.g., Dominitz and Manski (2007), Kezdi and Willis (2011), Ben-David, Graham, and Harvey (2013), Boutros, Ben-David, Graham, Harvey, and Payne (2024)), we infer each respondent's perceived expected return distribution moments from respondents' perceived return likelihoods by assuming returns are normally distributed. Specifically, we estimate the perceived distribution of continuously compounded returns from the respondent's estimates of the likelihoods of a gain greater than 20% or a loss greater than 20% at both the one- and ten-year horizons.[15] The mapping of probability estimates into return distribution moments requires, of course, that a respondent's perceived likelihoods satisfy basic probability laws, e.g., the sum of probabilities cannot exceed 100%.[16] Approximately 69% of the near-term forecasts and 62% of the long-term forecasts are consistent with probability laws and allow us to estimate the mean and variance of the perceived distribution of 1- and 10-year returns for each respondent at each point in time. The substantial number of responses that are inconsistent with probability laws is consistent with previous work (e.g., de Bruin, Fischhoff, Millstein, and Halpern-Felsher (2000), Merkoulova and Veld (2022)), although it is unclear if such beliefs arise because of standard measurement error or the structure of expectations (e.g., Binswanger and Salm (2017), Drerup, Enke, and von Gaudecker (2017)). Regardless, because estimation of distributional parameters can

[14] Wave 44 of the survey was split into two portions (44.1 and 44.2). Only respondents to 44.1 were asked the likelihood that stock returns over the next decade would exceed 20% or fall by more than 20%.

[15] Our hypotheses (see Section 2) are based on continuously compounded returns. Therefore, when estimating continuous return distribution parameters, we first convert discrete expectations into continuous expectations, e.g., the likelihood of a 20% discrete return over the next year is equivalent to the likelihood of a 18.2% (=ln(1.2)) continuously compounded return over the next year.

[16] Specifically, to compute the mean and standard deviation of each investor's perceived lognormal return distribution (at each point in time) requires that (1) the perceived likelihood of a 20% gain or a 20% loss is non-zero, and (2) the sum of the tail probabilities is less 100%.

generate extreme values, we winsorize (at the $5^{th}$and 95^{th} percentiles) the estimates of respondents' implied perceptions of the mean and standard deviation of the distribution for near- and long-term returns.

3.2 Equity ownership, trading, and respondent characteristics

In the first two waves (both long form), ALP asked respondents a single question regarding stock ownership—whether the respondent owned stock or stock mutual funds "directly," in "employer pension accounts," or "in other retirement accounts such as IRAs." Beginning in the third wave (a short-form wave), ALP began asking about both direct holdings (e.g., "do not include stock holdings that are part of an IRA, 401(k), Keogh, or similar retirement accounts"), and holdings in retirement accounts separately. The question regarding stock holdings in retirement accounts was subsequently asked only in long-form waves. Thus, we can identify whether a respondent participates in equity markets (either directly or in their retirement account) in a total of 30 waves (the 29 long-form waves plus wave 3). In six of the surveys (executed in January 2011, 2012, 2013, 2014, 2015, and 2016), ALP also collected information regarding respondents' assets allowing us to compute the fraction of financial assets held in equities for these waves (i.e., including both direct holdings and retirement holdings). The Internet Appendix provides data construction details.

As noted above, in the first two waves, respondents are asked about ownership of any stock or stock mutual fund including both directly held shares and shares held in retirement accounts. From wave 3 forward, respondents are asked separate questions about directly held stocks versus equity in retirement accounts. Specifically, in wave 3 and all subsequent waves (both short- and long-form) respondents are asked about trading stocks held directly since the previous wave. In addition, in long-form wave 5 and all subsequent long-form waves, respondents are asked (1) if they have taken any action to increase or decrease equity in their retirement accounts, and (2) whether they have changed the allocation of new contributions to their retirement accounts since the last long-form wave. From this set of questions (direct trading in all waves ≥ 3 and retirement trading in short-form wave 3 and all long-form waves ≥ 5), we can classify investors as non-traders, buyers, sellers, or indeterminate (e.g., if the respondent purchased directly held equity and sold retirement equity) between each long-form wave. The Internet Appendix provides details of the trade classification process.

The ALP surveys also collect data regarding respondents' gender, race, marital status, employment status, retirement status, age, education, income, and health. The Internet Appendix provides details regarding construction of the respondent characteristic variables.

3.3 Descriptive statistics

Table I reports descriptive statistics for respondent characteristics in the pooled cross-sectional time-series of 90,134 observations from 3,866 individuals (the average respondent participates in 23.3 survey waves) that include any individual-survey wave observation where the respondent answers at least one of the six stock market belief questions. Our sample is 59% female, nearly two thirds are married, 59% are working, and the average respondent is 51 years old with 15 years of education. Income levels average about $68,000 (with an intraquartile range from $32,500 to $87,500). Approximately 55% hold equity (either directly or in a retirement account), and equities account for 34% of financial assets for the average individual.

[Insert Table I about here]

The first three rows of Panel A in Table II report descriptive statistics for respondents' answers to the questions regarding the likelihood markets rise, rise more than 20%, and fall more than 20% over the next year. The penultimate column reports historical values based on the CRSP value-weighted index between 1926 and 2020. The final column reports the fraction of respondents who report perceived likelihoods lower than the associated historical value. Consistent with previous work (e.g., Hurd (2009), Hurd, Van Rooij, and Winter (2011), Kuhnen and Miu (2017), Das, Kuhnen, and Nagel (2020), Giglio, Maggiori, Stroebel, and Utkus (2021), Sias, Starks, and Turtle (2023)), the typical individual's near-term beliefs are more bearish than historical values. The median respondent, for instance, believes markets are as likely to fall as rise in the next year compared to a historical likelihood of 75%.[17] As a result, the inferred expected return for 86% of respondents is less than the historical average annual market return. In contrast, respondents' inferred standard deviation of 1-year returns is close to the historical value, e.g., the median respondent has an inferred standard deviation of 22% versus the historical market average of 20%.

[Insert Table II about here]

[17]Most surveys of expectations ask respondents to estimate the likelihood markets increase in the next year and find that respondents tend to underestimate (relative to historical averages) the likelihood markets increase, e.g., the HRS survey used by Hurd (2009), the Dutch DNB Household Survey used by Hurd, Van Rooij, and Winter (2011), and the Michigan Survey of Consumers used by Das, Kuhnen, and Nagel (2020). In contrast, Giglio, Maggiori, Stroebel, and Utkus (2021) ask their Vanguard investors for expected returns directly. Even in this case, however, the average expected return of their sample of relatively sophisticated investors is less than half the historical value of 9.3% for the CRSP value weighted index between 1926 and 2020.

Panel B in Table II reports analogous statistics for respondents' perceptions of the distribution of expected equity returns over the next decade. Consistent with Sias, Starks, and Turtle (2023), who use a subset of this data to investigate the negativity bias in expected returns, the results reveal that the typical individual underestimates both long-term expected returns and long-term return volatility relative to historical values. For example, the median respondent perceives only a 45% chance that the market increases more than 20% in the next decade versus a 93% historical likelihood (second to last column). As shown in the Internet Appendix, matching the point estimate reported by Giglio, Maggiori, Stroebel, and Utkus (2021) for their sample of Vanguard investors, the correlation between near- and long-term expected returns is 0.302.

4 Empirical Results

We begin by examining the data for evidence that both priors and signals play a role in driving heterogeneity in expectations. We then focus on the relation between economic choices and near- versus long-term expectations.

4.1 Heterogeneity in expected returns

If temporary signals play no role in cross-sectional variation in expectations, then the cross-sectional standard deviation of 10-year expected returns will be 10 times that of 1-year expected returns (see Section 2). In contrast, if signals play an important role in explaining cross-sectional variation in expected returns then heterogeneity in 10-year expected returns will be (proportionally) less than the heterogeneity in 1-year expected returns. Columns 3-5 in Table III report the cross-sectional standard deviation of expected returns over the next year or decade as well as the ratio of the standard deviation of 10-year expected returns to the standard deviation of 1-year expected returns for each of the 29 long-form waves. Column 2 reports the respondent sample size for each wave. Panel B reports the time-series averages as well as the time-series minimum and maximum of these values.

[Insert Table III about here]

The results reveal that, relative to dispersion in near-term forecasts, dispersion in long-term expected returns is much less than expected if heterogeneity in signals played no role in explaining cross-sectional heterogeneity in expected returns. Specifically, column 5 in Panel B reveals that the cross-sectional standard deviation of 10-year expected returns averages only 2.72 times the cross-sectional standard deviation of 1-year expected returns (ranging from 2.48 times to 3.16 times) versus an expected value of 10 if heterogeneity in investors' expectations were fully explained by priors (i.e., Equation 4).[18] Equivalently, the standard deviation of 1-year expected returns averages 370% of the value implied by a world where signals play no role (i.e., 9.13/(24.83/10)). A Morgan-Pitman test of equality of variance for paired data based on the cross-sectional variance of 1-year expected returns versus the cross-sectional variance of the 1-year return (assuming no signals) implied by 10-year expected returns (i.e., 10-year expected return/10) is rejected at the 1% level in every wave.

One limitation of the tests in Table III is that expected returns are inferred from the perceived likelihoods of the market rising or falling at least 20% over the next year or decade. In addition, evidence suggests individuals face cognitive limitations when answering questions about stock market expectations (e.g., Merkoulova and Veld (2022)) and question structure may impact answers (see, e.g., Hartzmark and Sussman (2024), Sias, Starks, and Turtle (2024b)). Inconsistent with the hypothesis that the results in Table III are solely due to these issues, the point estimates reported in Giglio, Maggiori, Stroebel, and Utkus (2021) also suggest near-term expectations exhibit substantially greater cross-sectional heterogeneity than long-term expectations.[19] In short, both the results in Table III and the descriptive statistics in Giglio, Maggiori, Stroebel, and Utkus (2021) are consistent with the hypothesis that signals play an important role in explaining belief dispersion.

4.2 Respondent characteristics and expected returns

Previous work examining the relation between expectations and respondent characteristics is both limited and inconsistent. For instance, work suggests that near-term expected returns are positively related to age (Giglio, Maggiori, Stroebel, and Utkus (2021)), negatively related to age (Vissing-Jorgensen (2004), Dominitz and Manski (2007), and Hudomiet, Kezdi, and Willis (2011)), and independent of age (Kezdi and Willis (2011) and Hurd, Van Rooij, and Winter (2011)). Giglio, Maggiori, Stroebel, and Utkus (2021) find that wealthier individual exhibit lower near-term

[18]As detailed in Section 2, the fact that the ratio is less than $\sqrt{10}$ (= 3.2) is consistent with the hypothesis that heterogeneity in near-term signals is greater than heterogeneity in long-term signals. (i.e., $\sigma^2_{\eta_t} > \sigma^2_{\eta_{t+1}}$).

[19]The Vanguard sample (whose typical respondent holds more than \$225,000 in their Vanguard account and therefore differs substantially from ALPs' representative sample of Americans) used in Giglio, Maggiori, Stroebel, and Utkus (2021) asks respondents for 1-year expected returns and the *average* annual expected return over the next decade. In this case, if expected returns are fully explained by differences in μ_i and signals play no role, then the ratio of the cross-sectional standard deviation of *average* annual returns over the next decade will equal the cross-sectional standard deviation of expected returns over the next year. The descriptive statistics reported by the authors reveal that the standard deviation 1-year expected returns is 158% of the standard deviation of average annual return over the next decade (6.08/3.85).

expected returns while Kezdi and Willis (2011) find a positive relation between wealth and near-term expected returns and Hurd, Van Rooij, and Winter (2011) find a positive relation between near-term expected returns and income. Dominitz and Manski (2007), Hudomiet, Kezdi, and Willis (2011), and Kezdi and Willis (2011) find men exhibit higher near-term expected returns while Giglio, Maggiori, Stroebel, and Utkus (2021) and Hurd, Van Rooij, and Winter (2011) find no evidence gender is related to 1-year expected returns.

Regardless of the inconsistent evidence across datasets used in previous work, if respondent characteristics are related to cross-sectional variation in priors, then characteristics should tend to be more strongly related to heterogeneity in long-term expectations than near-term expectations (see Section 2 for details). The first two columns Table IV report coefficients from panel regressions of expected returns in the next year (column 1) or decade (column 2) on respondent characteristics. In both cases, the dependent variable is standardized to allow direct comparison across columns, regressions include wave fixed effects, and standard errors are clustered at the respondent level. In addition, the non-indicator independent variables (income, education, age, and health) are standardized. Thus, the coefficients can be directly compared across columns and, in the case of the non-indicator independent variables, reflect the standard deviation change in the dependent variable associated with a one standard deviation change in the independent variable. The third column reports the coefficients from a regression of the *difference* between the standardized 1- and 10-year expected returns. As a result, the coefficients in column 3 equal the difference between the coefficients in columns 2 and 1 (the regression in column 3 also includes wave fixed effects and standard errors are clustered at the respondent level). That is, the coefficients in column 3 test whether the characteristic's relation the (standardized) expected return in the next decade differs from the characteristic's relation with the (standardized) expected return in the next year. Columns 4-6 report analogous statistics for standardized perceived likelihood markets rise in the next year, standardized perceived likelihood markets rise in the next decade, and their difference. Because the likelihood of markets rising in the next year or decade is asked in every wave, while expected returns are estimated only for long-form waves, the sample size in columns 4-6 is greater than that in columns 1-3.[20]

[Insert Table IV about here]

The results in Table IV support the hypothesis that short-term signals result in a muted relation

[20] In addition, as detailed in Section 3.1 the sample in columns 1-3 is limited to individuals whose beliefs follow probability laws.

between characteristics and heterogeneity in 1-year expected returns. For example, there is a 600% improvement in R^2 (11.1% versus 1.80%) when moving from 1-year expected returns to 10-year expected returns. Similarly, the R^2 increases from 10.2% to 17.5% when moving from explaining heterogeneity in the likelihood markets rise in the next year to the likelihood markets rise in the next decade. Moreover, the results in column 3 reveal the relation is meaningfully stronger for 10-year expected returns than 1-year expected returns for four of the respondent characteristics. For example, the results suggest that a one standard deviation greater level of education is associated with an 8% standard deviation higher 1-year expected return (column 1), but a 15% standard deviation higher 10-year expected return (column 2) and the 7% difference (column 3) is statistically significant at the 1% level. Similarly, the results in column 6 reveal that a one standard deviation increase in the independent variable has a meaningfully (statistically significant at the 5% level or better) stronger relation with the (standardized) likelihood markets rise in the next decade than the (standardized) likelihood markets rise in the next year for five of the independent variables.

In sum, the results in Table IV support the hypothesis that because temporary signals play a larger in driving heterogeneity in near-term expectations and divergent priors play a larger (relative) role in driving heterogeneity in long-term expectations, respondent characteristics better explain heterogeneity in long-term expectations than near-term expectations. The results in both Tables III and IV provide empirical support for models that rely on divergent priors, divergent signals, or both divergent signals and priors, as well as work that suggests the weak transmission from beliefs to action results, at least in part, because respondents beliefs are a function of a cogitative default value and a noisy signal.

4.3 Risky share

Traditional economic theory holds that higher expected returns should be associated with greater exposure to risky assets. For example, in the Merton (1969) model for power-utility investors, the risky share is given by (where γ is relative risk aversion):

$$\%Equity = \frac{E(R) - R_f}{\gamma\sigma^2(R)}. \tag{8}$$

Under traditional assumptions, both expected returns and variance linearly increase with time (i.e., $\sigma^2(R_{10}) = 10\sigma^2(R_1)$ and $E(R_{10}) = 10E(R_1)$ because $\eta_1 = \eta_2 = ...\eta_{10} = 0$). Thus, Equation (8) holds at any horizon.

Giglio, Maggiori, Stroebel, and Utkus (2021) generate a "back of the envelope" estimate of the economic magnitude implied by the Merton (1969) model by assuming (1) all investors have a relative risk aversion coefficient of 6 (i.e., a value consistent with evidence from the experimental literature) and, (2) the standard deviation of the annual market return is 20% (i.e., the approximate historical value; see Table II) implying a 1% higher expected return should be associated with 4.2% higher equity share, i.e., the coefficient in a regression of risky share on 1-year expected returns should be 4.2 ($1/(6 \times 0.2^2)$).[21] The corresponding implied "theoretical" coefficient associated with the 10-year expected returns (given variance is proportional to time in the Merton (1969) model) is 0.42 (i.e., $1/(6 \times (10 \times 0.2^2))$).[22,23]

Extant evidence of the relation between variation in 1-year expected returns and risky share, however, generates coefficients that are much smaller than the 1-year theoretical value of 4.2—Vissing-Jorgensen (2004) estimates a value of 0.50, Hurd, Van Rooij, and Winter (2011) estimate a value of 0.49, Kezdi and Willis (2011) estimate a value of 0.30, Amromin and Sharpe (2014) estimate a value of 0.33, Giglio, Maggiori, Stroebel, and Utkus (2021) estimate a value of 0.69, and Ameriks, Kézdi, Lee, and Shapiro (2020) estimate a value of 0.45.[24] The estimates are remarkably consistent given differences in samples (e.g., Dutch households, a representative set of Americans, and wealthy Vanguard investors) and methods and suggest the empirical relation can only account for 7-16% of the theoretical relation (i.e., minimum of 0.3/4.2 and maximum of 0.69/4.2). As detailed in Section 2, work suggests that although measurement error contributes to the the gap between empirical estimates and theoretical values, it plays a relatively small role in explaining the attenuation puzzle. Recall if the measurement error explanation is the only factor driving attenuation, then although long-term expectations may help explain financial choices after controlling for near-expectations, near-term expectations should play a larger role.[25] On the other hand, frictions and cognitive

[21] The authors note that the experimental literature estimates γ somewhere between 3 and 10 and give examples for γ=4 and γ=6. Our relative comparisons between the implied 1- and 10-year coefficients are qualitatively unchanged by the proposed γ. That is the gamma coefficient cancels out in estimating relative importance of near- and long-term expectations relative to theoretical values, i.e., if we let λ_t be the estimated coefficient then $(\lambda_{10}/\frac{E(R_{10}-r_{f,10})}{\gamma\sigma^2_{R_{10}}})/(\lambda_1/\frac{E(R_1-r_{f,1})}{\gamma\sigma^2_{R_1}}) = (\lambda_{10}/\frac{E(R_{10}-r_{f,10})}{\sigma^2_{R_{10}}})/(\lambda_1/\frac{E(R_1-r_{f,1})}{\sigma^2_{R_1}})$.

[22] Equivalently, the 0.42 predicted coefficient for a 1% higher 10-year expected return is the same as 4.2% predicted coefficient for a 0.1% higher *annual* return for each of the next 10 years.

[23] If instead of the independence assumption that implies the 10-year variance is 10 times the 1-year variance, we use the historical variance of 10-year returns (0.474^2, see Table II), the implied theoretical coefficient associated with 10-year returns is 0.74. However, once one assumes investors perceive differences in near- and long-term uncertainty (i.e., market returns are not independent), then the optimal risky share becomes a function of the investors' horizon (see, e.g., Pástor and Stambaugh (2012)).

[24] Hurd, Van Rooij, and Winter (2011) estimate a value of 0.29 for their 2004 dataset and a value of 0.49 for their 2006 dataset. Vissing-Jorgensen (2004) estimates the relation in a dummy variable framework. We estimate the relation as the difference in implied risky share for those with expected returns between 0-5% and those with expected returns between 15-20%, i.e., the Vissing-Jorgensen (2004) estimate of 0.5 = (0.1019 - 0.0272)/(0.175 - 0.025).

[25] Assuming the measurement error in near-term expectations is not systematically larger than the measurement error in long-term expectations.

limitations allow for the possibility that long-term expectations play a larger role than near-term expectations.

Panel A in Table V reports coefficients from regressions of the fraction of financial wealth invested in equities on wave fixed effects and, depending on the specification, near- and long-term expected returns, near- and long-term standard deviations, and respondent characteristics.[26] Panel B repeats the analysis replacing expected returns with the likelihood markets rise in the next year or decade, and replacing standard deviations with the perceived likelihood markets fall by at least 20% over the next year or decade. Because previous work examines these relations for samples including respondents who report an equity share of zero (e.g., Hurd, Van Rooij, and Winter (2011)) and others are limited to samples of individuals with positive equity shares (e.g., the Michigan Survey of Consumer Attitudes used by Amromin and Sharpe (2014)), we consider both cases. Specifically, columns (1)-(5) include all respondents with sufficient information while columns (6)-(10) exclude respondents with zero equity exposure. As before, the independent variables are standardized (to allow direct comparison of the coefficients) and standard errors are clustered at the respondent level. As discussed in the data section, the sample is limited to six waves of the ALP Financial Crisis Surveys (Januaries for 2011-2016) that collect respondent asset values (see Internet Appendix for details).

[Insert Table V about here]

The results in the first five columns of Table V yield three important insights. First, consistent with previous work, higher near-term expected returns (Panel A column 1) or a higher likelihood of the market rising in the next year (Panel B column 1) are positively related to the risky share. For instance, the top left cell suggests a one standard deviation higher near-term expected return is associated with 2.7% larger risky share. Second, long-term expected returns are much more important than near-term expected returns in explaining the risky share. The results in column 3 of Panel A, for example, reveal that the relation between risky share and a one standard deviation higher long-term expected return is approximately 10 times that for a one-standard deviation near-term expected return (i.e., 6.762/0.674) when both are included in the regression. In fact, the results in Panel A reveal little evidence that near-term expected returns have any explanatory power once accounting for long-term expected returns. Moreover, the penultimate row of Panel A reveals the difference in standardized coefficients associated with expected returns is statistically

[26]The linear regression approach also follows much of the literature (e.g., Black, Devereux, Lundborg, and Majlesi (2017)). Nonetheless, as detailed in the Internet Appendix, our conclusions are identical when using a tobit model to examine the relations between risky share and near- versus long-term expectations.

significant at the 1% level in every case. Near-term expectations fare better in Panel B which focuses on perceived likelihoods rather than inferred expected returns. Similar to the analysis in Panel A, however, the coefficient associated with the long-term likelihood markets rise is uniformly larger than the corresponding coefficient associated with the likelihood markets rise in the next year and the difference is statistically meaningful (at the 5% level or better) as shown in columns 3-5.

Third, not only are long-term expectations much more important than near-term expectations in explaining the risky share, the magnitude of the coefficients associated with long-term expected returns are much closer to the values predicted by theory. Specifically, the standard deviations of 1- and 10-year expected returns (for the sample used in the first five columns of Panel A) are 8.76 and 24.80, respectively. Thus, the coefficient associated with a 1% increase in 1-year expected returns is 0.31 (i.e., the standardized coefficient divided by the standard deviation of the variable; 2.69/8.76)—a value fully inline with previous estimates. Compared to the theoretical coefficient discussed above, the coefficient associated with 1-year expected returns therefore accounts for 7.3% of the theoretical value (i.e., 0.31/4.2). In contrast, a 1% higher 10-year expected return is associated with 0.28 higher (6.96/24.80) risky share—67% of the 10-year theoretical value (i.e. the 0.42 figure discussed above). Equivalently, a 1% higher *annual* expected return for the next 10 years is associated with 2.8% higher risky share.

After excluding individuals who hold no equity (i.e., columns 6-10 in Panel A), the results reveal little evidence that 1-year expected returns are meaningfully related to risky share. Once again, however, risky share remains strongly related 10-year expected returns. Moreover, the results in the penultimate row reveals that differences between 1- and 10-year expected returns remain statistically significant at the 1% level in every case. Nonetheless, the coefficient associated with 10-year expected returns is about 55% smaller when excluding individuals who do not participate and accounts for 29% of the theoretical value—approximately double the highest value found in previous work examining the relation between risky share and 1-year expected returns.[27] Similarly, the results in Panel B suggest that although a one standard deviation higher likelihood markets rise in the next decade has approximately twice the influence as a one standard deviation higher likelihood markets rise in the next year, the differences in coefficients are no longer statistically meaningful (see penultimate row of the final three columns in Panel B).

The results in Table V also suggest that heterogeneity in expected returns is more important

[27]The standard deviation of 10-year expected returns for the sample in columns 6-10 is 26.15. Thus, the raw coefficient, 0.123 (=3.21/26.15), accounts for 29.3% of the 10-year theoretical value (i.e., 0.123/0.42).

than heterogeneity in perceived risk—either inferred standard deviations in Panel A or the perceived likelihood of a 20% loss in Panel B—as only the perceived likelihood of a 20% loss over 10 years when including all respondents (columns 4 and 5 of Panel B) is statistically significant (at the 5% level or better).

4.4 Stock market participation

Because many of the datasets used in the literature are limited (or effectively limited) to stock market participants (e.g., Vissing-Jorgensen (2004), Giglio, Maggiori, Stroebel, and Utkus (2021), Amromin and Sharpe (2014)), relatively few studies examine the relation between near-term expected returns and stock market participation. Several studies document, however, that higher near-term expectations are associated with a higher likelihood of stock market participation. For instance, Kezdi and Willis (2011) estimate that a 1% higher 1-year expected return is associated with a 0.7% higher likelihood of equity market participation but find no evidence that cross-sectional heterogeneity in perceived volatility impacts the participation decision. Averages reported by Dominitz and Manski (2007) also suggest that, relative to non-participants, stock market participants perceive a higher likelihood markets rise in the next year. For example, the authors report that only 33% of men who predict a 21-30% chance markets rise in the next year hold equity versus 48% of men who predict a 60-69% chance markets rise in the next year.

For ease of interpretation (and following much of the literature, e.g., Hong, Kubik, and Stein (2004), Puri and Robinson (2007), Giannetti and Wang (2016), Barth, Papageorge, and Thom (2020)), we estimate a linear probability model of stock market participation on near- and long-term beliefs.[28] In addition, to allow direct comparison between coefficients, we standardize (i.e., rescale to zero mean and unit variance) near- and long-term expected returns and standard deviations. The first column in Table VI reports the coefficient from a regression of stock market participation (as shown in Table I, 55% of ALP respondents hold equities) on wave fixed effects and near-term expected returns. We report t-statistics based on standard errors clustered at the respondent level. Consistent with previous work, respondents with more bullish near-term beliefs are more likely to invest in equities—a one standard deviation higher near-term expected return is associated with a 5.5% increase in the likelihood of holding equities (statistically significant at the 1% level). Dividing the standardize coefficient by the standard deviation of 1-year returns (9.2 for the sample used in Panel A of Table VI) implies that 1% higher expected near-term return is associated with a 0.6% (i.e., 0.055/9.2) higher probability of holding any equity (almost identical to the 0.7% figure

[28] As detailed in the Internet Appendix, limited dependent variable models generate identical conclusions.

reported by Kezdi and Willis (2011)).

[Insert Table VI about here]

Consistent with the analysis of risky share, the results in the second column of Table VI reveal equity market participation is strongly related to long-term expected returns and the results in the third column suggest that much of the relation between near-term expected returns and market participation arises from the correlation between near- and long-term beliefs. That is, once including long-term expected returns, the coefficient associated with near-term expected returns falls 60% (from 5.5% to 2.2%). Because both variables are standardized, we can directly compare the estimates—the coefficients suggest that perceived 10-year expected returns are approximately five times as important as perceived 1-year expected returns in explaining equity market participation (0.109/0.022=4.95). The penultimate row in Panel A reveals that the difference in standardized coefficients associated with near- and long-term expected returns is statistically significant at the 1% level. In terms of returns, the results in column 3 suggest that a 1% increase in expected return in the next year is associated with a 0.24% higher likelihood of holding equities while a 1% increase in the average annual return over the next decade is associated with 4.3% higher likelihood of holding equity.[29]

The fourth column adds the inferred standard deviations of the perceived 1- and 10-year return distributions. Consistent with traditional theory, higher near- and long-term perceived uncertainty are both associated with a lower likelihood of participating in equity markets and we cannot reject the hypothesis that near- and long-term uncertainty are equally important. The difference in coefficients associated with expected returns becomes even larger and remains statistically significant (at the 1% level). The fifth column adds respondent characteristics—respondent age, years of education, income, health and indicators for gender, White race, married, working, and retired—to test if these variables fully account for the relation between long-term beliefs and equity market participation. Given the strong relation between long-term expectations and respondent characteristics identified in Table IV, it is not surprising that accounting for respondent characteristics reduces the magnitude of the coefficient associated with long-term expected returns. Nonetheless, the relation between stock market participation and both near- and long-term expected returns remains statistically significant (at the 1% level) and the effect size for long-term expected returns

[29] The standard deviation of expected 1- and 10-year expected returns are 9.2 and 25.4, respectively (for the sample used in Panel A). Thus, the effect of a 1% higher near-term expected return is 0.022/9.2 = 0.24%. Analogously, the effect of a 1% higher annual expected return over the next decade is 0.109/(25.4/10) = 4.3%.

remains meaningfully larger (at the 1% level) than near-term expected returns. The effects associated with both near- and long-term uncertainty, however, are largely absorbed by other respondent characteristics.

Panel B repeats the analysis but replaces inferred expected returns and standard deviations with the perceived likelihood markets rise in the next year or decade and the perceived likelihood markets fall by at least 20% in the next year or decade. Analogous to Panel A, the independent variables are standardized. Sample sizes are larger because, as discussed in the data section, it includes respondents whose beliefs violate probability laws. The results in Panel B are even stronger than the results in Panel A. For instance, as shown in the first column, a one standard deviation higher perceived likelihood markets rise in the next year is associated with 14% higher likelihood the respondent holds equity. As shown in the third column, however, the relation between near-term perceived likelihoods and equity market participation is largely absorbed by the relation between long-term perceived likelihoods and equity market participation. In all cases (penultimate row of columns 3, 4, and 5), we can reject (at the 1% level) the hypothesis that 1- and 10-year perceptions of the likelihood markets rise are equally important.

4.5 Trading

Although previous work is largely in agreement that individuals' near-term expectations are positively related to their risky share and equity market participation, the evidence regarding near-term expectations and trading is scarcer and more mixed. Based on a sample of Dutch retail investors during a 12-month period around the financial crisis (April 2008-March 2009), Hoffmann, Post, and Pennings (2013) find no evidence that the level of, or changes in, near-term expected returns explains whether an investor is a net buyer or seller, but both levels and innovations in near-term expected returns are positively associated with trading, e.g., higher expected returns are associated with making a trade, but not the sign of the trade. Merkle and Weber (2014) examine the relation between expected returns for the next quarter and trading for a sample of UK investors over a two-year period and find that near-term expected return levels have little relation with trading, but that increases in near-term expected returns are positively related to net buying. Giglio, Maggiori, Stroebel, and Utkus (2021) find a statistically strong, but economically weak, positive relation between changes in risky share and both lag levels of, and changes in, 1-year expected returns for their sample of Vanguard investors. They find the relation is stronger when the sample is limited to respondents who trade. As far as we are aware, no previous study has examined the relation between trading and long-term expectations.

Recall (see Section 3) that questions regarding trading in direct and retirement accounts capture trading between long-form waves (approximately quarterly) over the March 2009-January 2016 window (the average trading window is 93 days). Table VII reports the analysis for respondents who either report owning stock in a retirement account (top row), directly (second row), or either (third row). The first four columns report time-series means (across the 27 trading windows) of the cross-sectional average fraction of investors that (1) report they made no trades or adjustments to their positions, (2) purchased equity, (3) sold equity, or (4) traded indeterminately (e.g., increased their retirement equity and decreased direct holdings; see Internet Appendix for details). The final three columns report, respectively, the fraction of respondents who report a change, over the trading window, in at least one of their three near-term expectations (chance market rises, rises more than 20%, and falls more than 20% over the next year), at least one of their three long-term expectations, or at least one of the six expectations over the next year or decade.

[Insert Table VII about here]

The results reveal that most individuals trade infrequently—especially in their retirement accounts. Specifically, in more than 85% of the observations, respondents make no adjustment to equity exposure in their retirement accounts during the trading window. Respondents who hold equity directly (most of whom also hold retirement equity) are more active—with transactions in 27% of the observations. The results are largely consistent with evidence of household inaction and inertia.[30] One potential explanation for the strong inertia documented in this and previous studies, is that respondents' perceptions of the distribution of risky returns rarely changes. Although reported subjective expectations contain measurement error (Giglio, Maggiori, Stroebel, and Utkus (2021), Ameriks, Kézdi, Lee, and Shapiro (2020)) and therefore changes in subjective expectations capture both changes in true expectations and changes in measurement error, it is nonetheless interesting to examine how frequently reported expectations change. The last three columns reveal that although respondents trade relatively infrequently, their reported return expectations change in almost every trading window. Specifically, respondents report a change in their near-term expectations in more 90% of the trading window observations (column 5), long-term expectations in more than 89% of the observations (column 6), and changes to any expectations in more than 93% of the observations (column 7).

[30]See, e.g., Agnew, Balduzzi, and Sundén (2003), Brunnermeier and Nagel (2008), Bilias, Georgarakos, and Haliassos (2010), Alvarez, Guiso, and Lippi (2012), and Gomes, Haliassos, and Ramadorai (2021).

Given respondents' apparent reluctance to trade, both changes in expectations and levels of lag expectations may play a role in explaining trading behavior. That is, given a reluctance to trade, lag expectations may not be reflected in current positions. Thus, we begin evaluating the relation between beliefs and trading by examining differences—between non-traders, buyers, and sellers—in average expectations and average changes in expectations. Specifically, the first three columns of Table VIII report, for each trading group, the pooled cross-sectional time-series average expected return at the beginning of the trading window and changes in expectations over the trading window. In columns 2 and 3, the associated statistical significance is based on a test of whether the value (for buyers in column 2 and sellers in column 3) differs from non-traders (i.e., column 1). Tests for differences are based on standard errors clustered at the respondent level. Panel A reports values for retirement accounts and Panel B reports values for direct accounts.

[Insert Table VIII about here]

The results in the first three columns in Table VIII suggest that, relative to non-traders, both buyers and sellers exhibit higher long-term expected returns for trading in retirement accounts (Panel A) and trading in direct accounts (Panel B). For buyers, the results are consistent with the hypothesis long-term expectations are gradually incorporated into portfolios. The results in Panel A also suggest that sellers exhibit lower near-term expected returns. Thus, at least for retirement accounts, the results suggest that individuals are more likely to sell when their near-term expected returns are lower than, and their long-term expected returns are higher than, non-traders' near- and long-term expected returns, respectively.

To examine near- and long-term levels and changes in expectations simultaneously, we estimate a multinomial logit of the likelihood of buying and selling (both relative to non-trading) on standardized 1- and standardized 10-year beginning of trading window expected returns, standardized changes in 1- and standardized changes in 10-year expected returns over the trading window, wave fixed effects, and the number of days since the respondent's previous long-form interview.[31] Results are reported in the final two columns of Table VIII. The penultimate row reports p-values associated with tests that the coefficients associated standardized 1- and 10-year expected returns are equal, and the bottom row reports analogous p-values for tests comparing the coefficients associated with standardized changes in 1- and 10-year expected returns. The results for retirement accounts (Panel A) suggest that, when controlling for other expectations, relative to non-traders, buyers (column 4)

[31] Because trading is more likely the longer the survey window, we control for the number of days between interviews for each respondent.

tend to exhibit both higher (row 2) and increasing (row 4) 10-year expected returns. In contrast, relative to non-traders, sellers (column 5) exhibit both lower (row 1) and decreasing (row 3) 1-year expected returns, but higher (row 2) and increasing (row 4) 10-year expected returns. In both cases, we can reject the hypothesis that beginning of trading window 1-year expected returns have the same impact as 10-year expected returns. Similarly, the p-values reported in the bottom row reveal we can reject the hypothesis (at the 10% level for buyers and at the 1% level for sellers) that changes in 1-year expected returns have the same impact as changes in 10-year expected returns. Direct accounts (Panel B) exhibit broadly similar patterns albeit the results tend to be somewhat weaker and less consistent. In the Internet Appendix we repeat these tests replacing levels of, and changes in, expected returns with levels of, and changes in, the likelihood markets rise in the next year and decade and find similar results.

In sum, consistent with previous work, most individuals exhibit strong inertia in their portfolios. Nonetheless, even after accounting for near-term beliefs, long-term beliefs play an important role in trading decisions. In fact, the results in Table VIII suggest that long-term expectations play at least as an important role as near-term expectations in driving trading decisions. Specifically, optimistic long-term views are associated with buying while a combination of negative near-term expectations and positive long-term expectations increase the likelihood of selling (at least for retirement accounts). The results provide further evidence consistent with the hypothesis that individuals' behavior is impacted by trading frictions and the weighting of cognitive defaults and signals.

5 Discussion

Although surveys can be sensitive to language and interpretation (e.g., Prescott (1977), Lamont (2004)), a growing literature demonstrates that surveys of subjective expectations provide valuable insights and are central to understanding economic behaviors and their impact on asset prices and the real economy (e.g., see discussions in D'Acunto and Weber (2024), Bordalo, Gennaioli, and Shleifer (2022), Manski (2018), and Manski (2004)). In addition, the ALP questions are, arguably, the simplest approach to mental calculations—presumably, nearly everyone can understand the question of whether one expects the stock market to be higher or lower 10 years from today. Most important, our empirical results demonstrate that long-term expectations are not just "noise" as they are strongly related to respondent characteristics and respondent choices. Our results are also largely robust to examination of either inferred expected returns or raw probability beliefs.

As discussed in Section 2.3, the evidence that long-term expected returns play an important role in explaining the risky share, equity market participation, and trading even when controlling for near-term expected returns is consistent with at least three explanations: measurement error, trading frictions, and cognitive uncertainty. Consistent with previous work (e.g., Ameriks, Kézdi, Lee, and Shapiro (2020), Giglio, Maggiori, Stroebel, and Utkus (2021)) that concludes measurement error plays only a small role in explaining the relation between subjective expectations and behavior, it is hard to reconcile measurement error as the primary cause of the stronger relation between risky share or participation and long-term expected returns versus near-term expected returns. Specifically, for measurement error to explain why risky share and participation are so much more strongly related to long-term than near-term beliefs, would require near-term beliefs to have an order of magnitude larger measurement error than long-term beliefs. Given near- and long-term beliefs are inferred from the same questions (over different horizons), it is unlikely measurement error would be an order of magnitude larger for near-term beliefs.

The final two explanations may better explain why long-term expectations play a more important role than near-term expectations in explaning behaviors. Specifically, long-term expectations may better explain risky share and participation because trading frictions (e.g., inattention, non-pecuniary costs) keep respondents from incorporating near-term expectations into actions or because respondents discount their near-term expectations due to cognitive uncertainty. As a simple test of whether cognitive uncertainty plays an important role in explaining the results, we posit that trading frictions are smaller for higher income individuals (e.g., Vissing-Jorgensen (2004)). Thus, if trading frictions are the primary reason long-term expectations play a more important role, then the stronger relation between long-term beliefs and portfolio choice should primarily be limited to lower income individuals. In the Internet Appendix, we repeat our baseline tests for high- and low-income individuals, and find that long-term expectations are much more important than near-term expectations for both low- and high-income individuals in explaining risky share and participation choices. In sum, the results are consistent with the hypothesis that cognitive uncertainty plays an important role in explaining the stronger relation between long-term beliefs (relative to near-term beliefs) and participation or risky share decisions.

6 Conclusions

Absent pecuniary, non-pecuniary, and cognitive frictions, long-term expectations should play little role in explaining investors' choices once accounting for near-term expectations as an individual can always adjust their portfolio to reflect their near-term expectations. If, however, frictions play a substantial role, then long-term expectations may not only contribute to explaining behaviors, but also play a more important role than near-term expectations. Specifically, if temporary signals play a more important role in driving heterogeneity in near-term expectations (relative to long-term expectations), then individuals' long-term expectations may better capture their behaviors.

Our first two tests support the hypothesis that temporary signals help explain near-term belief heterogeneity. Specifically, (1) 1-year expected returns exhibit proportionally greater heterogeneity than 10-year expected returns and (2) respondent characteristics better explain variation in 10-year expected returns than 1-year expected returns. In addition, we find that long-term expectations are much more important than near-term expectations in explaining both the risky share and stock market participation decisions. Moreover, the empirical relation between long-term expectations and risky share is much closer to the theoretical relation than that found (in both this study and others) for the relation between risky share and near-term expectations. Further consistent with these frictions impacting choices, individuals exhibit inertia in their holdings. When do they trade, however, long-term expectations appear at least as important as near-term expectations in driving these decisions.

In sum, the central role of long-term expectations in stock market participation, risky share choices, and trading provides important insights into investor behavior with implications for theory, empirical work, and public policy.

References

Agnew, Julie, Pierluigi Balduzzi, and Annika Sundén, 2003, Portfolio Choice and Trading in a Large 401(k) Plan, *American Economic Review* 93(1), 193–215.

Alvarez, Fernando, Luigi Guiso, and Francesco Lippi, 2012, Durable Consumption and Asset Management with Transaction and Observation Costs, *American Economic Review* 102(5), 2272–2300.

Ameriks, John, Gábor Kézdi, Minjoon Lee, and Matthew D. Shapiro, 2020, Heterogeneity in Expectations, Risk Tolerance, and Household Stock Shares: The Attenuation Puzzle, *Journal of Business & Economic Statistics* 38(3), 633–646.

Amromin, Gene, and Steven A. Sharpe, 2014, From the Horse's Mouth: Economic Conditions and Investor Expectations of Risk and Return, *Management Science* 60(4), 845–866.

Barberis, Nicholas, Robin Greenwood, Lawrence Jin, and Andrei Shleifer, 2018, Extrapolation and bubbles, *Journal of Financial Economics* 129(2), 203–227.

Barth, Daniel, Nicholas W. Papageorge, and Kevin Thom, 2020, Genetic Endowments and Wealth Inequality, *Journal of Political Economy* 128, 1774–1522.

Ben-David, Itzhak, John R. Graham, and Campbell R. Harvey, 2013, Managerial Miscalibration*, *Quarterly Journal of Economics* 128(4), 1547–1584.

Bhamra, Harjoat S., and Raman Uppal, 2019, Does Household Finance Matter? Small Financial Errors with Large Social Costs, *American Economic Review* 109(3), 116–1154.

Bilias, Yannis, Dimitris Georgarakos, and Michael Haliassos, 2010, Portfolio Inertia and Stock Market Fluctuations, *Journal of Money, Credit and Banking* 42(4), 715–742, _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1538-4616.2010.00304.x.

Binswanger, Johannes, and Martin Salm, 2017, Does everyone use probabilities? The role of cognitive skills, *European Economic Review* 98, 73–85.

Black, Sandra E., Paul J. Devereux, Petter Lundborg, and Kaveh Majlesi, 2017, On the Origins of Risk-Taking in Financial Markets, *Journal of Finance* 72(5), 2229–2278, _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/jofi.12521.

Bodie, Zvi, 2021, Wishful Thinking About the Risk of Stocks in the Long Run: Consequences for Defined Contribution and Defined Benfit Retirment Plans, *Retirement Management Journal* 10(1), 79–85.

Bordalo, Pedro, Nicola Gennaioli, and Andrei Shleifer, 2022, Overreaction and Diagnostic Expectations in Macroeconomics, *Journal of Economic Perspectives* 36(3), 223–244.

Boutros, Michael, Itzhak Ben-David, John R Graham, Campbell R Harvey, and John Payne, 2024, The Persistence of Miscalibration, Working Paper, Bank of Canada, Ohio State University, Duke University.

Brunnermeier, Markus K., and Stefan Nagel, 2008, Do Wealth Fluctuations Generate Time-Varying Risk Aversion? Micro-evidence on Individuals, *American Economic Review* 98(3), 713–736.

Carvalho, Carlos M., Hedibert F. Lopes, and Robert E. McCulloch, 2018, On the Long-Run Volatility of Stocks, *Journal of the American Statistical Association* 113(523), 1050–1069.

Charles, Constantin, Cary Frydman, and Mete Kilic, 2024, Insensitive Investors, *The Journal of Finance (forthcoming).*

Das, Sreyoshi, Camelia M Kuhnen, and Stefan Nagel, 2020, Socioeconomic Status and Macroeconomic Expectations, *Review of Financial Studies* 33(1), 395–432.

de Bruin, Wändi Bruine, Baruch Fischhoff, Susan G. Millstein, and Bonnie L. Halpern-Felsher, 2000, Verbal and Numerical Expressions of Probability: "It's a Fifty–Fifty Chance", *Organizational Behavior and Human Decision Processes* 81(1), 115–131.

Dominitz, Jeff, and Charles F. Manski, 2007, Expected Equity Returns and Portfolio Choice: Evidence from the Health and Retirement Study, *Journal of the European Economic Association* 5(2-3), 369–379.

Drerup, Tilman, Benjamin Enke, and Hans-Martin von Gaudecker, 2017, The Precision of Subjective Data and the Explanatory Power of Economic Models, *Journal of Econometrics* 200(2), 378–389.

D'Acunto, Francesco, and Michael Weber, 2024, Why Survey-Based Subjective Expectations Are Meaningful and Important, *Annual Review of Economics.*

Enke, Benjamin, and Thomas Graeber, 2023, Cognitive Uncertainty, *Quarterly Journal of Economics* 138(4), 2021–2067.

Favilukis, Jack, 2013, Inequality, Stock Market Participation, and the Equity Premium, *Journal of Financial Economics* 107(3), 740–759.

Gabaix, Xavier, 2019, Behavioral Inattention, in *Handbook of Behavioral Economics: Applications and Foundations 1*, vol. 2, pp. 261–343.

Giacomini, Raffaella, Vasiliki Skreta, and Javier Turen, 2020, Heterogeneity, Inattention, and Bayesian Updates, *American Economic Journal: Macroeconomics* 12(1), 282–309.

Giannetti, Mariassunta, and Tracy Yue Wang, 2016, Corporate Scandals and Household Stock Market Participation, *Journal of Finance* 71(6), 2591–2636, _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/jofi.12399.

Giglio, Stefano, Matteo Maggiori, Johannes Stroebel, and Stephen Utkus, 2021, Five Facts about Beliefs and Portfolios, *American Economic Review* 111(5), 1481–1522.

Gomes, Francisco, Michael Haliassos, and Tarun Ramadorai, 2021, Household Finance, *Journal of Economic Literature* 59(3), 919–1000.

Gomes, Francisco, and Alexander Michaelides, 2005, Optimal Life-Cycle Asset Allocation: Understanding the Empirical Evidence, *Journal of Finance (New York)* 60(2), 869–904.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales, 2008, Trusting the Stock Market, *Journal of Finance* 63(6), 2557–2600, _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1540-6261.2008.01408.x.

Hartzmark, Samuel M., and Abigail B. Sussman, 2024, Eliciting Expectations, Working Paper, Boston College, University of Chicago.

Hoffmann, Arvid O. I., Thomas Post, and Joost M. E. Pennings, 2013, Individual investor perceptions and behavior during the financial crisis, *Journal of Banking & Finance* 37(1), 60–74.

Hong, Harrison, Jeffrey D. Kubik, and Jeremy C. Stein, 2004, Social Interaction and Stock-Market Participation, *Journal of Finance* 59(1), 137–163, _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1540-6261.2004.00629.x.

Hudomiet, Peter, Gabor Kezdi, and Robert J. Willis, 2011, Stock market crash and expectations of American households, *Journal of Applied Economics* 26(3), 393–415.

Hurd, Michael, Maarten Van Rooij, and Joachim Winter, 2011, Stock Market Expectations of Dutch Households, *Journal of Applied Econometrics* 26(3), 416–436.

Hurd, Michael D., 2009, Subjective Probabilities in Household Surveys, *Annual Review of Economics* 1(1), 543–562, _eprint: https://doi.org/10.1146/annurev.economics.050708.142955.

Kezdi, Gábor, and Robert Willis, 2011, Household Stock Market Beliefs and Learning, Working Paper w17614, National Bureau of Economic Research, Cambridge, MA.

Kuhnen, Camelia M., and Andrei C. Miu, 2017, Socioeconomic Status and Learning from Financial Information, *Journal of Financial Economics* 124(2), 349–372.

Lahiri, Kajal, and Xuguang Sheng, 2010, Measuring forecast uncertainty by disagreement: The missing link, *Journal of Applied Econometrics* 25(4), 514–538.

Lamont, Owen, 2004, Comment on Annette Vissing-Jorgensen “Perspectives on Behavioral Finance: Does “Irrationality” Disappear with Wealth? Evidence from Expectations and Actions”, *NBER Macroeconomics Annual* 18, 200–207.

Malmendier, Ulrike, and Stefan Nagel, 2011, Depression Babies: Do Macroeconomic Experiences Affect Risk Taking?, *Quarterly Journal of Economics* 126(1), 373–416.

Manski, Charles F., 2004, Measuring Expectations, *Econometrica* 72(5), 1329–1376, _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1468-0262.2004.00537.x.

——— , 2018, Survey Measurement of Probabilistic Macroeconomic Expectations: Progress and Promise, *NBER Macroeconomics Annual* 32, 411–471.

Martin, Ian W. R., and Dimitris Papadimitriou, 2022, Sentiment and Speculation in a Market with Heterogeneous Beliefs, *American Economic Review* 112(8), 2465–2517.

Merkle, Christoph, and Martin Weber, 2014, Do Investors Put Their Money Where Their Mouth Is? Stock Market Expectations and Investing Behavior, *Journal of Banking & Finance* 46, 372–386.

Merkoulova, Yulia, and Chris Veld, 2022, Stock Return Ignorance, *Journal of Financial Economics* 144(3), 864–884.

Merton, Robert C., 1969, Lifetime Portfolio Selection under Uncertainty: The Continuous-Time Case, *Review of Economics and Statistics* 51(3), 247–257.

Patton, Andrew J., and Allan Timmermann, 2010, Why do Forecasters Disagree? Lessons from the Term Structure of Cross-Sectional Dispersion, *Journal of Monetary Economics* 57(7), 803–820.

——— , 2011, Predictability of Output Growth and Inflation: A Multi-Horizon Survey Approach, *Journal of Business & Economic Statistics* 29(3), 397–410.

Prescott, Edward C, 1977, Should control theory be used for economic stabilization?, *Carnegie-Rochester Conference Series on Public Policy* 7, 13–38.

Puri, Manju, and David T. Robinson, 2007, Optimism and Economic Choice, *Journal of Financial Economics* 86(1), 71–99.

Pástor, Ľuboš, and Robert F. Stambaugh, 2012, Are Stocks Really Less Volatile in the Long Run?, *Journal of Finance* 67(2), 431–478, _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1540-6261.2012.01722.x.

Sias, Richard, Laura T. Starks, and H. J. Turtle, 2023, The Negativity Bias and Perceived Return Distributions: Evidence from a Pandemic, *Journal of Financial Economics* 147(3), 627–657.

——— , 2024a, Extrapolation and Near- and Long-term Return Perceptions, Working Paper, University of Arizona, University of Texas, Colorado State University.

——— , 2024b, Uncertain Uncertainty, Working Paper, University of Arizona, University of Texas, Colorado State University.

Siegel, Jeremy, 2014, *Stocks for the Long Run: The Definitive Guide to Financial Market Returns and Long-Term Investment Strategies.* McGraw-Hill, New York.

Vissing-Jorgensen, Annette, 2004, Perspectives on Behavioral Finance: Does "Irrationality" Disappear with Wealth? Evidence from Expectations and Actions, *NBER Macroeconomics Annual* 18, 139–194.

Woodford, Michael, 2020, Modeling Imprecision in Perception, Valuation, and Choice, *Annual Review of Economics* 12, 579–601.

Zumbrun, Josh, 2023, Never Mind the 1%. Mini-Millionaires Are Where Wealth Is Growing Fastest, *Wall Street Journal*.

Table I – Descriptive Statistics for ALP Respondents

This table reports pooled cross-sectional time-series descriptive statistics of respondents in our sample (see the Internet Appendix for variable construction details). Except for the bottom two rows, the sample period is November 2008 through January 2016 and includes 61 waves of the "Effects of the Financial Crisis" surveys. The sample for holds equity is limited to the 29 long-form waves and short-form wave 3. The sample for %Equity is limited to six waves (between 2011 and 2016), where ALP collected asset value data.

Description	Waves	N	Mean	25$^{\text{th}}$	Median	75$^{\text{th}}$ Dev.	Std
Female	61	90,002	0.587	0.000	1	1	0.492
White race	61	90,134	0.872	1.000	1	1	0.334
Married	61	90,134	0.645	0.000	1	1	0.479
Retired	61	90,119	0.229	0.000	0	0	0.420
Working	61	90,119	0.591	0.000	1	1	0.492
Income	61	89,736	68,058	32,500	55,000	87,500	50,718
Years education	61	90,003	14.753	13.000	14	16	2.606
Age	61	90,134	51	40	53	62	15
Health	61	88,341	3.410	3.000	3	4	0.929
Holds equity	30	44,132	0.550	0.000	1.000	1.000	0.497
%Equity	6	5,834	34.264	0.000	28.063	62.759	33.730

Table II – Beliefs Regarding Near- and Long-Term Stock Returns

This table reports descriptive statistics for the pooled cross-sectional time-series of American Life Panel Survey data between 2008 and 2016. The first three rows in Panel A report summary statistics for investor perceptions over the next 12 months regarding the likelihood the market rises, rises more than 20%, and falls by more than 20%. The next two rows report summary statistics for the implied expected return and standard deviation estimated from respondent probabilities of the likelihood of a 20% or greater gain and a 20% or greater loss over the next year. The second to last column reports the historical average (computed from the CRSP value-weighted index between 1926 and 2020). The final column reports the fraction of observations below the historical average. Panel B reports analogous statistics for the likelihood equity markets rise, rise by more than 20%, and fall by more than 20% over the next decade. The final two rows report summary statistics for the implied expected return and standard deviation for the next decade estimated from respondent probabilities of the likelihood of a 20% or greater gain and a 20% or greater loss over the next decade.

Description	N	Mean	25^{th}	Median	75^{th}	Std Dev.	Hist.	%<Hist
Panel A: ALP respondent beliefs over the next year								
$P(R_{1yr} > 0)$	89,959	0.434	0.200	0.500	0.600	0.270	0.747	0.829
$P(R_{1yr} > 0.20)$	89,811	0.250	0.060	0.200	0.450	0.216	0.330	0.679
$P(R_{1yr} < -0.20)$	89,724	0.237	0.100	0.200	0.400	0.200	0.063	0.237
$E_{i,t}(R_{1yr})$	62,212	-1.039	-5.141	-2.041	3.830	10.266	0.093	0.861
$\sigma_{i,t}(R_{1yr})$	62,212	29.939	15.819	22.452	33.820	21.277	0.201	0.443
Panel B: ALP respondent beliefs over the next decade								
$P(R_{10yr} > 0)$	89,718	0.563	0.300	0.510	0.800	0.299	0.958	0.906
$P(R_{10yr} > 0.20)$	41,550	0.412	0.200	0.450	0.600	0.276	0.928	0.959
$P(R_{10yr} < -0.20)$	41,536	0.220	0.050	0.150	0.400	0.197	0.014	0.143
$E_{i,t}(R_{10yr})$	25,735	12.921	-2.041	3.154	18.232	25.423	0.962	1.000
$\sigma_{i,t}(R_{10yr})$	25,735	42.114	17.822	29.139	50.674	36.153	0.474	0.714

Table III – Forecast Horizon and Belief Heterogeneity

The first four columns report the survey date, number of respondents, and the cross-sectional standard deviation (denoted by Ψ) of the perceived 1- and 10-year expected returns, respectively. Column (5) reports the ratio of the 10-year cross-sectional standard deviation to the 1-year standard deviation. Panel A reports values for each of the 29 long-form surveys and Panel B reports summary statistics across all surveys.

Date	N	$\Psi(E_{i,t}(R_{1yr}))$	$\Psi(E_{i,t}(R_{10yr}))$	$\frac{\Psi(E_{i,t}(R_{10yr}))}{\Psi(E_{i,t}(R_{1yr}))}$
(1)	(2)	(3)	(4)	(5)
Panel A: Cross-sectional dispersion by survey				
200811	801	12.20	31.62	2.59
200902	807	10.83	30.24	2.79
200907	1,120	9.69	26.23	2.71
200910	991	9.44	26.47	2.80
201001	1,095	9.06	27.02	2.98
201004	1,082	9.19	24.48	2.66
201007	992	9.00	24.73	2.75
201010	1,076	8.76	24.91	2.84
201101	1,076	8.19	25.77	3.15
201104	538	8.70	24.09	2.77
201107	614	8.94	25.12	2.81
201110	552	9.37	25.42	2.71
201201	628	8.59	23.26	2.71
201204	641	8.80	26.62	3.03
201207	595	8.52	25.00	2.93
201210	562	8.73	23.83	2.73
201212	651	9.12	24.52	2.69
201304	854	9.33	23.59	2.53
201307	850	9.19	23.22	2.53
201310	811	9.14	23.32	2.55
201401	588	9.46	23.60	2.49
201404	781	9.35	23.20	2.48
201407	770	9.10	23.20	2.55
201410	738	8.85	24.65	2.79
201501	762	8.81	22.91	2.60
201503	741	8.56	24.11	2.82
201507	697	8.40	23.71	2.82
201510	666	8.49	22.81	2.68
201601	669	8.98	22.41	2.50
Panel B: Times series summary measures				
Average	784	9.13	24.83	2.72
Min	538	8.19	22.41	2.48
Max	1,120	12.20	31.62	3.15

Table IV – Near- and Long-Term Beliefs and Respondent Characteristics

This table reports coefficients from regressions of the standardized 1-year expected return (column 1) and the standardized 10-year expected return (column 2) on respondent characteristics. Column 3 reports coefficients where the dependent variable is the difference between standardized 10- and 1-year expected returns. Columns 4-6 report corresponding values for the 1-year likelihood of a market increase, the 10-year likelihood of a market increase, and the difference between the standardized 10- and 1-year likelihoods of a market increase. In all cases, regressions include wave fixed effects and standard errors are clustered at the respondent level. In addition, the non-indicator explanatory variables (reported in the first four rows) are standardized such that the coefficient reflects the standard deviation change in the dependent variable given a one standard deviation change in the independent variable. Significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

	$E(R_{i,t})$			$P(R_{i,t} > 0)$		
	1 year	10 year	Difference	1 year	10 year	Difference
Description	(1)	(2)	(3)	(4)	(5)	(6)
Income	0.016	0.118***	0.103***	0.104***	0.167***	0.063***
Years Education	0.081***	0.148***	0.067***	0.188***	0.215***	0.027***
Age	0.008	0.001	-0.007	-0.012	0.027	0.039***
Health	0.044***	0.043***	-0.001	0.072***	0.071***	-0.001
Female	0.045	-0.281***	-0.326***	-0.243***	-0.290***	-0.047***
Married	-0.033	-0.076**	-0.043	-0.030	-0.033	-0.003
White race	-0.029	0.124***	0.153***	0.162***	0.218***	0.056**
Retired	0.112**	0.150***	0.038	0.082*	0.104**	0.021
Working	0.014	-0.024	-0.038	-0.059**	-0.045	0.014
Wave fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	22,616	22,616	22,616	87,392	87,392	87,392
R^2	0.018	0.111	0.056	0.102	0.175	0.040

Table V – Fraction of Financial Assets in Equity and Beliefs

This table reports coefficients from regressions of the fraction in financial assets held in equity on near- and long-term beliefs. Columns (1) to (5) report results for all ALP respondents and columns (6) to (10) report comparable results when limited to the subset of participants who report positive equity holdings. Columns (5) and (10) include respondent characteristics (gender, race, marital status, working, retired, age, years of education, income, and health). Panel A reports results for expected returns and standard deviations, and Panel B reports results for comparable respondent probability beliefs. Expected returns, standard deviations, and probability beliefs in the next year or decade are standardized. Standard errors are clustered at the respondent level. The penultimate row of Panel A reports the p-values from tests of the hypothesis that the coefficient associated with the standardized 1-year expected return does not differ from the coefficient associated with the standardized 10-year expected return and the bottom row reports p-values from an analogous test for standardized 1- and 10-year standard deviation coefficients. The bottom two rows of Panel B reports analogous figures for probability beliefs. The fraction of financial assets held in equities is limited to ALP's Effects of the Financial Crisis waves 23 (January 2011), 35 (January 2012), 47 (January 2013), 53 (January 2014), 57 (January 2015), and 61 (January 2016). We report t-statistics in parentheses and significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

	%Stock - All respondents					%Stock - Stock market participants				
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Panel A: Risky share and belief moments									
$A : E_{i,t}(R_{1yr})$	2.686***		0.674	0.612	1.070	0.005		-0.965	-1.290*	-1.036
	(3.90)		(0.98)	(0.87)	(1.61)	(0.01)		(-1.35)	(-1.73)	(-1.41)
$B : E_{i,t}(R_{10yr})$		6.964***	6.762***	7.722***	5.055***		3.214***	3.482***	4.031***	3.488***
		(10.34)	(9.74)	(8.41)	(5.68)		(4.87)	(5.13)	(4.19)	(3.6)
$C : \sigma_{i,t}(R_{1yr})$				-0.447	-0.327				0.899	0.735
				(-0.64)	(-0.5)				(1.23)	(1.02)
$D : \sigma_{i,t}(R_{10yr})$				-1.444	-0.706				-0.911	-0.693
				(-1.58)	(-0.82)				(-0.96)	(-0.73)
Wave fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Resp Characteristics	No	No	No	No	Yes	No	No	No	No	Yes
N	3,425	3,425	3,425	3,425	3,419	2,396	2,396	2,396	2,396	2,391
R^2	0.053	0.091	0.091	0.093	0.185	0.004	0.018	0.019	0.02	0.042
$p - value : A = B$			0.01	0.01	0.01			0.01	0.01	0.01
$p - value : C = D$				0.46	0.76				0.19	0.3

Continued on the next page

	%Stock - All respondents					%Stock - Stock market participants				
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel B: Risky share and belief probabilities										
$A: P(R_{1yr} > 0)$	8.157***		2.643***	2.991***	2.592***	3.907***		1.620**	1.752**	1.710**
	(14.44)		(3.65)	(4.11)	(3.74)	(6.4)		(2.12)	(2.27)	(2.25)
$B: P(R_{10yr} > 0)$		9.861***	8.043***	7.528***	5.205***		4.486***	3.400***	3.273***	2.833***
		(16.95)	(10.64)	(9.94)	(6.91)		(7.13)	(4.26)	(4.03)	(3.43)
$C: P(R_{1yr} < -0.2)$				-0.953	-0.337				1.311*	1.240*
				(-1.46)	(-0.52)				(1.88)	(1.78)
$D: P(R_{10yr} < -0.2)$				-2.169***	-1.537**				-0.633	-0.472
				(-3.35)	(-2.43)				(-0.91)	(-0.68)
Wave fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Resp Characteristics	No	No	No	No	Yes	No	No	No	No	Yes
N	5,792	5,792	5,792	5,792	5,783	3,813	3,813	3,813	3,813	3,807
R^2	0.112	0.138	0.141	0.149	0.213	0.021	0.027	0.029	0.03	0.046
$p-value: A = B$			0.01	0.01	0.04			0.21	0.29	0.43
$p-value: C = D$				0.29	0.29				0.11	0.16

Table VI – Stock Market Participation and Beliefs

Panel A reports coefficients from regressions of an indicator for stock market participation on 1- and 10-year expected returns, standard deviations, and respondent characteristics. Panel B reports coefficients from regressions of stock market participation on the perceived likelihoods markets rise in the next year or decade, markets fall at least 20% in the next year or decade, and respondent characteristics. The independent variables are standardized (rescaled to unit variance, zero mean) so that coefficients can be directly compared. The penultimate row in Panel A (Panel B) reports p-values from a test of the hypothesis that the coefficient associated with the 1-year expected return (perceived likelihood markets rise in the next year) does not differ from the coefficient associated with the 10-year expected return (perceived likelihood markets rise in the next 10 years). The bottom row reports p-values from an analogous test for the near- and long-term standard deviation (Panel A) or likelihood markets fall at least 20% (Panel B). Standard errors are clustered at the respondent level and t-statistics are reported parenthetically. Significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

	(1)	(2)	(3)	(4)	(5)
Panel A: Stock market participation and return belief moments					
$E_{i,t}(R_{1yr})$	0.055***		0.022***	0.022***	0.022***
	(8.96)		(3.82)	(3.86)	(4.43)
$E_{i,t}(R_{10yr})$		0.115***	0.109***	0.126***	0.060***
		(18.9)	(18.25)	(17.14)	(8.48)
$\sigma_{i,t}(R_{1yr})$				-0.019***	-0.010*
				(-3.21)	(-1.82)
$\sigma_{i,t}(R_{10yr})$				-0.024***	-0.008
				(-3.68)	(-1.36)
Wave fixed effects	Yes	Yes	Yes	Yes	Yes
Resp Characteristics	No	No	No	No	Yes
N	22,735	22,735	22,735	22,735	22,603
R^2	0.025	0.066	0.068	0.072	0.266
$p-value : E_{i,t}(R_{1yr}) = E_{i,t}(R_{10yr})$			0.01	0.01	0.01
$p-value : \sigma_{i,t}(R_{1yr}) = \sigma_{i,t}(R_{10yr})$				0.54	0.88
Panel B: Stock market participation and return belief probabilities					
$P(R_{1yr} > 0)$	0.140***		0.039***	0.047***	0.038***
	(23.55)		(6.11)	(7.35)	(6.45)
$P(R_{10yr} > 0)$		0.173***	0.145***	0.137***	0.076***
		(28.35)	(20.81)	(19.79)	(11.54)
$P(R_{1yr} < -0.2)$				-0.030***	-0.016***
				(-5.93)	(-3.38)
$P(R_{10yr} < -0.2)$				-0.035***	-0.016***
				(-7.02)	(-3.68)
Wave fixed effects	Yes	Yes	Yes	Yes	Yes
Resp Characteristics	No	No	No	No	Yes
N	41,308	41,308	41,308	41,308	41,028
R^2	0.098	0.138	0.141	0.155	0.305
$p-value : E_{i,t}(R_{1yr}) = E_{i,t}(R_{10yr})$			0.01	0.01	0.01
$p-value : \sigma_{i,t}(R_{1yr}) = \sigma_{i,t}(R_{10yr})$				0.50	0.89

Table VII – Trading and Expectations

This table reports the time-series mean (over the 27 trading windows; the average trading window is 93 days) of the cross-sectional average fraction of respondents not changing their exposure to equities in their retirement accounts, in their direct accounts (for direct accounts not trading includes both those not trading and those buying and selling equally), and in any account. The next three columns report the fraction buying, selling, or cases where they trade but it is not known if they were net buyers or net sellers. The final three columns report, respectively, the time-series mean of the cross-sectional average fraction of respondents who report a change in at least one of their three near-term expectations (chance market rises, rises more than 20%, and falls more than 20% over the next year), at least one of their three long-term expectations, and those who change any of their six expectations.

	No trade	Net buy	Net sell	Indeterminate	ΔNear-term expectations	ΔLong-term expectations	ΔAny expectations
Description	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Retirement accounts	85.18%	9.62%	4.88%	0.47%	90.88%	89.47%	94.09%
Direct accounts	73.25%	16.54%	9.15%	1.79%	91.61%	89.95%	94.75%
Any	74.80%	15.75%	7.53%	1.92%	90.44%	89.03%	93.72%

Table VIII – Expected Returns and Trading

The first three columns report the pooled cross-sectional time-series average 1- and 10-year expected returns at the beginning of the trading window and changes in 1- and 10-year expected returns over the trading window (the average trading window is 93 days) for non-traders, buyers, and seller, respectively. Statistical significance in columns 2 and 3 are based on tests of whether the values differ from non-traders (column 1) and standard errors are clustered at the respondent level. The last two columns report marginal effects from multinomial logit regressions of indicators for buyers and sellers (relative to non-traders) on standardized 1- and 10-year beginning of trading window expected returns, standardized changes in 1- and 10-year expected returns over the trading window, wave fixed effects, and the number of days since the respondent's previous long-form interview wave. The sample period covers 27 trading windows from March 2009 to January 2016. Panel A reports values for trading in retirement accounts and Panel B reports analogous results for trading in direct accounts. Tests that the coefficient associated with standardized beginning of trading window 1-year expected return equals the coefficient associated with standardized beginning of trading window 10-year expected returns are reported in the penultimate row of each panel. The final row of each panel reports analogous tests that the standardized coefficient on changes in 1-year beliefs equals the standardized coefficient on changes in 10-year beliefs. Significance at the 1, 5, and 10% levels are indicated by ***, **, and *, respectively.

	Average Expectations			Logit Results	
	No trade	Buy	Sell	Buy	Sell
Description	(1)	(2)	(3)	(4)	(5)
Panel A: Trading in retirement accounts					
$A : E_{i,t}(R_{1yr})_{-1}$	-0.009	0.152	-1.457***	-0.003	-0.013***
$B : E_{i,t}(R_{10yr})_{-1}$	16.996	21.692***	22.397***	0.017***	0.011***
$C : \Delta E_{i,t}(R_{1yr})$	0.042	0.142	0.147	-0.001	-0.009***
$D : \Delta E_{i,t}(R_{10yr})$	-0.350	-0.614	-0.586	0.008**	0.007***
N	6,882	744	384	8,010	
$p - value : A = B$				0.007	0.001
$p - value : C = D$				0.098	0.001
Panel B: Trading in direct accounts					
$A : E_{i,t}(R_{1yr})_{-1}$	-0.041	-0.605	0.728	-0.020*	0.006
$B : E_{i,t}(R_{10yr})_{-1}$	17.424	22.083***	22.660***	0.029***	0.015***
$C : \Delta E_{i,t}(R_{1yr})$	-0.068	0.428	-0.220	-0.004	0.000
$D : \Delta E_{i,t}(R_{10yr})$	-0.085	-0.638	-0.389	0.012*	0.007*
N	3,618	867	461	4,946	
$p - value : A = B$				0.002	0.186
$p - value : C = D$				0.117	0.314

Internet Appendix for
"Long-term Beliefs and Financial Choices"

Contents

IA-1 Return perceptions correlations

Table IA-I reports the correlation between ALP respondents' perceived likelihood markets rise, rise at least 20%, and fall at least 20% in the next year or decade as well as the inferred 1- and 10-year expected returns and standard deviations.

[Insert Table IA-I about here]

IA-2 Risky share – Tobit analysis

Directly analogous to Table V in the paper, Table IA-II reports coefficients from Tobit regressions of the fraction of wealth invested in equity on standardized 1- and 10-year expected returns and standard deviations (Panel A) or the (standardized) perceived likelihoods markets rise or fall at least 20% over the next year or decade (Panel B).

[Insert Table IA-II about here]

The results are fully consistent with those reported in the paper. For example, column 3 of Panel A in Table IA-II suggests that 10-year expected returns have almost six times the impact as 1-year expected returns (9.320/1.667) in explaining the fraction of wealth invested in equity.

IA-3 Stock market participation – Logit analysis

Our results in Table VI are based on regressions of an indicator for stock market participation on standardized 1- and 10-year expected returns and standard deviations or standardized perceived likelihoods markets rise or fall by at least 20% over the next year or decade. Table IA-III reports marginal effects from logistic regressions of stock market participation on the same (standardized) explanatory variables.

[Insert Table IA-III about here]

Once again, the results reported in Table IA-III are fully consistent with those reported in the paper (see Table VI). For instance, when including both 1- and 10-year standardized expected returns (column 3), the marginal effects reported in Table IA-III suggest that a one standard deviation higher 10-year expected return has 6.2 times (i.e., 0.124/0.020) the impact as a one standard deviation higher 1-year expected return in explaining stock market participation.

IA-4 Trading and perceived likelihoods

Directly analogous to Table VIII, the first three columns of Table IA-IV report the pooled cross-sectional time-series average perceived likelihood markets rise in the next year or decade (at the beginning of the trading window) and changes in the perceived likelihoods (over the trading window) for non-traders, buyers, and sellers. In columns 2 and 3, the associated statistical significance is based on a test of whether the value (for buyers in column 2 and sellers in column 3) differs from non-traders (i.e., column 1). Tests for differences are based on standard errors clustered at the respondent level. Panel A reports values for retirement accounts and Panel B reports values for direct accounts. The final two columns report marginal effects from multinomial logit of the likelihood of buying and selling (both relative to non-trading) on standardized 1- and standardized 10-year beginning of trading window perceived likelihoods market rise, standardized changes in 1- and standardized changes 10-year perceived likelihood markets rise over the trading window, wave fixed effects, and the number of days since the respondent's previous long-form interview.

[Insert Table IA-IV about here]

The results in Table IA-IV (focusing on probability beliefs) are consistent with those reported in Table VIII (focusing in on expected returns). For example, the results in Panel A suggest relative to non-traders, sellers perceive a lower likelihood of markets rising in the next year, but a higher likelihood of markets rising in the next decade. Buyers tend to perceive (relative to non-traders) a higher likelihood markets rise in the next decade. In Table IA-IV, for retirement accounts (Panel A), relative to non-traders, buyers also tend to exhibit an increase in the perceived likelihood markets rise in the next year. For direct accounts, however, buyers tend to exhibit both higher long-term perceived likelihood markets rise and an increase in that perceived likelihood.

IA-5 Risky share and stock market participation by income levels

As noted in the the study, we hypothesize that trading frictions are greater for low-income individuals. In this section we examine whether the patterns we document are primarily limited to low income individuals. Specifically, we partition respondents into low ($< \$75,000$, 64% of observations) and high ($\geq \$75,000$, 36% of observations) income individuals and regress the fraction of wealth invested in equity on standardized (such that coefficients can be directly compared) 1- and 10-year expected returns for both low- and high-income individuals and wave fixed effects (i.e., directly analogous to column (3) of Table V). The results, reported in the first column of Table IA-V, reveal that long-term expectations play a more important role that near-term expectations in explaining equity market participation for both low- and high-income individuals and the difference is statistically meaningful at the 1% level in both cases (rows 6 and 7). Rows 8 and 9 also demonstrate we cannot reject the hypothesis that the coefficients for low- and high-income individuals differ from each other.

[Insert Table IA-V about here]

The second column of Table IA-V reports coefficients from a regression of stock market participation on near- and long-term expected returns for low- and high-income individuals (directly analogous to the third column of Panel A in Table VI). Once again, we find that long-term expected returns are much more important than near-term expected returns for both low- and high-income individuals and the differences are statistically meaningful at the 1% level in both cases (rows 6 and 7). The bottom row of the second column reveals, however, that the relation between participation and long-term expected returns is meaningfully stronger for low-income individuals (at the 5% level). In sum, long-term expected returns are much more important than near-term expected returns for both high and low-income individuals in explaining both their risky share and stock market participation.

IA-6 Variable details

Variable construction follows Sias, Starks, and Turtle (2024). As a result, this Appendix contains identical descriptions to their Appendix A.

Variable	Description
Female	Gender is identified in the pre-loaded demographic data for each "Effects of the Financial Crisis" survey.
White race	Ethnicity is identified in the pre-loaded demographic data for each "Effects of the Financial Crisis" survey.
Health	In each survey respondents are asked "Would you say your health is excellent, very good, good, fair or poor?"
Married	Current living situation is asked in each survey. Those who respond, "Married or living with a partner" are classified as married. All others (e.g., separated, divorced, widowed, never married) are classified as non-married.
Working	Current job status is identified in each survey. Respondents who report, "working now" are classified as working.
Retired	Current job status is identified in each survey. Respondents who report "retired" are classified as retired.
Age	Respondent age is reported in each survey.
Years Education	Respondents report 16 possible answers for "What is the highest level of school you have completed or the highest degree you have received?" We assign the following years of education for each answer (1) less than 1st grade=0, (2) 1st, 2nd, 3rd or 4th grade=2.5, (3) 5th or 6th grade=5.5, (4) 7th or 8th grade=7.5, (5) 9th grade=9, (6) 10th grade=10, (7) 11th grade=11, (8) 12 grade no diploma=12, (9) high school graduation=12, (10) some college but no degree=13, (11) associate degree in college occupational/vocational program=14, (12) associate degree in college academic program=14, (13) bachelor's degree=16, (14) master's degree=18, (15) professional school degree (e.g., MD, DDS, DVM, LLB, JD)=22, (16) Doctorate degree (e.g., PhD EdD)=22.

Income	Respondents report values for family income questions. The first question, "family income" reports 14 possible income buckets—with the final bucket indicating income greater than $75,000. "Family income part 2" asks those who report family income greater than $75,000 to report income in four additional buckets. The 14 family income buckets are: inc.<$5k, $5k≤inc<$7.499k, $7.5k≤inc<$9.999k, $10k≤inc<$12.499k, $12.5k≤inc<$14.999k, $15k≤inc<$19.999k, $20k≤inc<$24.999k, $25k≤inc<$29.999k, $30k≤inc<$34.999k, $35k≤inc<$39.999k, $40k≤inc<$49.999k, $50k≤inc<$59.999k, $60k≤inc<$74.999k, $75k≤inc. The family income part 2 groupings are: $75k≤inc<$99.999k, $100k≤inc<$124.999k, $125k≤inc<$199.999k, $200k≤inc. For respondents who report income less than $75K, we use the bucket midpoint. For respondents who report income of at least $75k, but less than $200k, we use the bucket midpoint of family income part 2. For respondents who report income greater than $200k, we assume income is $250k.
Holds equities	In the first two waves of the financial crisis surveys (both long-form), respondents (ST001) are asked, "Do [you (or your husband/wife/partner)] have any shares of stock or stock mutual funds? Please include stocks that [you (or your husband/wife/partner)] hold in an employer pension account." Thus, in the first two waves, respondents are classified as equity market participants based on this question. In all subsequent waves, respondents are asked (ST001), "In the next set of questions we will ask you about stock holdings. Please, do not include stock holdings that are part of an IRA, 401(k), Keogh or similar retirement accounts. Do [you(and/or your husband/wife/partner)] have any shares of stock or stock mutual funds?" In short-form wave 3 and all subsequent long-form waves, respondents who report having retirement account (RA001) are asked (RA006), "Are any of these retirement accounts invested in stocks or stock mutual funds, either fully or partially?" In these waves, we classify respondents who hold report owning stocks (either directly or in retirement account) as equity holders. Respondents who answer they do not have money in stock directly and either report no retirement stock or do not have a retirement account are classified as non-participants. In total, we measure the variable in 30 waves—the 29 long-form waves plus wave 3.

%Stock	In Effects of the Financial Crisis waves 23 (January 2011), 35 (January 2012), 47 (January 2013), 53 (January 2014), 57 (January 2015), and 61 (January 2016), respondents were asked about the value of their assets. We define financial assets as the sum of (1) other real estate ("Other real estate: such as land, rental real estate, or money owed to you on a land contract or mortgage. Do not include your primary residence [or second home] that you have already reported. Do not include business or farm real estate which we ask about separately below"), (2) bonds ("Corporate, municipal, government or foreign bonds, or bond funds: Do not include any assets you reported earlier, for example under retirement accounts. Do not include government savings bonds or treasury bills, asked about below"), (3) savings accounts ("Checking or savings accounts, or money market funds: Do not include any assets you reported earlier, for example under retirement accounts"), (4) CDs ("CDs, Government Savings Bonds, or Treasury Bills: Do not include any assets you reported earlier, for example under retirement accounts"), (5) other savings ("Do [you (or your spouse/partner)] have any other savings or assets, such as jewelry, money owed to you by others, a collection for investment purposes, cash value of any life insurance policies or an annuity that you haven't already told us about?"), (6) assets in trust not yet reported ("What is the total value of the assets in the trust that you have not yet reported?"), (7) value of retirement account ("Adding all these retirement saving accounts together, what is the total value of these accounts?"), (8) value of direct stock holdings ("What are [your (and your spouse's/partner's)] stock holdings worth now?"). We compute the value of stock as the sum of the value of direct stock holdings (see (8)) and the product of retirement assets (see (7)) and the reported fraction of retirement assets held in equity (RA007; "About what fraction of the total value of these retirement accounts is invested in stocks or stock mutual funds?").

We compute trading for each long-form wave. The process for computing trading is wave dependent. To ensure we know when the trading occurred, we only compute trading for respondents who complete the previous long-form survey.

Trades

Wave 5: The previous long-form wave is wave 2, therefore we consider three waves of data (wave 3, wave 4, and wave 5) to determine trading between waves 2 and 5. As noted in the study, starting in wave 3, respondents were asked about direct trades (i.e., stock held outside of retirement funds) in every wave. Specifically (ST001), "In the next set of questions we will ask you about stock holdings [] Please, do not include stock holdings that are part of an IRA, 401(k), Keogh or similar retirement accounts. Do [you (and/or your husband/wife/partner)] have any shares of stock or stock mutual funds?" Respondents are also asked if they traded stock since their previous interview (ST004), "Since [time frame reference for ST00 questions], have [you and/or your spouse/partner] bought or sold any stock or stock mutual funds?" with answers of "1 Bought only", "2 Sold only", "3 Both bought and sold", and "4 Neither bought nor sold." For respondents who report they both bought and sold, they are asked, (ST007) "Thinking both of what [you and/or your spouse/partner] bought and what [you and/or your spouse — partner] sold since [time frame reference for ST00 questions], did you overall take money out of — the stock market or did you overall put money in?" with answers, "1 Took out", "2 Put in", and "3 Neither (purchases and sales were worth about the same)". We classify respondents as non-traders if they report holding money in equity and either (1) neither bought nor sold or (2) bought and sold equal amounts. We classify investors as buyers if they report owning shares and either (1) bought only or (2) net put money in equities. We classify investors as sellers if they either (1) report having money in stock and selling or took money out, or (2) report not having money in stock and selling.

Trades (cont.)

In all ($\geq$ wave 5) long-form waves, respondents are then asked a series of questions about retirement savings and trading. First respondents are asked if have a retirement savings account (RA001), "We are interested in how people save for retirement. Do [you and/or your spouse/partner] have any IRA, 401(k), Keogh or similar retirement saving accounts? Please include any such accounts that [you and/or your spouse/partner] have through a current or former employer" with answers "Yes", "No", and "Don't know." If the respondent answers yes, they are asked if any of the retirement funds are invested in equities (RA006) "Are any of these retirement accounts invested in stocks or stock mutual funds, either fully or partially?" with answers "Yes" or "No". If the respondent answers yes, they asked about trading retirement stock since the last long-form survey (RA008), "Since [time frame reference for when last taken RA002-RA015 questions], have [you and/or your spouse/partner] taken any action to change the amount invested in stocks or stock mutual funds?" with answers "Yes, increased the amount", "Yes, decreased the amount", and "No". Respondents are further asked about new contributions since the last long-form survey (RA009): "Since [time frame reference for when last taken RA002-RA015 questions], have [you and/or your spouse/partner] made any new contributions to retirement accounts such as IRAs, 401(k)s, KEOGHS?" with answers "Yes" and "No". If the respondent answers yes, they are asked if the new contributions were in equities (RA010), "Were any of these new contributions to your retirement accounts invested in stocks or stock mutual funds?" with answers "Yes" or "No". If they answer yes that they made new contribution in equity they are asked about whether they changed their exposure in their new contribution since the last long-form wave (RA012), "Since [time frame reference for when last taken RA002-RA015 questions], have you changed the percentage of your new contributions that were invested in stocks?" with answers, "Yes, increased", "Yes, decreased", and "No".

Wave 5 is unique in that the set of retirement questions (RA002 to RA015) is also asked in the short-form wave 3. As a result, wave 5 has direct trading information between waves 2 and 3, waves 3 and 4, and waves 4 and 5, and retirement trading information between waves 2 and 3, and waves 3 and 5. Thus, for wave 5, investors are included in the trade sample if they report either (1) owning stock directly in waves 3, 4, or 5 and have a non-missing value for whether they traded or not (i.e., ST004/ST007) or report not owning stock but selling stock (i.e., allowing for the possibility they liquidated their portfolio), (2) report holding stock in their retirement account in either wave 3 or 5 and have non-missing trading of retirement sock data (RA008), and (3) report making a new contribution to their retirement account in equity and have non-missing data regarding changing their allocation (RA012) or report making a new contribution with none in stock and that they decreased their allocation.

In total, there are seven trading variables: direct trades since previous wave in waves 3, 4, and 5, retirement account trades since previous long-form wave in waves 3 and 5, and new contributions since previous long-form wave in waves 3 and 5. We classify investors as non-traders (for wave 5) if they report non-trading (e.g., have not taken any action to change allocation to stocks) in at least one of those seven categories and not classified as a buyer or seller in any of the other six categories. Analogously, we classify investors as buyers if they report buying in any one of the seven categories and not as a seller in the other six categories. We classify investors as sellers if they report selling in one of the seven categories and not as a buyer in the other six categories. We classify investors as indeterminate if they report buying in at least one of the seven categories and selling in at least one of the other six categories.

Trades (cont.)

Waves 8-50: These waves are similar to wave 5, except that both prior waves are short form waves (e.g., waves 6 and 7) that do not ask the retirement questions (RA002-RA015) whereas for wave 5, one previous short form wave (wave 3) asked the retirement question and one previous short form wave did not (wave 4). As a result, the retirement questions in these waves ask about trades to retirement accounts since the last long form wave. Thus, rather than seven categories, these waves have five: three for direct trades (the current long-form wave and the two previous short-form waves), one for trading in retirement accounts (current long-form wave) and one for new allocations to retirement accounts (current long-form wave). Thus, we use a directly analogous algorithm to wave 5 (e.g., an investor is classified as a buyer is they report buying in any of the five categories and are not classified as a seller in any of the other four categories).

Waves 51-61: After wave 50, ALP eliminated the short form waves. As a result, in waves 51-61, both direct trade questions and retirement trade questions are since the last (now all long-form) wave. As a result, there are three trade categories: direct trades, retirement trades, and new contributions trades. Again, we use a directly analogous algorithm (e.g., a buyer if they report buying in any of the three categories and not selling in the remaining two categories).

General comments	For many questions, respondents are prompted if they do not initially respond to a question. For instance, if respondents do not respond to the question regarding direct stock holdings, they are prompted, "[You did not answer. Your answers are important to us. Please answer the question to the best of your ability.] In the next set of questions we will ask you about stock holdings besides those that you may have already told us about. Do [you (and/or your husband/wife/partner)] have any shares of stock or stock mutual funds besides stock holdings that are part of an IRA, 401(k), Keogh or similar retirement accounts?" These responses generally show up as a second variable (e.g., no value for ST001, but a value for ST001_NR_DK) that we include in our analysis. Correspondingly, in some cases, respondents who do not report a faction are prompted to select a range. For example, respondents who do not answer the question (RA007) "About what fraction of the total value of these retirement accounts is invested in stocks or stock mutual funds" are prompted (RA007_NR_DK), "[You did not answer. Your answers are important to us. Please answer the question to the best of your ability.] About what fraction of the total value of these retirement accounts is invested in stocks or stock mutual funds" and respondents are given eight ranges (e.g., 51%-69%) from which to select. In these cases we use the range midpoint.

Table IA-I – Correlations between ALP Respondent Beliefs

This table reports pooled cross-sectional time-series (for surveys over the 2008-2016 period) correlations between ALP respondents beliefs that the market will rise, rise more than 20%, and fall at least 20% in the next year or decade, as well as the imputed moment beliefs for 1- and 10-year expected returns and standard deviations.

Description	$P(R_{1yr} > 0)$	$P(R_{1yr} > .2)$	$P(R_{1yr} < -.2)$	$E(R_{1yr})$	$\sigma(R_{1yr})$	$P(R_{10yr} > 0)$	$P(R_{10yr} > .2)$	$P(R_{10yr} < -.2)$	$E(R_{10yr})$
$P(R_{1yr} > 0.20)$	0.558								
$P(R_{1yr} < -0.20)$	0.008	0.302							
$E_{i,t}(R_{1yr})$	0.394	0.668	-0.555						
$\sigma_{i,t}(R_{1yr})$	0.283	0.719	0.635	0.132					
$P(R_{10yr} > 0)$	0.698	0.352	-0.004	0.265	0.177				
$P(R_{10yr} > 0.20)$	0.561	0.495	0.149	0.267	0.286	0.733			
$P(R_{10yr} < -0.20)$	0.021	0.276	0.654	-0.242	0.383	-0.106	0.067		
$E_{i,t}(R_{10yr})$	0.426	0.304	-0.062	0.302	0.137	0.589	0.868	-0.275	
$\sigma_{i,t}(R_{10yr})$	0.317	0.383	0.333	0.089	0.436	0.374	0.622	0.480	0.583

Table IA-II – Fraction of Financial Assets in Equity and Beliefs: Tobit Analysis

This table reports coefficients from Tobit regressions of the fraction in financial assets held in equity on near- and long-term beliefs. Columns (1) to (5) report results for all ALP respondents, and columns (6) to (10) report comparable results when limited to the subset of participants who report positive equity holdings. Columns (1) and (6) report relations between participation and near-term beliefs. Columns (2) and (7) report results for long-term beliefs. Columns (3) and (8) report results for both near- and long-term beliefs. Columns (4), (5), (9), and (10) include measures of near- and long-term volatility. Columns (5) and (10) include respondent characteristics (gender, race, marital status, working, retired, age, years of education, income, and health). Panel A reports results for expected returns and standard deviations, and Panel B reports results for comparable respondent probability beliefs. All models include wave fixed effects. Independent variables are standardized. The penultimate row in Panel A reports the p-values from tests of the hypothesis that the coefficient associated with the standardized 1-year expected return does not differ from the coefficient associated with the standardized 10-year expected return and the bottom row reports p-values from an analogous test for standardized 1- and 10-year standard deviation coefficients. The bottom two rows of Panel B reports analogous figures for probability beliefs. The fraction of financial assets held in equities is limited to ALP's Effects of the Financial Crisis waves 23 (January 2011), 35 (January 2012), 47 (January 2013), 53 (January 2014), 57 (January 2015), and 61 (January 2016). Significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

	%Stock - All respondents					%Stock - Stock market participants				
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Risky share and belief moments										
$A : E_{i,t}(R_{1yr})$	4.502***		1.667**	1.776**	2.415***	-0.040		-0.985*	-1.308**	-1.059*
$B : E_{i,t}(R_{10yr})$		9.802***	9.320***	10.621***	6.487***		3.123***	3.396***	3.850***	3.315***
$C : \sigma_{i,t}(R_{1yr})$				-1.338	-0.986				0.920	0.764
$D : \sigma_{i,t}(R_{10yr})$				-1.889*	-0.734				-0.771	-0.566
N	3,425	3,425	3,425	3,425	3,419	2,396	2,396	2,396	2,396	2,391
$p-value : A = B$			0.01	0.01	0.01			0.01	0.01	0.01
$p-value : C = D$				0.74	0.87				0.17	0.28

Continued on the next page

	%Stock - All respondents					%Stock - Stock market participants				
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel B: Risky share and belief probabilities										
$A : P(R_{1yr} > 0)$	12.949***		4.001***	4.428***	3.886***	3.926***		1.710***	1.843***	1.794***
$B : P(R_{10yr} > 0)$		15.846***	13.084***	12.230***	8.282***		4.436***	3.289***	3.177***	2.775***
$C : P(R_{1yr} < -0.2)$				-2.208***	-0.970				1.414**	1.319**
$D : P(R_{10yr} < -0.2)$				-3.244***	-2.186***				-0.568	-0.414
N	5,792	5,792	5,792	5,792	5,783	3,813	3,813	3,813	3,813	3,807
$p - value : A = B$			0.01	0.01	0.01			0.17	0.25	0.4
$p - value : C = D$				0.51	0.42				0.07	0.11

Table IA-III – Stock Market Participation and Beliefs – Logit Analysis

Panel A reports marginal effects from logit regressions of an indicator for stock market participation on 1- and 10-year expected returns, standard deviations, and respondent characteristics. Panel B reports marginal effects from logit regressions of stock market participation on the perceived likelihoods markets rise in the next year or decade, markets fall at least 20% in the next year or decade, and respondent characteristics. The independent variables are standardized (rescaled to unit variance, zero mean) so that coefficients can be directly compared. The penultimate row in Panel A (Panel B) reports p-values from a test of the hypothesis that the coefficient associated with the 1-year expected return (perceived likelihood markets rise in the next year) does not differ from the coefficient associated with the 10-year expected return (perceived likelihood markets rise in the next 10 years). The bottom row reports p-values from an analogous test for the near- and long-term standard deviation (Panel A) or likelihood markets fall at least 20% (Panel B). Standard errors are clustered at the respondent level. Significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

	(1)	(2)	(3)	(4)	(5)
Panel A: Stock market participation and return belief moments					
$E_{i,t}(R_{1yr})$	0.055***		0.020***	0.019***	0.019***
$E_{i,t}(R_{10yr})$		0.132***	0.124***	0.139***	0.063***
$\sigma_{i,t}(R_{1yr})$				-0.019***	-0.008
$\sigma_{i,t}(R_{10yr})$				-0.022***	-0.009
Wave fixed effects	Yes	Yes	Yes	Yes	Yes
Resp Characteristics	No	No	No	No	Yes
N	22,735	22,735	22,735	22,735	22,603
$p-value : E_{i,t}(R_{1yr}) = E_{i,t}(R_{10yr})$			0.01	0.01	0.01
$p-value : \sigma_{i,t}(R_{1yr}) = \sigma_{i,t}(R_{10yr})$				0.72	0.96
Panel B: Stock market participation and return belief probabilities					
$P(R_{1yr} > 0)$	0.137***		0.040***	0.051***	0.037***
$P(R_{10yr} > 0)$		0.164***	0.136***	0.127***	0.064***
$P(R_{1yr} < -0.2)$				-0.030***	-0.012***
$P(R_{10yr} < -0.2)$				-0.037***	-0.016***
Wave fixed effects	Yes	Yes	Yes	Yes	Yes
Resp Characteristics	No	No	No	No	Yes
N	41,308	41,308	41,308	41,308	41,028
$p-value : E_{i,t}(R_{1yr}) = E_{i,t}(R_{10yr})$			0.01	0.01	0.01
$p-value : \sigma_{i,t}(R_{1yr}) = \sigma_{i,t}(R_{10yr})$				0.37	0.57

Table IA-IV – Probability Beliefs and Trading

The first three columns report the pooled cross-sectional time-series average 1- and 10-year perceived likelihood markets rise measured at the beginning of the trading window and changes in 1- and 10-year perceived likelihood markets rise over the trading window (the average trading window is 93 days) for non-traders, buyers, and seller, respectively. Statistical significance in columns 2 and 3 are based on tests of whether the values differ from non-traders (column 1) and are based on standard errors clustered at the respondent level. The last two columns report marginal effects from multinomial logit regressions of indicators for buyers and sellers (relative to non-traders) on standardized 1- and 10-year beginning of trading window perceived likelihood market rise, standardized changes in 1- and 10-year perceived likelihood markets rise over the trading window, wave fixed effects, and the number of days since the respondent's previous long-form interview wave. The sample period covers 27 trading windows from March 2009 to January 2016. Panel A reports values for trading in retirement accounts and Panel B reports analogous results for trading in direct accounts. Tests that the coefficient associated with standardized beginning of trading window perceived likelihood markets rise in the next year equals the coefficient associated with standardized beginning of trading window perceived likelihood markets rise over the next decade are reported in the penultimate row of each panel. The final row of each panel reports analogous tests that the standardized coefficient on changes in 1-year beliefs equals the standardized coefficient on changes in 10-year beliefs. Significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

	Average Expectations			Logit Results	
	No trade	Buy	Sell	Buy	Sell
Description	(1)	(2)	(3)	(4)	(5)
Panel A: Trading in retirement accounts					
$A : P(R_{1yr} > 0)_{-1}$	49.538	53.953***	45.861***	0.012*	-0.017***
$B : P(R_{10yr} > 0)_{-1}$	63.696	69.843***	66.940**	0.013**	0.014***
$C : \Delta P(R_{1yr} > 0)$	0.363	1.529**	-0.149	0.011***	-0.011***
$D : \Delta P(R_{10yr} > 0)$	-0.432	-0.815	-2.195**	0.002	0.004**
N	13,998	1,617	920	16,535	
$p - value : A = B$				0.708	0
$p - value : C = D$				0.278	0
Panel B: Trading in direct accounts					
$A : P(R_{1yr} > 0)_{-1}$	48.381	53.652***	50.381	0.013	-0.008
$B : P(R_{10yr} > 0)_{-1}$	63.117	70.928***	68.823***	0.037***	0.019***
$C : \Delta P(R_{1yr} > 0)$	0.229	0.293	0.787	0.005	-0.001
$D : \Delta P(R_{10yr} > 0)$	-0.507	-0.986	-1.636*	0.014**	0.002
N	7,458	1,849	975	10,282	
$p - value : A = B$				0.191	0.018
$p - value : C = D$				0.374	0.599

Table IA-V – Income, Risky Share, Stock Market Participation, and Beliefs

Respondents are partitioned (each wave) into low ($<$ \$75,000, 64% of observations) and high ($\geq$ \$75,000, 36% of observations) income individuals. The first column reports coefficients from a regression of the fraction of wealth invested in equities on standardized 1- and 10-year expected returns (such that the coefficients can be directly compared) for low- and high-income individuals. The sixth (seventh) row reports p-values from tests of the hypothesis that the effect of near- and long-term expected returns are equal for low-income (high-income) individuals. The eight (ninth) row reports p-values from tests of the hypothesis that the effect of near-term (long-term) expected returns are equal for low- and high-income individuals. The second column reports analogous figures from a regression of stock market participation on standardized near- and long-term expected returns for low- and high-income individuals. Both regressions include wave fixed effects and standard errors are clustered at the respondent level. Significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

		%Stock	Stock market participation
(1)	$Low\ income\ E_{i,t}(R_{1yr})$	-0.177	0.027***
(2)	$Low\ income\ E_{i,t}(R_{10yr})$	7.084***	0.122***
(3)	$High\ income\ E_{i,t}(R_{1yr})$	1.87*	0.010
(4)	$High\ income\ E_{i,t}(R_{10yr})$	6.353***	0.093***
(5)	N	3,419	22,610
(6)	$p-value : Low\ E_{i,t}(R_{1yr}) = Low\ E_{i,t}(R_{10yr})$	0.01	0.01
(7)	$p-value : High\ E_{i,t}(R_{1yr}) = High\ E_{i,t}(R_{10yr})$	0.01	0.01
(8)	$p-value : Low\ E_{i,t}(R_{1yr}) = High\ E_{i,t}(R_{1yr})$	0.14	0.15
(9)	$p-value : Low\ E_{i,t}(R_{10yr}) = High\ E_{i,t}(R_{10yr})$	0.59	0.02**